

APPENDIX 4 – HERITAGE

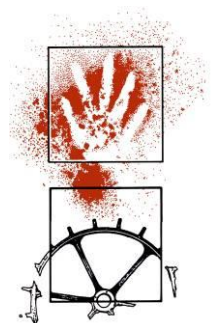
Heritage Reports



Scarred Trees WCP94, 95 and 99 Wilpinjong Coal Mine, NSW

Salvage Report

March 2017



**Navin
Officer**

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1. INTRODUCTION

1.1. Background

As part of the on-going management of Aboriginal cultural heritage sites subject to direct impact from the operation of the Wilpinjong Coal Mine, three scarred trees (WCP 94, 95 and 99), were the subject of salvage operations in December 2016 (Figure 1). Each tree had previously been the subject of archaeological and arboricultural interpretation, analysis and assessment (NOHC 2005, WCPL 2005, UTM 2013, NOHC 2016).

These sites are located within Area 17 as depicted in Figure 1. The clearance survey of Area 17 found eleven scarred trees, of these

- Nine trees were elected for 3D scanning program (WCP94-99, WCP101, WCP196 and WCP197).
- Five trees were elected for salvage program (WCP94, WCP95, WCP97, WCP98 and WCP99).
- Two trees were elected for possible salvage (WCP96 and WCP196).
- Two trees were elected to be removed from AHIMS scarred tree record (WCP100 and WCP169).

At the time of the current survey WCP101 and WCP 100 were also removed, WCP101 was 3D scanned but not elected for salvage and WCP100 was removed as the Aboriginal Groups determined that the scar was not Aboriginal. Additionally, WCP 96, 97, 98, 169, 196 and 197 did not need to be removed at that time.

The physical salvage of the three trees was a required action specified in the Wilpinjong Coal Mine – Aboriginal Cultural Heritage Management Plan (WCPL 2006). The conduct of the management plan is an action undertaken for the purpose of complying with Director General Requirements issued by the Department of Planning and Infrastructure for a Major Project (Part 3A – now repealed) under the Environmental Planning and Assessment Act 1979.

Previous scarred tree salvage operations conducted at the Wilpinjong Coal Mine had variously employed a methodology which attempted to maximise the recovery of the scarred portion of the trunk, and particular, the basal portion, by uprooting the tree by pushing it over mechanically. It was observed that although this avoided the need to employ a chainsaw in cutting the trunk close to ground level, it increased the risk of structural damage to the salvaged trunk. Demolition forces which proved difficult to control were the force needed to extract the tree from the ground, and controlling the subsequent fall of the trunk.

In response to these assessments a new salvage methodology was developed by NOHC for Wilpinjong Coal for which a major objective was the effective salvage of trunks considered to be structurally fragile and vulnerable to applied force. This methodology was utilised in March 2016 for the salvage of trees WCP89, 90 and 91. It was deemed to be very successful based on the result that all salvaged trunk sections were recovered without breakage or structural failure

This report documents the conduct of salvage of scarred trees WCP 94, 95 and 99 using the revised methodology, once again each tree remained in-tack during the salvage program.

Attached to the hardcopy of this report is a USB storage device containing a digital photographic record of the salvage operations.



1.2 Copyright, Restricted information and Confidentiality

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 OEHL 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

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

No information in this report has been classified as confidential.

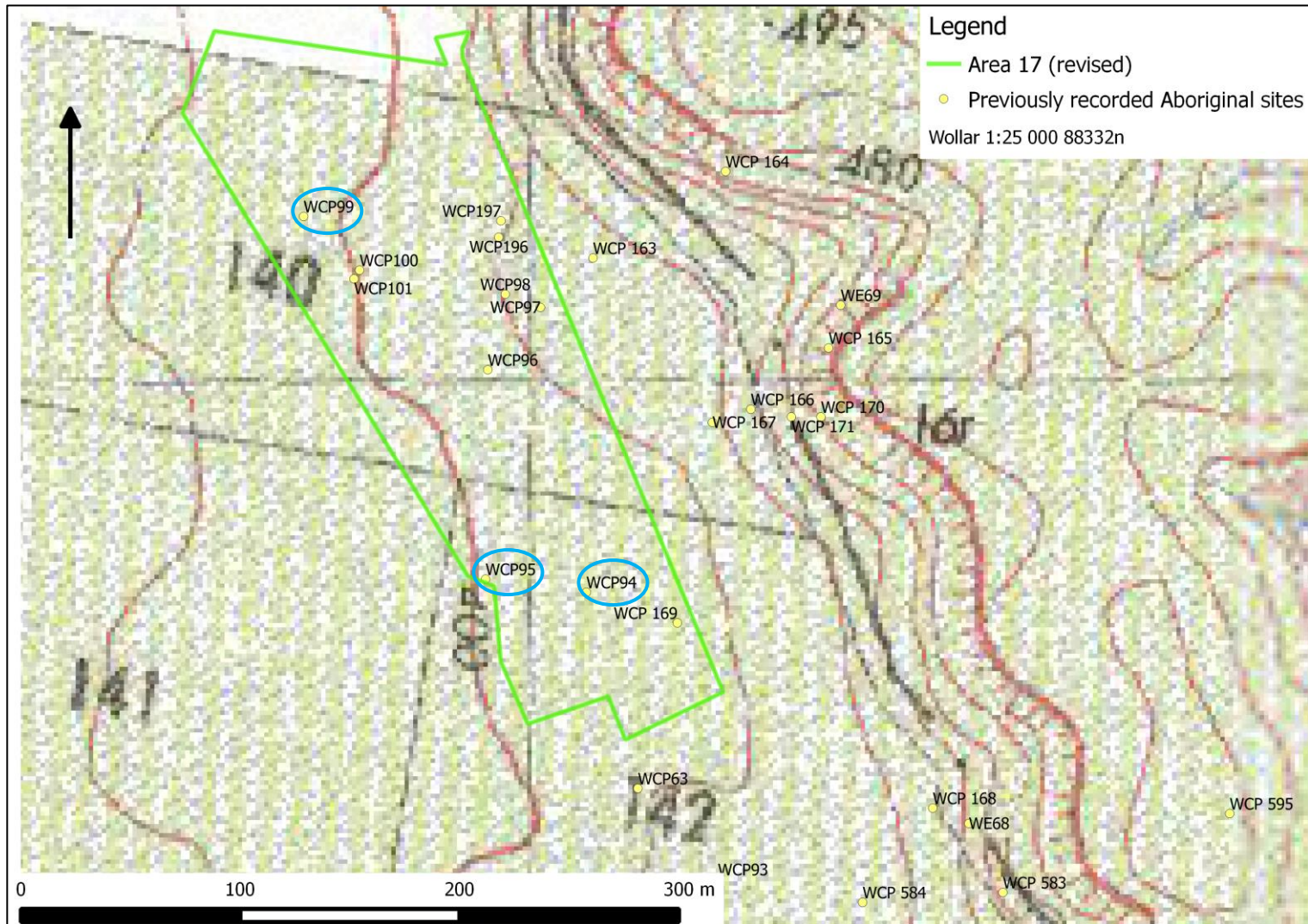


Figure1 General Location of (scarred trees) – Area 17 – Trees the subject to current salvage program circled (Base map Wollar 1:25 000 8833-2-N)



2. METHODOLOGY

2.1 Project Personnel

Personnel involved in the project were:

Nicola Hayes Archaeological salvage direction, report writing, general photography
Director, Navin Officer Heritage Consultants

Jo Dubden

Aboriginal stakeholder field representatives

Larry Foley Murong Gailinga Aboriginal and Torres Strait Island
Corporation

Shannon Foley Murong Gailinga Aboriginal and Torres Strait Island
Corporation

Coral Williams Warrabinga Native Title Claimants Aboriginal Corporation

Shaen Morgan North East Wiradjuri Company Ltd

Wilpinjong Coal Pty Ltd personnel included:

Clark Potter Senior Environmental Advisor

2.2 Field Equipment Utilised

General photography

Panasonic Lumix AVCHD Lite HD compact digital camera, 14 Mega Pixels 28mm Wide,
Model DMC FT2

Supplied by Wilpinjong Coal Pty Ltd

Elevated work platform HA260PX (Furneys Hire)

Terex AT20 Franna SWL 20T (Mudgee Cranes)

Excavator: 329DL CAT 32 tonne

Omnituff polywoven strap 19mm Hi Vis 06-NSAW75P indicative break strain: 1100kg webbing

Treated pine 'sleepers' 200mm x 75mm x 2400mm

Non-woven stable fibre geotextile

2.3 Field Program

The field component of the salvage program was conducted over the course of four days between 12th and 15th December 2016.

2.4 Salvage Methodology

The following procedure was followed in sequence for each tree scar:

1. Conduct inspection of condition and context of trees. Identify any areas requiring special attention or management including: structural integrity, fragile features, fauna, necessity for excavation,



access constraints, and requirement for machinery platforms. Determine the extent of the required salvaged portion of the tree trunk, ensuring that this area includes any suspected fully occluded sections at the top and bottom of the original scar, and an appropriate buffer distance.

2. Construct access tracks for Franna and elevated working platform access, as necessary.
3. Remove any superficial dirt or other debris which may obscure laser and photographic recording.
4. Conduct terrestrial and hand held 3D laser scanning survey, and create systematic High resolution colour photographic record. This was undertaken by internal Wilpinjong Staff.
5. Remove canopy branches and any upper sections of trunk not required for salvage, using chainsaw and personnel within an elevated working platform, Ensure that there is substantial length to allow the securing of the trunk to an overhead crane/franna without impacting the occluded and unoccluded sections of the scar. Care should be taken to protect and avoid impacting the scarred portion of trunk from falling limbs.
6. As necessary, use excavator to excavate around base of tree to provide enough clearance/depth for the safe use of a chainsaw and to gain enough clearance below trunk scar.
7. Secure the top of the remaining trunk to an overhead crane/franna. As necessary, slight upward tension can be applied by the crane/franna. During this process WCP94 was also wrapped with geotextile as it was deemed fragile due to the scar extending to the ground.
8. Review location of basal chainsaw cut, taking into consideration, area required for salvage, the necessity for a straight cut, or a scarf and hinge, slope and tendency to fall, and likely depth of wood prior to encountering termite nest or other internal non-wooden material. Remove obscuring dirt or other hazards.
9. Conduct chainsaw cut around base of, and below scarred section of trunk. The use of wedges may be beneficial. Where a scar extends close to or into the base of a tree, it is beneficial to salvage as much of the trunk as possible. In such cases a straight cut, utilising wedges, is preferable to employing a scarf and back cut and a hinge detachment.
10. As necessary maintain upward tension on the upper trunk using overhead crane/franna. Following completion of the chainsaw basal cut, detach and/or raise the salvaged section trunk away from the stump
11. With the use of a crane/franna, transport the salvaged section of trunk to a flatbed truck, ensuring that the scarred sections and any fragile features are not subject to direct impact
12. Secure trunks to truck for transport. Ensure that some form of pedestal or packing (such as the sleepers) are used between the trunk and truck surface.
13. Transport salvaged trunks to storage facility. Use crane/franna to remove from truck flatbed and position into storage facility, as necessary.



3. SITE DESCRIPTIONS

WCP94

GDA 774165.6417995

An assessment of WCP94 was undertaken by NOHC (2005) who determined the two scars with indistinct axe marks may be Aboriginal or European in origin. NOHC reports one upper straight row and one lower straight row of axe marks 210mm apart. In 2013, an additional assessment of WCP94 was undertaken by UTM who determined the origin of both scar wounds were likely to be Aboriginal.

Proposal for salvage of WCP94 was discussed with the Aboriginal representatives on site in April 2016 (Figure 2).

WCP94 was nominated for 3D scanning and the salvage program.



Figure 2 WCP94 scar 1 and 2



4.0 TREE ASSESSMENT - Assessment of Tree/s – Tree 15 / 94

Tree No. / Reference No. Genus & species Common Name	1. Age Class Y = Young M = Mature O = Over-mature (Senescent) 2. Age range of tree in yrs. approx. 3. Age range of wound in yrs. approx.	Condition G = Good F = Fair P = Poor M = Moribund D = Dead	Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Height in metres approx. / Crown spread approx. length x breadth metres / Crown spread orientation.	Trunk diameter in mm @ 1.4m, or as stated / Trunk diameter orientation.	Crown cover / Crown density approx. %.	SRIV Age, Vigour, Condition / Index Rating App A.
15 / 94 <i>Eucalyptus melliodora</i> A. Cunn. Ex Schauer Yellow Box	1. O 2. >350 - <400 3.1 100 - <150 3.2 150 - <200	F	F	20 / 12 Radial	1200 x 900, 1050 Av EW	90 90	OGVF - 5

Description - general

Eucalyptus melliodora A. Cunn. Ex Schauer - Yellow Box, is a medium-sized woodland to occasionally tall forest tree (Brooker and Kleinig 1999, p. 248, Boland *et al*, 2006, p. 498) with crown spread 8-25 m and a height of 10-30 m (Elliot and Jones 1986, p. 145) or 15-30 m, with a trunk diameter 1.0 m DBH or more, with trunk one third or half the tree height (Boland *et al*, 2006, p. 498). Yellow Box a high green density (GD) approximately 1230 kg / m³ and an air dry density (ADD) of 1030 kg/ m³ heartwood durable (Boote 1985, p. 257), resistant to *Lyctus borers*, heartwood hard, strong and very durable, termite resistant, used for heavy engineering, construction, poles, fencing material and railway sleepers (Boland *et al*, 2006, p. 498), burns well and is an excellent honey tree (Elliot and Jones 1986, p. 147). The durable wood is indicative of gradual deterioration since wounding.

Description - specific

This tree is senescent, 350 -<400 years old. Caulescent, trunk to 3.0 m approx., deliquescent, crown symmetrical with a wound on S side of trunk and as smaller wound on the N side.

Wound 1

Trunk wound, basal, broad oval, on south side, extending from ground – 2800 mm extending to 4000 mm as die-back along the trunk and 1250 mm at widest at 1400 mm. Wound face entire to heartwood, weathering medium as delignification, extending from ground to 2800 mm and then sapwood distally to 4000 mm approx. from more recent die-back, with a 1250 mm circumference at its widest at 1.0 m. Wound margins entire, apex acute and base truncate at ground. Initial wound margins not evident. Depth of margins: right 50 and left 50 mm. Width of margins: right 230 mm and left 190 - 230 mm proximal to distal.

This wound is expected to have affected approximately 60-70% of the trunk circumference *in situ*. The wound is expected to be 100 - <150 years old. From the dimensions and age of the tree, depth of the wound margins, medium weathering of its durable heartwood as delignification, the wound is likely to be of Aboriginal cultural origin.

Wound 2

Trunk wound, oval to triangular, on north side, extending from ground to 600 mm and 300 at widest at center. Wound face incomplete, detached and pronounced, weathering of heartwood high as delignification (Photograph 13.2) extending from ground to 370 mm and 90 mm at widest at center. Wound margins entire, apex acute and base truncate. Initial wound margins not evident. Depth of margins: right 450 mm and left 390 mm. Width of margins not evident.



This wound is expected to have affected approximately 10% of the trunk circumference *in situ*. The wound is expected to be 150 - <200 years old. From the dimensions and age of the tree, depth of the wound margins, high weathering of heartwood as delignification, the wound is the wound is likely to be of Aboriginal cultural origin.

Risks to tree

Damage from fire, fungal decay, termite damage and continued structural deterioration leading to the collapse of the trunk or first order structural branches.



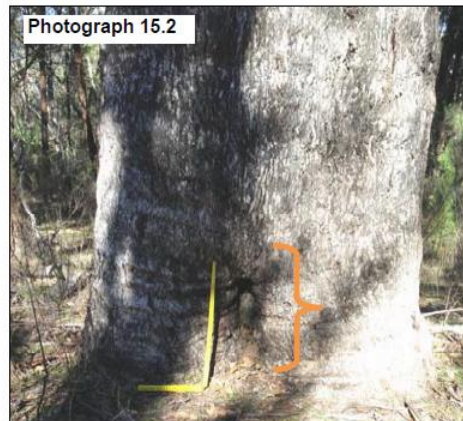
Photograph 15.0

Photograph 15.0 By Danny Draper. View to south of Tree 15 / 94, *Eucalyptus melliodora* A. Cunn. Ex Schauer – Yellow Box, indicated by red arrow.



Photograph 15.1

Photograph 15.1 By Danny Draper. View to north. Wound 1 shown with a yellow folding ruler extended to 1 m. Orange brace shows the extent of the wound up the trunk likely extended from its original length as die-back as the tree has declined.



Photograph 15.2

Photograph 15.2 By Danny Draper. View to south. Wound 2 shown with a yellow folding ruler extended vertically to 0.5 m. Orange brace shows expected extent of wound.



WCP95

GDA 774073.6418007

WCP95 was assessed by NOHC (2005) who determined the scar may be Aboriginal or European in origin with three upper straight rows and two lower straight rows of axe marks 215mm apart. In 2013 UTM also assessed the wound as likely to be an Aboriginal scar.

Proposal for salvage of WCP95 was discussed with the Aboriginal representatives on site April 2016t (Figure 3).

WCP95 was nominated for 3D scanning and the salvage program.



Figure 3 WCP95



4.0 TREE ASSESSMENT - Assessment of Tree/s – Tree 14 / 95

Tree No. / Reference No. Genus & species Common Name	1. Age Class Y = Young M = Mature O = Over-mature (Senescent) 2. Age range of tree in yrs. approx. 3. Age range of wound in yrs. approx.	Condition G = Good F = Fair P = Poor M = Moribund D = Dead	Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Height in metres approx. / Crown spread approx. length x breadth metres / Crown spread orientation.	Trunk diameter in mm @ 1.4m, or as stated / Trunk diameter orientation.	Crown cover / Crown density approx. %	SRIV Age, Vigour, Condition / Index Rating App A.
14 / 95 <i>Eucalyptus melliodora</i> A. Cunn. Ex Schauer Yellow Box	1. M 2. 200 - <250 3.1 50 - <75	F	D	18 / 10 Radial	750x550, 650 Av NE/SW	85 90	MGVF - 9

Description - general

Eucalyptus melliodora A. Cunn. Ex Schauer - Yellow Box, is a medium-sized woodland to occasionally tall forest tree (Brooker and Kleinig 1999, p. 248, Boland *et al*, 2006, p. 498) with crown spread 8-25 m and a height of 10-30 m (Elliot and Jones 1986, p. 145) or 15-30 m, with a trunk diameter 1.0 m DBH or more, with trunk one third or half the tree height (Boland *et al*, 2006, p. 498). Yellow Box a high green density (GD) approximately 1230 kg / m³ and an air dry density (ADD) of 1030 kg/ m³ heartwood durable (Bootle 1985, p. 257), resistant to *Lyctus borers*, heartwood hard, strong and very durable, termite resistant, used for heavy engineering, construction, poles, fencing material and railway sleepers (Boland *et al*, 2006, p. 498), burns well and is an excellent honey tree (Elliot and Jones 1986, p. 147). The durable wood is indicative of gradual deterioration since wounding.

Description - specific

This tree is mature, up to 200 - <250 years old. Caulescent, trunk straight – slightly crooked, to 4.0 m, crown deliquescent, symmetrical (Photograph 14.0).

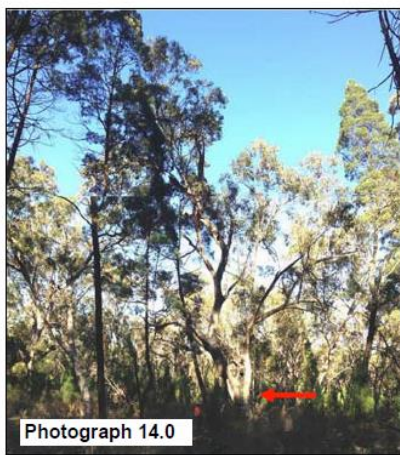
Wound 1

Trunk wound, oval, on east southeast side, extending from 450 – 2850 mm and widest at widest at center, but not recorded. Wound face entire, weathering of sapwood medium to heartwood with minimum weathering as delignification adjacent the right wound margin (Photograph 14.1) with lacerations 65 – 80 mm long consistent with steel axe cuts evident as 12 shallow cuts in 3 broken and uneven lines adjacent the wound apex and 7 shallow cuts in 2 broken and uneven lines adjacent the wound base with 2 cuts partially occluded by the right wound margin. Wound face extending from 470 – 2850 mm and 475 mm circumference at widest at center. Wound margins entire. Apex rounded and base rounded – acute. Initial wound margins not evident. Depth of margins: right 60 – 70 mm proximal to distal and left 70 – 90 mm, proximal to distal. Width of margins: right 100 mm and left 100 mm.

This wound is expected to have affected approximately 30% of the trunk circumference *in situ*. The wound is expected to be 50 - <75 years old. From the dimensions and age of the tree, depth of the wound margins, medium weathering of its durable heartwood as delignification, the wound is likely to be of Aboriginal cultural origin.

Risks to tree

Damage from fire, fungal decay, termite damage and continued structural deterioration leading to the collapse of the trunk or first order structural branches.



Photograph 14.0



Photograph 14.1

Photograph 14.0 By Danny Draper. View to west northwest of Tree 14 / 95, *Eucalyptus melliodora* A. Cunn. Ex Schauer – Yellow Box, indicated by red arrow.

Photograph 14.1 By Danny Draper. View to west northwest. Wound 1 shown with a yellow folding ruler extended to 1 m. Red arrows indicate 12 shallow axe cuts in the wound face distally adjacent wound apex, forming 3 broken and uneven lines, and 2 lines of axe cuts adjacent the wound base, comprised of 5 complete cuts and 2 cuts partially occluded by the right margin.



WCP99

GDA 773907.6418338

An assessment of WCP99 was undertaken by NOHC (2005) who determined the human made scar may be Aboriginal or European in origin. An additional assessment of WCP99, a Yellow Box approximately 250 - <300 years old, was undertaken by UTM (2013) who determined the origin of the scar (aged between 100 - <150 years old) likely to be Aboriginal.

Proposal for salvage of WCP99 was discussed with the Aboriginal representatives on site April 2016 (Figure 4).

WCP99 was nominated for 3D scanning and the salvage program.



Figure 4 WCP99



4.0 TREE ASSESSMENT - Assessment of Tree/s – Tree 24 / 99

Tree No. / Reference No. Genus & species Common Name	1. Age Class Y = Young M = Mature O = Over-mature (Senescent) 2. Age range of tree in yrs. approx. 3. Age range of wound in yrs. approx.	Condition G = Good F = Fair P = Poor M = Moribund D = Dead	Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Height in metres approx. / Crown spread approx. length x breadth metres / Crown spread orientation.	Trunk diameter in mm @ 1.4m, or as stated / Trunk diameter orientation.	Crown cover / Crown density approx. %	SRIV Age, Vigour, Condition / Index Rating App A.
24 / 99 <i>Eucalyptus melliodora</i> A. Cunn. Ex Schauer Yellow Box	1. O 2. 250 - <300 3.1 100 - <150	F	D	18 / 14 Radial	1100x700, 900 Av @ 600 EW	70 85	OGVF - 5

Description - general

Eucalyptus melliodora A. Cunn. Ex Schauer - Yellow Box, is a medium-sized woodland to occasionally tall forest tree (Brooker and Kleinig 1999, p. 248, Boland *et al*, 2006, p. 498) with crown spread 8-25 m and a height of 10-30 m (Elliot and Jones 1986, p. 145) or 15-30 m, with a trunk diameter 1.0 m DBH or more, with trunk one third or half the tree height (Boland *et al*, 2006, p. 498). Yellow Box a high green density (GD) approximately 1230 kg / m³ and an air dry density (ADD) of 1030 kg/ m³ heartwood durable (Bootle 1985, p. 257), resistant to *Lyctus borers*, heartwood hard, strong and very durable, termite resistant, used for heavy engineering, construction, poles, fencing material and railway sleepers (Boland *et al*, 2006, p. 498), burns well and is an excellent honey tree (Elliot and Jones 1986, p. 147). The durable wood is indicative of gradual deterioration since wounding.

Description - specific

This tree is senescent, up to 250 - <300 years old. Acaulescent, trunk to 0.9 m approx., deliquescent, crown comprised of 4 co-dominant first order structural branches (FOSB), orientation NE/SW, arrangement linear; 1 superior at center, acutely divergent and ascending to northeast; 3 inferior, 2 to NE and 1 to SW all acutely divergent and ascending; supporting approximately 45%, 10%, 35% and 10% of the live crown, respectively. Wound on south side of distal end of superior FOSB above trunk.

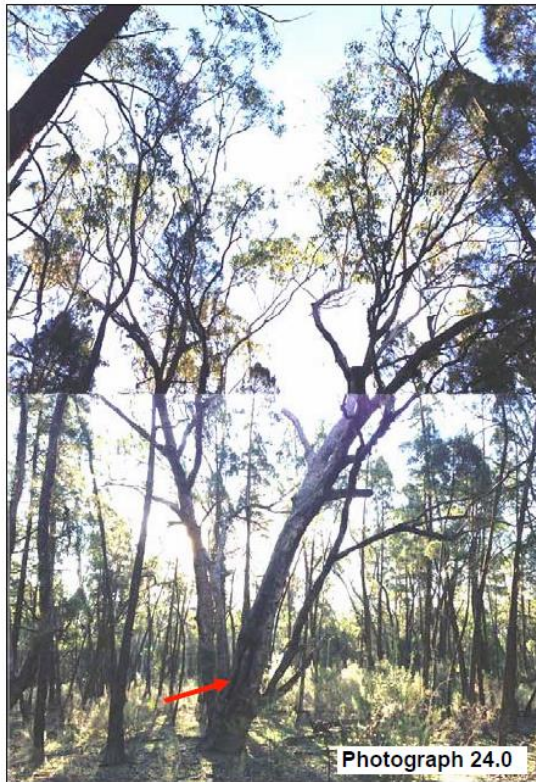
Wound 1

Branch wound, broad oval, on south side of superior first order structural branch (FOSB) at center of 4 FOSB, extending from 1000 – 2900 mm and 420 mm circumference at widest at 1500 mm. Wound face entire to heartwood with weathering medium as delignification (Photograph 24.1), extending from 1180 - 2460 mm and 420 mm circumference at widest at 1500 mm, separated from left margin exposing a hollow trunk and termite mud. Wound margins: right entire and left entire, apex acute and base rounded. Initial wound margins not evident. Depth of margins: right 160 mm and left 160 mm. Width of margins: not evident.

This wound is expected to have affected approximately 60% of the trunk circumference *in situ*. The wound is expected to be 100 - <150 years old. From the dimensions and age of the tree, depth of the wound margins and wound dimensions, medium weathering of its durable heartwood as delignification, the wound is likely to be of Aboriginal cultural origin.

Risks to tree

Damage from fire, fungal decay, termite damage and continued structural deterioration leading to the collapse of the trunk or first order structural branches.



Photograph 24.0



Photograph 24.1

Photograph 24.0 By Danny Draper. View to north of Tree 24 / 99, *Eucalyptus melliodora* A. Cunn. Ex Schauer – Yellow Box, arrow shows location of wound.

Photograph 24.1 By Danny Draper. View to north. Wound 1 with a yellow folding ruler extended to 1 m.



4. RECORD MANAGEMENT

The function of this report, as a baseline and archival record is associated with a number of priorities regarding its curation and storage. Standards and guidelines published by the NSW Heritage Office, now the NSW Office of Environment and Heritage, state that an archival record;

‘should be placed in public ownership, ie in a public library or archive or with a government department, in accordance with Article 28 of the Burra Charter. Ideally copies should be placed in a relevant library and with the owner of the item or client who commissioned the recording.’ (NSW Heritage Office 1998:14).

In order to comply with this requirement, it is recommended that Peabody Energy Australia consider the provision and/or storage of copies of this report, either in hard copy or electronic format as appropriate, to some or all of the following institutions and archives:

- Peabody Energy Australia archive
- Registered Aboriginal stakeholders
- NSW Office of Environment and Heritage
- Australian National Library
- Mid-Western Regional Council Library
- Mudgee Historical Society Inc archive



5. PHOTOGRAPHIC RECORD OF SALVAGE

5.1 WCP 94



WCP94 looking west prior to limb removal



WCP94 looking south



WCP94 during limb removal



WCP94 during limb removal



WCP94 after limb removal - south



WCP94 after limb removal - north



WCP94 wrapped in geotextile



WCP94 wrapped in geotextile being removed using franna



WCP94 laying on ground after removal



WCP94 base after removal



5.2 WCP 95



WCP 95 prior to limb removal looking west



WCP 95 prior to limb removal looking west



WCP 95 during limb removal looking west



WCP 95 during limb removal looking east



WCP 95 following limb removal looking west



WCP 95 following limb removal looking east



WCP 95 removal by franna



WCP 95 removal by franna



WCP 95 removal onto truck



WCP95 base after removal



5.2 WCP 99



WCP 99 prior to limb removal looking west



WCP 99 during limb removal looking west



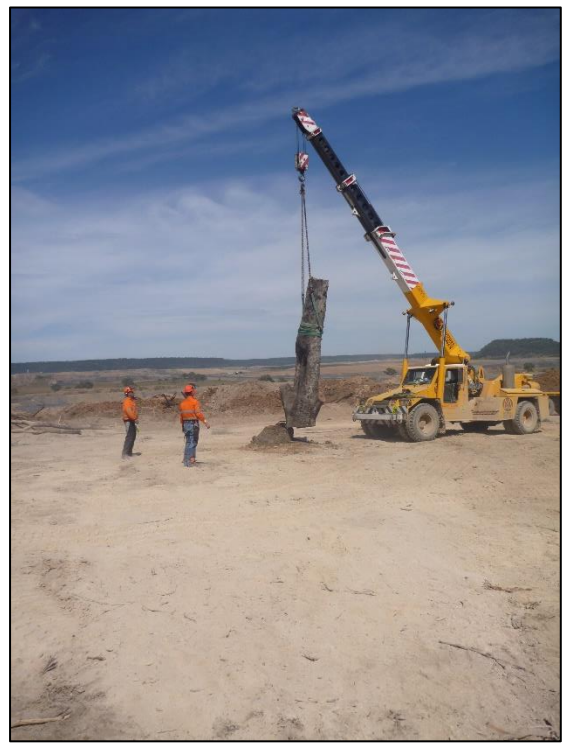
WCP 99 following limb removal looking north



WCP 99 following limb removal looking west



WCP 99 at base cut



WCP 99 removal by franna



WCP 99 removal onto truck



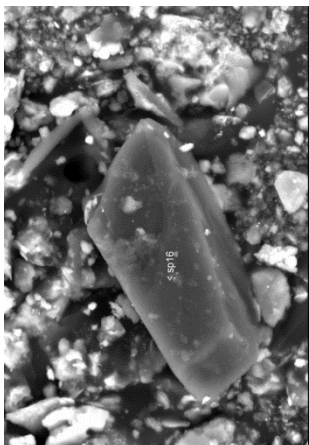
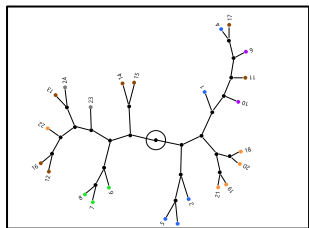
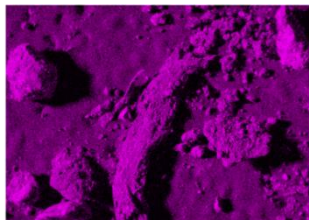
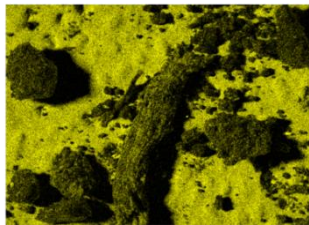
WCP99 base after removal



6. REFERENCES

- Navin Officer Heritage Consultants (NOHC) 2005 Wilpinjong Coal Project Aboriginal Cultural Heritage Assessment. Report to Resource Strategies on behalf of Wilpinjong Coal Pty Ltd.
- Navin Officer Heritage Consultants (NOHC) 2016 Wilpinjong Coal Mine Aboriginal Cultural Heritage Clearance Works Areas 2, 3 (part), 6, 14, Stem Pad, Pit 5 Monitor Station, Optic Fibre Route (part) and 17 (revised)
- NSW Heritage Office 1998 Heritage Information Series, How to Prepare Archival Records of Heritage Items. NSW Heritage Office, Parramatta.
- Urban Tree Management (UTM) 2013 Report: Arboricultural Assessment of Scarred Tree/s at Wilpinjong Coal Mine, Ulan Wollar Road Wilpinjong New South Wales. Report to Wilpinjong Coal Pty Ltd, Peabody Energy Australia. Reference 15134
- Wilpinjong Coal Pty Ltd. (WCPL) 2005 Wilpinjong Coal Project, Appendix F. Aboriginal Cultural Heritage Assessment. Prepared by Navin Officer Heritage Consultants Pty Ltd.
- Wilpinjong Coal Pty Ltd. (WCPL) 2006 Wilpinjong Coal Project Aboriginal Cultural Heritage Management Plan and North Eastern Wiradjuri Cultural Heritage Management Plan. Prepared by Wilpinjong Coal Pty Ltd.

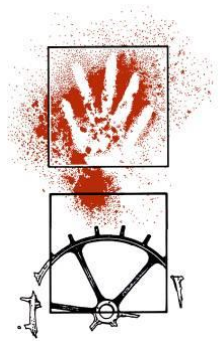
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Analysis of Dust and Other Surface Deposits within Aboriginal Rock Art Site WCP72, Wilpinjong NSW

Wilpinjong Coal Mine Aboriginal rock art monitoring and assessment program

June 2016



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Report Register

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

Issue No.	Notes/Description	Issue Date
v1.2	Draft for proponent comment	19 May 2016
v1.3	Final, following processing of proponent comments	27 June 2016

EXECUTIVE SUMMARY

This report outlines the methods and results of a study of accumulations of dark particles on panels containing Aboriginal rock art at large sandstone shelter site WCP72, known colloquially as Castle Rock (AHIMS number 36-3-0646). The site is the subject of a conservation management plan and is situated within the Wilpinjong Coal mine, 40 kilometres north east of Mudgee, NSW. Open cut coal mining has occurred up to 155 metres from the rock shelter.

During monitoring works at the site in 2014, it was noted that dust deposits on upward facing rock surfaces within the rock shelter appeared to be increasing, were darker in colour compared to baseline recordings made in 2006 and that these darker dusts were beginning to obscure the art at the site. It was suspected that the surface deposits responsible for the change in appearance may be aerosol dusts and that the dark coloured fraction contained coal, however, a scientific study was required to evaluate this possibility relative to a number of other causes. A combination of geochemical (Scanning Electron Microscopy [SEM] and portable X-Ray Fluorescence [pXRF]) and micro-morphological (SEM) techniques were used to investigate the composition of accumulated surface dusts within the rock shelter. The principle question of interest: *were the dark dust accumulations a result of the adjacent Wilpinjong Open Cut Coal Mine?* As part of the works, field based geochemical characterisations of features of interest at Castle Rock were also collected to inform a condition assessment.

The study found:

- 1) Dusts from the art panel at Castle Rock are predominantly in the aerosol particle range and contain coal. No metals or organic carbon particulates (generally associated with vehicle traffic) were observed.
- 2) Accumulation of dusts at the site is influenced by a number of complex factors including the interplay between increased airborne particles and geological weathering, particularly the deposition of mineral skins. These factors are acting together to exacerbate the visual impact of the dust. Settled aerosol particles 'stick' to the rock surface with the potential to become permanently incorporated/laminated within the accretions forming on the rock face.

The dusts currently sitting against the panels place the site at increased risk from secondary preservation threats including:

- The colonisation of micro-flora (lichens) due to the additional habitat provided by the dust;
- Thermal expansion and accelerated geological weathering, given that the moisture holding capacity and general humidity of the rock face are increased by dust particles retaining water;
- An increase in pH at the rock face, (both the sandy soils of the area and the coal seams are acidic) which would accelerate geological, particularly chemical, weathering; and
- The formation of secondary mineral deposits such as oxalates that may be catalysed by a combination of dusts and bacteria.

Globally, there is a very limited availability of scientific data on the effects of dust on rock art. Despite the discrete size and scope of this analysis, the findings of this study are therefore of considerable value within current rock art research, conservation science and cultural heritage management frameworks. The study is conspicuous among the small number of scientific programs undertaken, as Wilpinjong Coal have provided contextual information on aerosol dusts from their long-term air quality monitoring program.

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1. INTRODUCTION

1.1 Project Description and Aims

Navin Office Heritage Consulting (NOHC) recently conducted monitoring of three rockshelter sites containing art on behalf of Wilpinjong Coal Pty Ltd – WCP72 (Castle Rock), WCP152 and WCP153 (NOHC 2015). Compared to baseline recordings generated in 2006 (NOHC 2006) the following observations were made at Castle Rock:

“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...

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.” (NOHC 2015:19).

The analysis outlined in this assessment was designed to address the first two points through three specific research questions:

- I. What is the composition of the dust? and,*
- II. Are micro-organics such as lichen or fungi spores, present on the dust located on the shelter walls?*

The field based geochemical analyses undertaken also addressed a question alluded to in the NOHC 2015, that is:

- III. What is the composition and morphology of the shelter surface? Are mineral accretions present and if so, how are they contributing to the accumulation of dust?*

The report was commissioned by Wilpinjong Coal Pty Ltd.

1.2 Copyright

Copyright to this report rests with Wilpinjong Coal Pty Ltd 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 Restricted Information

Information in this report relating to the exact location of Aboriginal sites should not be published or promoted in the public domain.

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

1.4 Confidentiality

No information in this report has been classified as confidential.



2. METHODOLOGY

2.1 Contributors

This report was written by Dr Jillian Huntley, with editorial input from Dr Kelvin Officer.

2.2 Field Program

The field component of this project was conducted on the 26 October 2015.

The field team consisted of the following personnel:

Navin Officer Heritage Consultants team:

Dr Jillian Huntley	Archaeologist and specialist in the scientific analysis of rock art, archaeological pigments and rockshelter environments
Mr Stephen George	Geochemist, Access Macquarie Pty Ltd (Dept of Environmental Studies, Macquarie University)
Dr Kelvin Officer	Archaeologist, Director NOHC

The following Aboriginal stakeholder representatives, provided information and observed the field program:

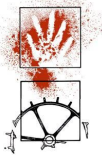
Ms Coral Williams	Warrabinga Native Title Claimants Aboriginal Corporation
Mr Robert Stewart	Wellington Valley Aboriginal Corporation),
Mr Shannon Foley	Murrong Gillinga Aboriginal and Torres Straight Island Corporation
Mr Larry Foley	Mudgee Local Aboriginal Land Council),
Mr Eric Hill	North East Wiradjuri Company Ltd, and
Ms Christine Maynard	Mudgee Local Aboriginal Land Council),

The following Wilpinjong Coal Pty Ltd personnel also participated:

Mr Clark Potter	Senior Environmental Advisor
Ms Tanietta de Laney	Native Title Claimant Liaison Officer



Figure 2.1 On-site discussion with Aboriginal stakeholders (left); Sample recovery (right).



2.3 Analysis

In order to address the three research questions posed, SEM and pXRF were used to describe the chemistry and micro-morphology of particles encountered within the Castle Rock shelter (data sets provided as Appendices A and B). Comparative samples taken from the surface of the rockshelter floor deposit at Castle Rock and potential sources of atmospheric dust within the Wilpinjong Coal Mine were also examined¹.

2.3.1 Portable X-Ray Fluorescence (pXRF)

In situ pXRF analysis was used to generate a spatial data set describing the inorganic geochemistry of the rockshelter wall, the surface of the rockshelter deposit and potential locations of atmospheric dust within the Castle Rock site. In addition, pXRF characterisations have provided data regarding the present condition of the shelter, specifically the presence of geological weathering products.

Elemental analysis was conducted using an Olympus Premium Innov-X X-Ray Fluorescent (pXRF) analyzer fitted with a 50kV, 4W Ta anode X-ray tube excitation source and a silicon drift detector at a resolution of 145eV. Analysis parameters of all exposures was conducted on 'soil mode' using a 3 beam sequence: (Beam 1) 50kV - 100 μ A, - (Beam 2) 40kV - 80 μ A and (Beam 3) 15kV - 80 μ A. Abundance data were produced by a 530 MHz CPU with integrated FPU and 128 MB RAM using a proprietary Olympus Digital Pulse Processor. A 3.6 μ m disc of clear (non-tainted) Mylar Thin-Film was applied to cover the pXRF's existing Kapton measurement window, with a negligible effect on elemental concentrations, as protection from the coarse rock surface and to limit cross contamination from dust. Spectra were collected for 180 analytic seconds².



Figure 2.2 Stephen George acquiring pXRF spectra at Castle Rock.

Field based pXRF spectra were collected in one analytical session during the inspection and sampling of Castle Rock on 26 October 2015. As a consequence, instrumental drift is not a concern (Johnson 2014). Nonetheless, a silica SiO₂ blank and three internal standards were measured prior to, and during, the site inspection in order to check instrument performance and quantify the amplitude of semi-quantitative results (Appendix A). pXRF spectra were obtained by placing the exposure window over the area of interest and manually holding the instrument during spectral acquisition (Figure 2.2). The location of pXRF spectra collected is detailed in Appendix C.

2.3.2 Scanning Electron Microscopy (SEM)

Dust samples were collect for further laboratory analysis by placing commercially available double sided tape onto areas of interest. SEM was conducted at the Newcastle University X-Ray Microscope Unit (EMX) on 20 November 2015³. A Zeiss Sigma VP FESEM instrument was used with a

¹ The morphology of grains can be a reliable indicator of their source. It is noted however that mineralogical analysis has not been undertaken and the chemical techniques used in this study do not have the resolution necessary to provenance coal to a particular seam/mining operation.

² Analytic seconds - the time taken to send a primary x-ray into the sample and receive a fluorescent x-ray back into the detector (not always equivalent to a second in time).

³ Due to policy changes at this facility, the EMX could no longer service non-university commercial users, after the initial scheduled session. As a consequence, a further analytic session for this project was-scheduled at another facility.



Bruker light element SSD EDS detector for chemical characterisation. A subsequent analytic session was undertaken at the Australian Centre for Microscopy and Micro Analysis (ACMMA), Sydney University facility, on 18 March 2016. A Zeiss EVO 50 SEM instrument with an Oxford AZtec EDS system was used, with a large area X-Max 80mm² silicon drift EDS detector. All samples were mounted on double sided carbon tape atop metal stubs and then carbon coated prior to analysis. Sample preparations for the Newcastle EMX session involved mounting thick accumulations of dusts on double sided tape directly onto metal stubs, followed by carbon coating. Sample preparation at the ACMMA Sydney involved dabbing pre-form carbon mounts for metal stubs onto the double sided tape in order to reduce the number of grains for analysis. These complementary strategies ensured that both a representative sample of grains, and their details, is described in this study.

SEM was used to produce high magnification images of particles at a micron scale. This magnification is necessary to investigate the presence and morphology of micro-organics such as lichen and fungi and/or mineral accretions such as amorphous silica skins, where present. SEM was also used to describe any evidence of the composition and morphology of the dust particles, to help determine their origin and possible relationship to the Wilpinjong Mine.

2.3.3 Statistical Analysis

To explore the relationship between geochemical profiles, pXRF data was scrutinised using multivariate techniques standard in chemometric investigations (Baxter 2003). Protocols developed specifically to apply pXRF within rock art investigations were used (Huntley 2014). Principle Components Analysis using a correlation matrix and (Ward's) Hierarchical Cluster Analysis was undertaken using JMP 12 (statistical analysis and data visualisation software) to observe trends in chemical characterisations and explore compositional groupings (Baxter and Johnson 2001; Glascock et al. 2004). A scatter plot of the first three principle components and dendrogram/constellation plot were used to visualise correlations between pXRF spectra.

2.4 Sampling

Excluding the internal standards, 27 pXRF spectra were collected at Castle Rock. Care was taken to minimise matrix and instrumental effects (potential sources of error in the chemical dataset – see Huntley 2012 for further discussion). Analyses were conducted in dry conditions to minimising moisture content/differences in sandstone matrix density (Liangquan et al. 2005). Care was taken to ensure 'best contact' between pXRF aperture and the sample, minimising attenuation from air and angles of incidence (de Boer et al. 1989; Forster et al. 2011). Mechanical degradation (L-drift, Johnson 2014) is not considered a factor in this study because analyses were completed in a single session.

pXRF samples were named in reference to the phenomena targeted. Dusts 1 to Dust 7 were taken at various places along the art panel including horizontal shelves and at the base of the rock face where dust accumulations are thickest. Oxalate 1 to O3 were taken on the horizontal surfaces of the shelter floor towards the northern end of the shelter where a thick, shiny, moist dust accretion resembling oxalate was observed. Mineral Accretion 1 to M5 targeted obvious evaporites and precipitates on the rock face (M2 and M3 are replicates within accretions to investigate chemical variance). F1 to F5 were taken on the floor/sediment deposit. S1 and S2 were taken in sandy deposits on the rock shelter ledges, within the shelter panels where particles were presumed to mostly derive from granular disintegration within the scalloped alcoves. W1 and W2 were taken on the rock panel wall in proximity to the location of suspected lichen growth. The 'soil' sample was taken from the spoil in front of the entrance to a wombat burrow, located on a slope around 150 metres east of WCP72 (GDA map reference: 771888.6417378).

Samples for SEM were selected on the basis of phenomena of interest and the density of dust accumulations.

ALS Environmental (Mudgee Office) provided filter papers from their dust monitoring program for comparison. A random selection of these, samples 7736, 7827 and 7835, were chosen for SEM



analysis. The ALS Environmental supplied filter papers were analysed along with J1, J3 and L1 at the ACMMA Sydney, while samples J2, J4, J5 and L2 were examined at the Newcastle XME unit⁴.

The location of samples is illustrated in detail in Appendix C.

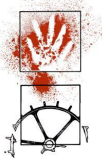
2.5 Acknowledgements

The authors acknowledge the facilities, and the scientific and technical assistance, of the Australian Centre for Microscopy and Micro Analysis research facility at Sydney University and Newcastle University EMX. We also acknowledge ALS Environmental for supplying filter papers from their Wilpinjong dust monitoring program.

Ken Mulvaney provided access to unpublished reports and advice regarding dust studies in the Burrup (Gillett et al. 2006). We thank Senior Research Fellows Maxime Aubert and Adam Brumm of Griffith University for their permission to cite as yet unpublished SEM studies of black rock art pigment in the Maros region of Southern Sulawesi.

We acknowledge the Bureau of Land Management, Price Field Office (Utah, USA) for access to recent dust studies in Nine Mile Canyon (Silver 2008, Itasca 2011) and in particular Michael S. Wolfe and Nate Thomas for their assistance. We thank Lynley Wallis for permission to cite Wallis et al. 2015.

⁴ Naming convention for SEM sample was chosen to contrast the pXRF dataset. J1 to J5 are various dust accumulations samples by Jillian Huntley, while L1 and L2 were taken from the vertical panel surfaces inside Castle Rock where lichens/micro-organics were presumed to be present.



3. ENVIRONMENTAL CONTEXT

3.1 Castle Rock

It is pertinent to consider the general environmental context of Castle rock in relation to identifying catalysts for recent (<2006) dust accumulation. The section below summarises the prevailing environmental conditions noted in the 2005 Environmental Impact Statement (EIS) for the Wilpinjong Mine (Resource Strategies Pty Ltd. 2005).

European land use of the area prior to establishment of the mine comprised mostly of pasture development for the grazing of sheep and cattle. Clearance of native vegetation occurred during the late 1800s and early 1900s. Sheep grazing was the primary use of the paddock enclosure surrounding Castle Rock until very recently, with the removal of all stock occurring in the past few years. The relatively sparse, low height vegetation surrounding the site is a result of both past clearing and grazing pressure, and a contributing factor in facilitating the transport of dust into the shelter space where it subsequently settles on the art panels. Remnant vegetation in the region is dominated by eucalypt woodland/forest (*E. Crebre*, *E. Moluccana*, *E eliodora*, *E. blakelyi*, *E. abens* and *E. punctata*) including black cypress pine and rough-barked apple.

The local climate has moderate seasonality, with higher rainfalls in the summer months. The expected annual rainfall is around 650 mm. November to March are the warmest months, with May through September the coolest. Daily temperatures peak at around 31^oC in January, with lows of around 2.5^oC in July. Relative humidity is highest in winter at around 84% in June, with lows of 56-60% recorded for December. Strong westerly winds dominate during winter, while easterly and westerly winds are common in spring and easterly to south-easterly winds are more common in summer and autumn. Evaporation rates are seasonally variable – highest in December/January (235-220 mm) and lowset in June/July (65-70 mm), with an annual average of 1,728 mm.

The Castle Rock shelter occurs in the Triassic Narrabeen Sandstones of the Sydney Basin, known locally as the Wollar Sandstone (including conglomerate). Siltstones, a likely pigment source (Huntley 2011, Huntley in press.), are known to occur to the south of the project area in the Goulburn River National Park and the Munghorn Gap Nature Reserve. Red and yellow podzolic soils are found on the mid to lower slopes surrounding and in from of Castle Rock shelter. Podzolic soils are poorly consolidated, moderately acidic and prone to erosion. Major bushfire events have been recorded in the Goulburn River National Park at 40 year intervals. Bushfires are most common in the hot dry weather in summer months in association with strong north-westerly winds.

The Environmental Protection Authority has sought to limit maximum increases in dust from new developments to 2 g/m²/month, and total dust deposition from all sources to 4 g/m²/month. The assumed background level for the Wilpinjong project, prior to mining, was 1.5 g/m²/month, which is the average deposition from the six collection sites for the 2005 EIS monitoring period. The EIS concluded that the local sources of emissions for the project area were typical of rural area (remote from industry): road traffic, community and agricultural activity, including periodic bushfire and regional dust storms (Holmes Air Sciences 2005).

3.2 Broader context

In September 2009 a major dust storm blanketed the south-east of Australia in a distinctive plume originating in arid central Australia. It came to be referred to as the 'Red Dawn' dust storm (De Deckker et al. 2014), (Figure 3.1). In broad terms, draught conditions predominated over south eastern Australia between 2006-2012 (BoM 2016). Dust storms are not uncommon occurrences – though the size of the 2009 'Red Dawn' storm was exceptional. A large dust storm had already hit the south-east of Australia, including the top of the Sydney Basin, in 2002 (De Deckker et al. 2008). This event is prior to the noted dark dust accumulations observed as part of site monitoring at Castle Rock after 2006 (NOCH 2006). Analysis of particles from the 2002 dust storm with Scanning Electron Microscopy (SEM) revealed morphologies typical of airborne particles, with larger grains coated in smaller angular to sub-angular particles, or agglomerated masses of smaller angular and sub-angular particles which act as a single larger grain (De Deckker et al. 2008:7, their Figure 2).



The 'Red Dawn' event is likely to have had an impact over and above the irregular but not uncommon dust storms that would have affected the area in the past. The 2009 dust storm might be an additional contributing factor in the accumulation of dusts at Castle Rock. As the name suggests, the 'Red Dawn' storm carried distinctive red coloured dusts from central Australia across the eastern seaboard. The dusts causing adverse visual impacts at Castle Rock are, however, noted as being dark brown to black in colour.

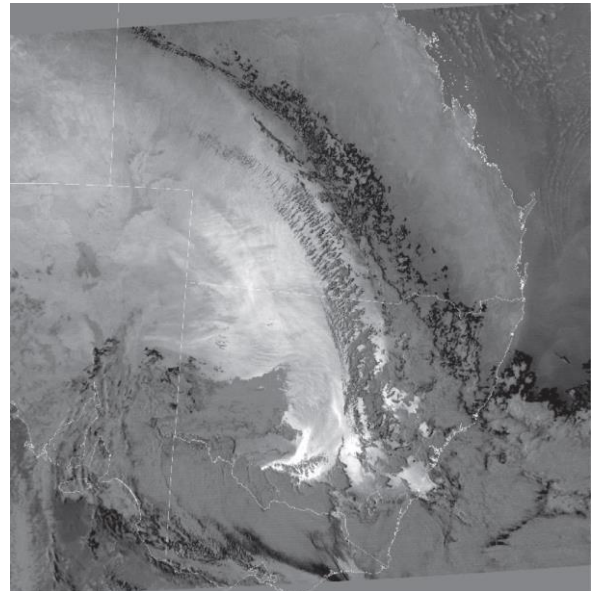


Figure 3.1 Satellite image showing the dust in front of a cloud band on the MODIS Terra overpass at 22:05 AEST 22 September 2009 – After Dedecker et al 2014, their Fig. 6.



4. LITERATURE REVIEW

4.1 Dust and Rock Art

There is little evidence globally for the use of mineral carbon (graphite⁵) as a rock art pigment⁶. Most pigment characterisation research has found 'carbon black', a mix of plant charcoal, was used to produce pictographs (Bonneau 2012). In the south of the Sydney Basin previous research has found evidence that colourants, including charcoal, were mixed with clay to produce rock art composite paints, some charcoal grains able to be speciated to *Eucalypts* (Huntley et al. 2011). The most relevant work undertaken in Australasia is a recent unpublished study of Pleistocene pigments from the Indonesian island of Sulawesi (Aubert et al. 2014) that revealed graphite pigments, presumably coal, were used by early modern humans⁷. No black coloured Aboriginal art graphics have to date been recorded at Castle Rock (NOHC 2006). Graphite, if present at Castle Rock, is therefore extremely unlikely to have a prehistoric cultural origin.

Dust is a major concern in conservation. In relation to rock art sites, at the very least, dusts can settle on a surface 'soiling' a panel, damaging visual amenity. In some instances this impact can become permanent if the dusts become entrapped in the site's fabric (encased by mineral skins). In some cases, dusts can be chemically reactive and even corrosive. Of particular concern are cases where deposited dusts are hygroscopic, and as a result of their water retention, create environments for micro-organisms. All of these factors can catalyse mechanical and chemical processes that deteriorate stone (Silver 2008:7). Reduction of visual amenity and the destruction of cultural landscapes posed by mining activity have also been recognised as threats to Aboriginal rock art sites by UNESCO (UNESCO1999).

The most numerous studies in regard to the effects of dust on rock art panels have been conducted in Europe over the last 40 years and relate to the parietal art of the Upper Palaeolithic (Silver 2008:12). As has been concluded by Silver, these studies deal with such significantly different geologies and microclimatic environments that they are not a useful analogy for the open, siliceous geological environments such as the Narrabeen Sandstones of the Sydney Basin and of the Castle Rock shelter. The few relevant detailed, scientific studies of dusts deposited on top of rock art in silicate geological environments are summarised below and provide a context for the present investigation. Most of the previous studies are local as Australian researchers have long recognised the threats to rock art preservation that dusts can pose (Morwood 1994, cited by Silver 2008:13).

4.2 Studies of Aerosol Dust in Rock Art Research

4.2.1 Split Rock 1994 (Watchman 1998)

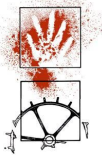
The paintings at Split Rock art site in Laura, Cape York Peninsula, Queensland, had long been observed as being obscured by dusts. Though it was assumed that the source of these dusts was the floor of the rock art site, which is a well-known and much visited tourist attraction, scientific studies conducted by rock art conservator Alan Watchman in 1994 showed that the main source of aerosol dust was in fact a nearby road.

Watchman deployed improvised dust collection traps at intervals 10 and 50 meters from the unsealed road, to the east and west of the rock art panel, and used commercially available masking tape to collect a sample of loose dust from inside the site. Scanning Electron Microscopy (SEM) revealed that the morphology of the dust particles was typical of aerosols, with small, solid clay grains encasing a larger quartz rich composite including calcium and feldspar grains. Watchman found much carbon rich grains associated with the vehicle track. Their morphology of complex and

⁵ Graphite is used here as a blanket term for mineralised carbon.

⁶ No published accounts were found during extensive the literature review undertaken.

⁷ J. Huntley unpublished SEM data.



contorted shapes suggested organic molecules rather than carbonates or graphite. He concluded these were the remnants of diesel fuel, and their coating by smaller clay particles was further evidence that they had originated from the unsealed road. These particles were found in greatest numbers in close proximity to the road, but also found on shelves on the art panel at Split Rock. It was strongly recommended that the road be bituminised to prevent dust accumulation over the rock art panels at Split Rock.

4.2.2 Burrup Peninsula 2004-2005 (Gillett et al. 2006)

The CSIRO collected data at eight locales along the Burrup Peninsula, including adjacent to industrial hubs, to measure gas and dust emissions in relation to the thousands of Aboriginal engravings found in the area. Aerosol particulates were measured monthly between August 2004 and mid-September 2005. Chemical analysis (Particle Induced X-Ray Emission spectroscopy - PIXE) was undertaken on a sample of particulates, though this did not measure the organic fractions or elemental carbon (Gillett et al. 2006:45). Though dust deposition rates were notably higher in the south of the Burrup as a result of industrial activity, the CSIRO concluded that "... deposition fluxes observed are not of the magnitude which is expected to cause any deterioration of the rock on the Burrup Peninsula" (Gillett et al. 2006:75).

Dust deposition was measured using passive 'frisbee type' gauges initially at six monthly and then at three monthly intervals for the same period (Aug 2004 to mid-September 2005). The results, including the control sites, were continually inconsistent, and therefore data on deposition was inferred from aerosol spectrometers. These 'one off' measurements were taken in September 2005 using a GRIMM aerosol spectrometer for short periods of time (~1 minute) at each of the eight study sites to determine particle size in the aerosol dusts. Size ranges from 0.3 μm – 20 μm were recorded along the Dampier Archipelago, with no particles greater than 10 μm observed. Following the modelling of a number of assumptions, the dust deposition rates were calculated from the aerosol spectrometer data. These showed a significant increase in deposition rates from locations in the southern Burrup associated with industrial complexes when compared to the 'control' sites in the north. Mass concentration values calculated for the two control sites in the north measured 9 $\mu\text{g m}^{-3}$, while the southern sites were around 30 $\mu\text{g m}^{-3}$, with the exception of the site closest to the iron ore operations, which measured 40 $\mu\text{g m}^{-3}$ total suspended particles. Similarly, average dust deposition rates of around 10 mg m^{-2} per day were calculated for the two northern control sites, with 32 mg m^{-2} per day estimated for southern sites in the industrial zone, again with the exception of the site closest to the iron ore operations (loading facility), which measured 68 mg m^{-2} per day (Gillett et al. 2006: 51).

4.2.3 Nine Mile Canyon (Silver 2008)

Conservation scientist Constance Silver was commissioned to undertake a study of the dusts accumulating on rock art sites in the Nine Mile Canyon, Utah, USA. These deposits were thought to be the result of industrial activity (a gas hub) in the area. Previous Australia studies by Watchman 1998 and Gillett et al. 2006 were described by Silver as the only existing relevant work available and she consequently described her investigation as pioneering research (2008:2).

In Nine Mile Canyon, Silver found that dust from the increased vehicle traffic was a significant factor in accumulations on the rock art panels (particularly 'open' engraving sites on horizontal rock platforms). Dust was deposited by plumes created by the vehicles on the unsealed roads, both prior to and as a result of the gas project operations. Magnesium chloride, used for dust abatement on the unsealed vehicle roads, was determined to be of more concern to rock art preservation as it is a salt that will deliquesce at low humidity, pulling ambient moisture from the air, then remain wet (Silver 2008: 32). The major concern was that increased mechanical weathering from wetting and drying cycles (increased shrink and swell mechanically breaking surfaces apart), would be a possible 'vector for deterioration'. Silver recommended that further scientific studies be undertaken to determine the composition of the dust accumulations at rock art sites, specifically quantifying the amount of magnesium chloride reaching the art.



4.2.4 Nine Mile Canyon (Itasca Consulting Group 2011)

Following on from Silver's detailed preliminary study, the Bill Barrett Corporation (an industrial gas firm) commissioned Itasca Consulting Group (ICG), to conduct a scientific investigation of dust from four of the five rock art sites included in the initial investigation. ICG's study also included one additional site identified by the regulatory agency responsible for Nine Mile Canyon (the Bureau of Land Management, Utah). Dust was sampled using Petri dishes as catchments and by aqueous extraction (removing dust in water irrigation). ICG found that the amount of dust on the rock art panels was as highly variable as the road and control samples. It was concluded that the magnesium and chloride found in the rock art samples was derived from geological minerals rather than commercial grade magnesium chloride compounds ($MgCl_2$ not $MgCl_2 \cdot 6H_2O$) used in dust suppression. The X-Ray Diffraction, SEM analysis (including energy dispersive X-Ray analysis – EDS) and statistical modelling showed that the dusts from the rock art panels bore more similarity to geological sediment samples rather than those associated with the roads. ICG concluded that the dusts on the rock art panels were deposited in association with gypsum minerals.

4.2.5 Central Pilbara 2015 (Wallis et al. 2015)

In a novel recent study, Wallis Heritage Consulting undertook an investigation of the painted rock art of the central Pilbara, Western Australia. As part of a detailed recording and condition assessment program Wallis et al. 2015 included analysis of data from a large scale, field based, portable X-Ray Fluorescence (pXRF) analysis program. While the Banded Iron Formations of north-western Australia might seem a contrast to the sandstone landscapes of the northern Sydney Basin of NSW, both are dominantly silicate environments and both rock art assemblages have been created using dominantly clay mineral pigments. In the central Pilbara, dusts are a significant threat to the preservation of rock art near iron ore mining operations. One such site (MACC-FS20) investigated in 2015 had thin accumulations of dust and mineral skin encrustations in small pockets and on short narrow ledges on the rock art panels. Micro-organic activity on the damp panels was concluded to have the potential to form oxalate, however the occurrence of this mineral is yet to be confirmed through invasive (though minimal destructive) sampling and laboratory analysis. The non-invasive pXRF characterisation of dusty accretions at the site indicated further investigations for oxalates would be fruitful. All assays showed consistent alumina-silicate and clay abundances (Al of 6.3% to 13.92%, Si of 15.6% to 26.6%). Two of the four assays produced chemistry profiles consistent with geological salts/gypsum (S of 7.5% and 23.6%, Ca of 5.4% and 7.8%), while one of the alumina-silicate assays showed elevated phosphorus in the order of 9.44%, which may indicate bacterial activity/microflora, the aforementioned catalyst for the production of oxalidic acid (Watchman 1991; Watchman et al. 2005; Hess et al. 2008; Wallis et al. 2015).

4.2.6 Adverse Impacts to Rock Art from Aerosol Dusts in Coal Mining

Only one case study was found as part of the extensive literature review undertaken for this assessment, which related specifically to effects on rock art from coal mining. Dust impacts from the Vele Colliery in South Africa, operated by Limpopo Coal (Pty) Ltd, formed part of a legal challenge to their operations which saw the mine temporarily shut in 2001/12. Evidence for the impact of dust from the coal mine was anecdotal however, and no data is available. Scientific work has not been undertaken and any ongoing impacts to the Mapungubwe cultural landscape, which incorporates pigment rock art on sandstone cave surfaces, remain unknown (Prof. Ben Smith [UWA] pers. com.).

4.2.7 Road Dusts

Bucko et al. 2011 demonstrated with SEM that road dusts are angular in shape, composed mostly of iron, chromium and nickel. They also showed, quite convincingly, that dust yield and abundance of trace elements (metals) in dusts decreased with distance to the bituminised roads/vehicle traffic studied (a highway and a contrasting rural road).



5. RESULTS

5.1 pXRF (including statistical modelling)

A total of 32 elements were measured by pXRF ranging from phosphorous to uranium.

Ogburn et al.2013 have demonstrated that taphonomic signatures (the weathering process effecting stone) are primarily found in light z elements (chemistry lighter than and including Fe). Therefore profiles from phosphorous to iron were interrogated separately (Figures 5.1 and 5.2 below), whereas entire element profiles, including small peaks of transition metals and other trace chemistry, were modelled using statistical treatments (cluster and PCA, Figures 5 and 6).

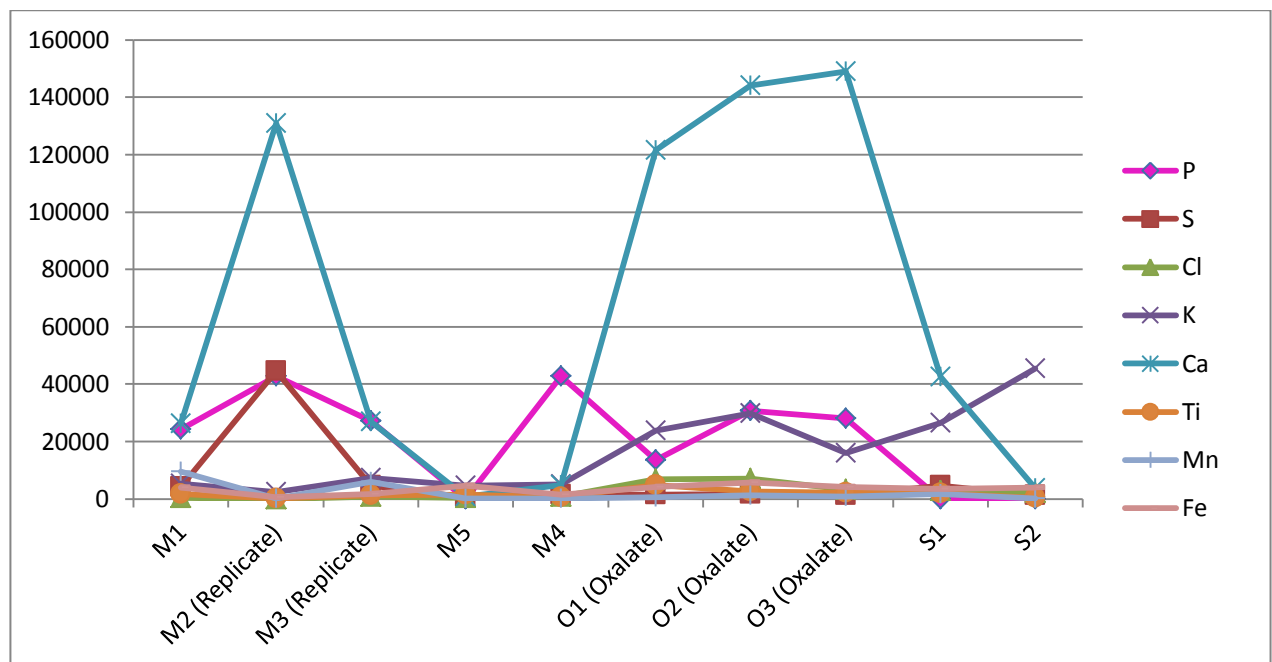


Figure 5.1 Line chart of major pXRF chemistry (reported in ppm) at Castle Rock.

Spectra Mineral accretion 1 (including 2 replicates) and M4 have very high phosphorous yields (2.42 – 4.27%), whereas Oxalates 1 to 3 have high phosphorous abundance (1.35-3.08%) and Dust 4 has a moderate phosphorous peak (7156 parts per million [ppm]). These are interpreted as evidence for micro-organisms on the rock face (lichen and/or bacteria) (Figure 5.1). None of the floor spectra returned phosphorous (Figure 5.2).

Sulphur is persistent in the mineral accretion and oxalate spectra, but is generally higher in M1-5. M2 has an anomalously high yield of sulphur (4.45%) which corresponds to a high calcium yield (13.09%). This is a general, though less pronounced trend, for all the M spectra (high calcium with moderate to high sulphur), indicating geological salts, such as gypsum, are present on the rock face (Figure 5.2 below). Calcium is more abundant in the locations where the presence of oxalates is suspected and this correlated to slightly lower sulphur yields (~1000ppm in the oxalate loci, ~4000 ppm in the mineral accretions, see Appendix A).

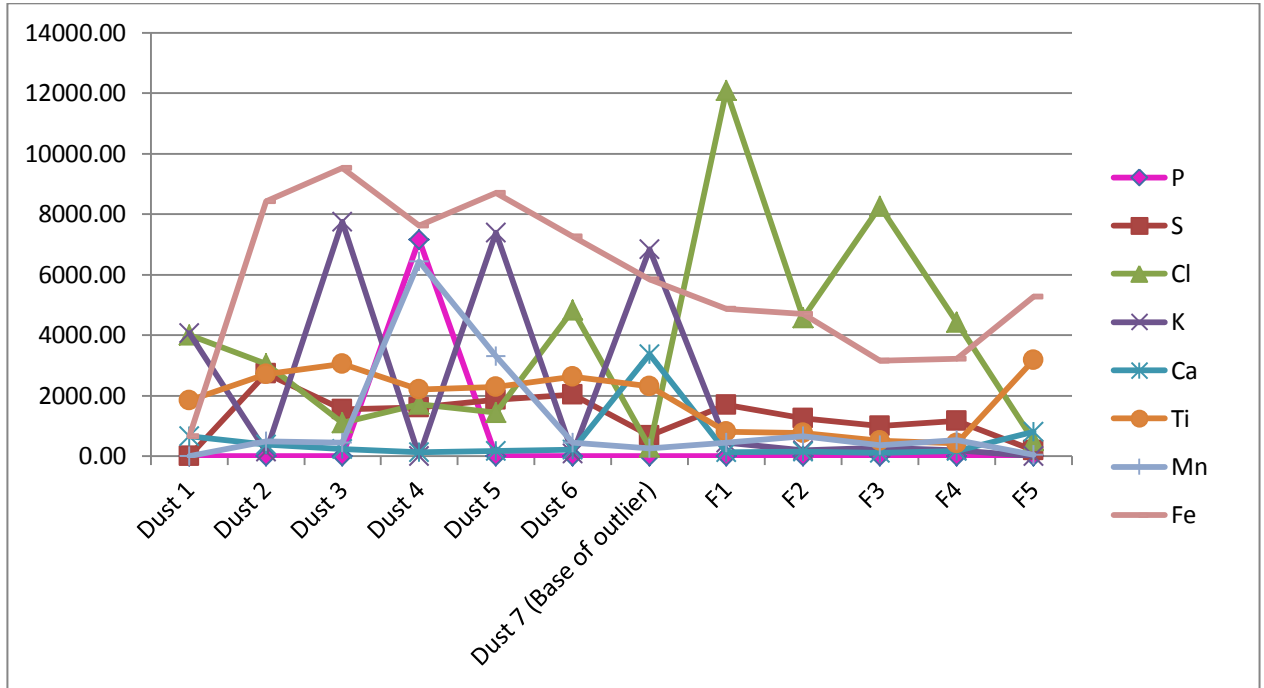


Figure 5.2 Line chart of pXRF ppm chemistry at Castle Rock associated with geological weathering processes (taphonomic indicator elements, Huntley 2012).

In the shelter floor samples there are lower yields of iron and sulphur. These elements are more abundant on the rock face than in the sediments. Conversely, the greater abundance of chlorine in the floor deposits is interpreted as reflecting a greater abundance of detritus resulting from cavernous weathering. This is because chlorine (along with sulphur, potassium and calcium) have been identified as components in granular disintegration in rock shelter environments within the Sydney Basin sandstones (Lambert 1980). Sulphur, though present in moderate relative abundance throughout, is more prevalent on the rock face. As previously stated, this is seen as a reflection of evaporite salts.

Some divergence between the spectra was seen in the hierarchical cluster analysis (Figure 5.3). However, the tests associated with the Principle Components analysis (Figure 5.4) indicate that the variation in dust composition within the site is not statistically significant (Table 5.1). This is interpreted as supporting evidence that the dust across the site has the same source or (more likely) the same sources. However, the chief cause of the statistical insignificance is the small sample population.

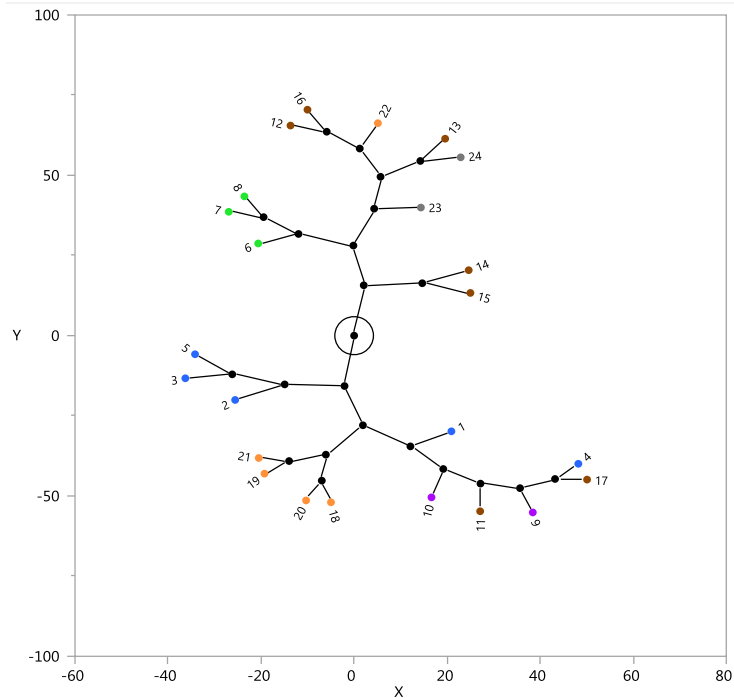
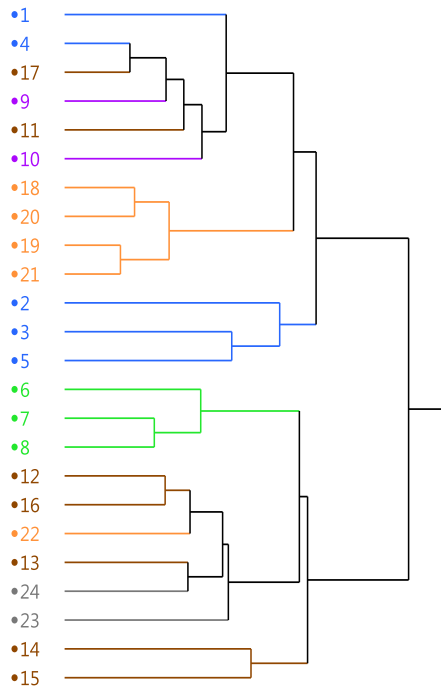


Figure 5.3 Dendrogram (left) and Constellation Plot (right) of Wards Hierarchical Clustering. Samples in the graph are one below numeral the pXRF IDs provided in Appendix A. Blue = mineral accretion spectra (NB 1-3 are replicates within the same accretion); Green = suspected oxalate; Purple = S1 and 2 on dust shelves; Brown = dust 1-7 within the shelter; Orange = floor of the shelter; Grey = W1 and 2 suspected lichen.

Table 5.1 Summary of the first three principle components of pXRF data analysis

Number	Eigenvalue	Percent	Cum. Percent	ChiSquare	DF	Prob>ChiSq
1	7.1487	23.829	23.829	212.275	432.440	1.0000
2	3.9563	13.188	37.017	139.734	416.246	1.0000
3	3.1208	10.403	47.420	100.012	394.091	1.0000

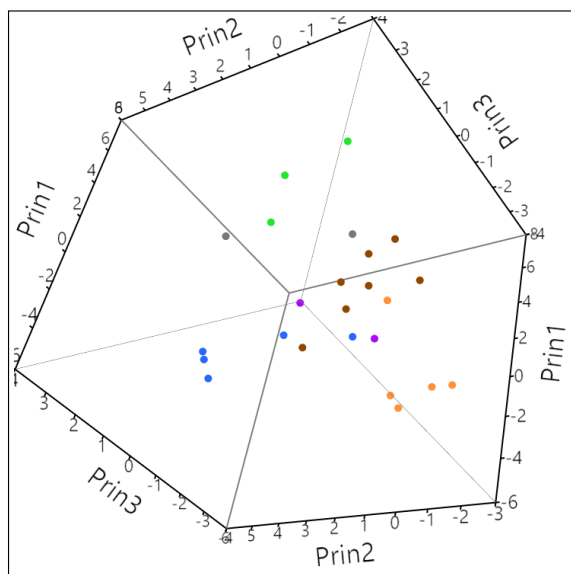


Figure 5.4 3D Scatterplot of the first three Principle Components of all 32 measured elements. Blue = mineral accretion spectra (NB 1-3 are replicates within the same accretion); Green = suspected oxalate; Purple = S1 and 2 on dust shelves; Brown = dust 1-7 within the shelter; Orange = floor of the shelter; Grey = W1 and 2 suspected lichen.



The multivariate analysis revealed an overall trend for the floor and mineral accretion spectra to group together. This is interpreted, chiefly, as chemical evidence for geological weathering (Huntley 2012). It should also be noted that both carbon and silicon are outside of the detection limits of the pXRF used. This means that the deeper layers of the dusts below the surface are likely better represented pXRF analyses, in contrast to the SEM which sampled the top, loose fraction of the dusts. Interestingly, the pXRF spectra of suspected oxalates grouped tightly, close to the suspected lichens and one other spectra on the wall of the shelter (dust). This indicates that micro-organic activity is effecting the chemistry of the rock face (Chiari 2004; Tratebas 2004).

The pXRF full dataset is provided in Appendix A.

5.2 SEM

5.2.1 Castle Rock

A consistent presence of aerosol particles around or less than 20 μm in size was observed (De Deckker et al. 2008, Silver 2008). The larger grains within these have block/crystalline morphology and were determined by EDS to be pure carbon (Figure 5.5). These pure carbon grains display a morphology consistent with sub-bituminous coal (Akinyemi et al. 2012, their Figure 7b:58).

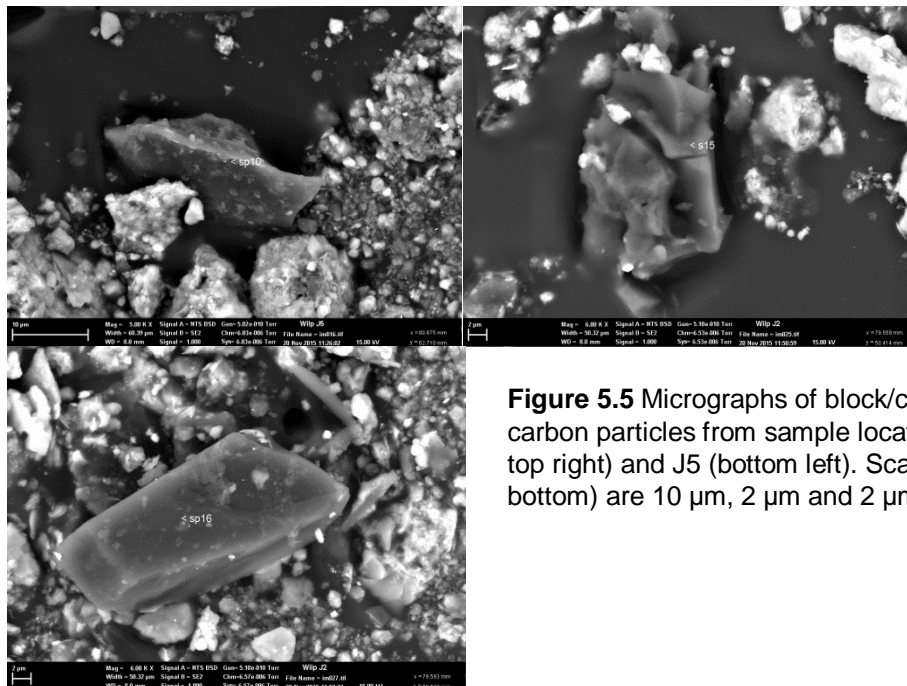


Figure 5.5 Micrographs of block/crystalline morphology carbon particles from sample locations J2 (top left and top right) and J5 (bottom left). Scale bars (top left to bottom) are 10 μm , 2 μm and 2 μm .

Notwithstanding the consistent presence of aerosol carbon, the typical morphology of the dust was larger quartz and carbon grains with smaller sediment particles adhered to the outside (Figure 5.6).

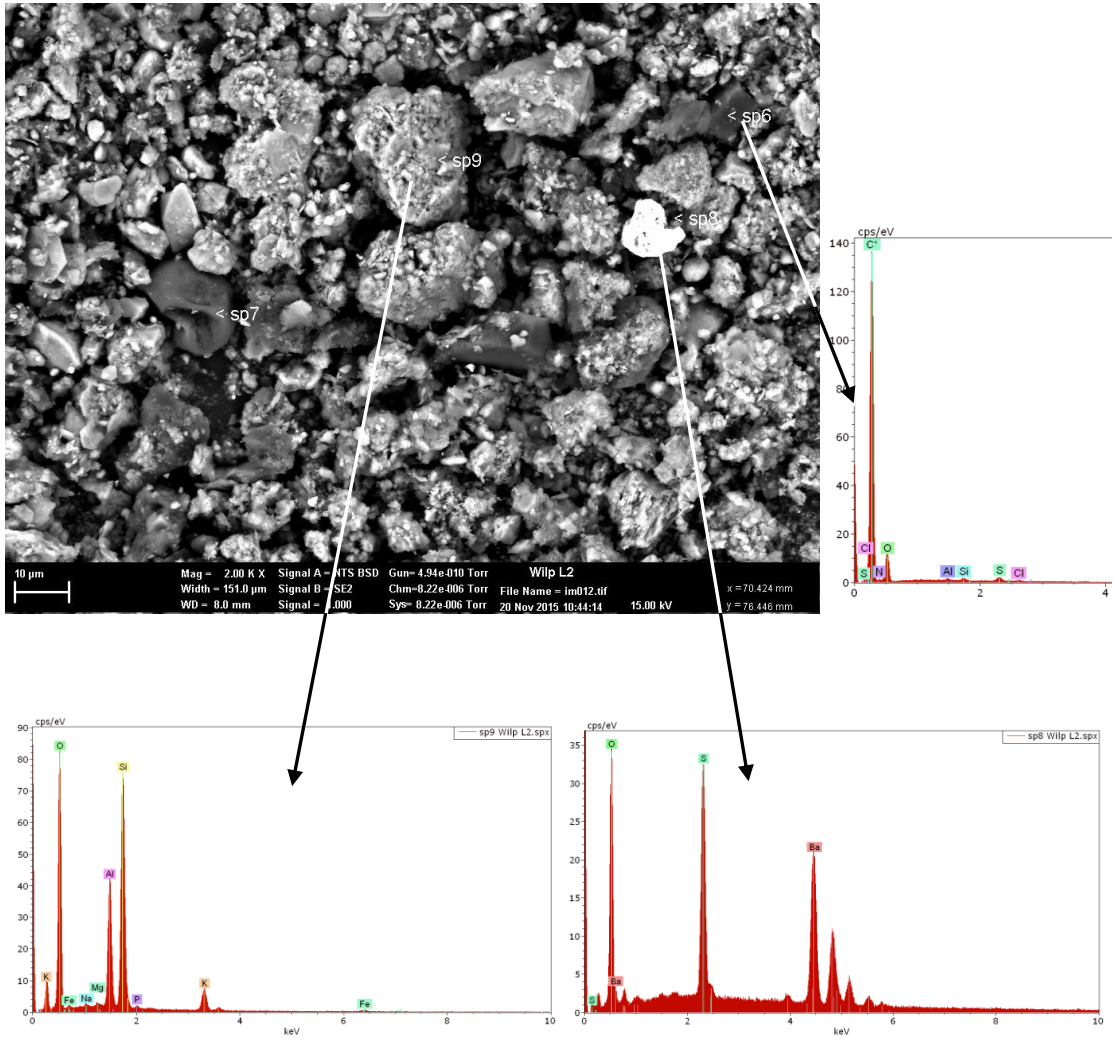


Figure 5.6 Overview of dust particles for sample location L2. The spectra (top and left) show typical carbon and

Organic structures are present on the rock panel surfaces at Castle Rock and are almost certainly lichens. These were observed incorporated into the dust deposits that are likely to be providing a suitable habitat for micro-organisms. The organic structures observed are consistent with micrographs of lichens in the published literature (Bell 1984, Chiari 2004, Tratebas 2004).

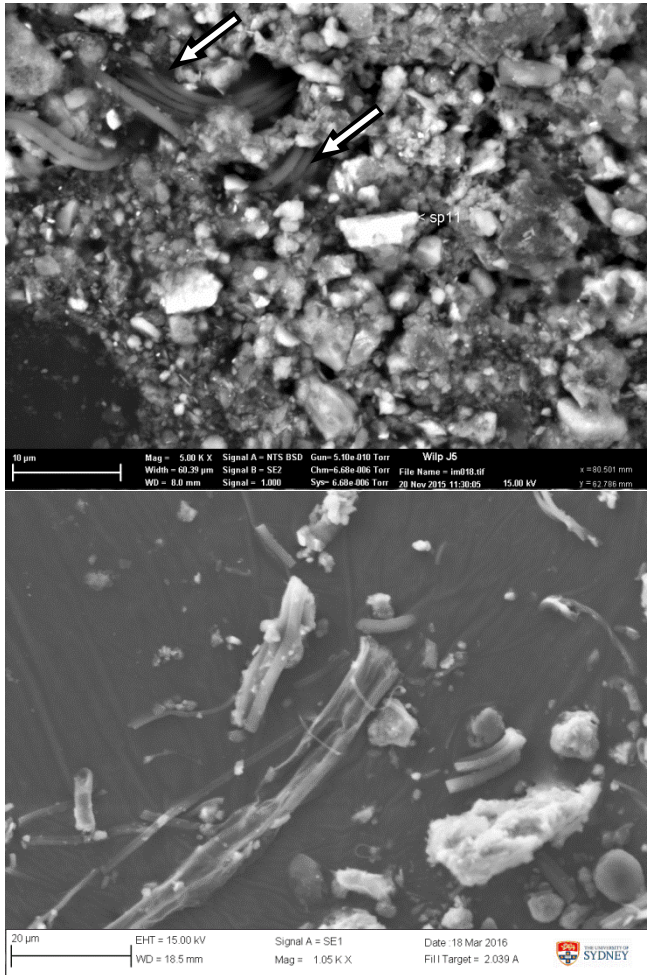


Figure 5.7. Organics/lichen observed in samples J5 (top) and L1 (bottom). Scale bars are 10 and 20 µm respectively.

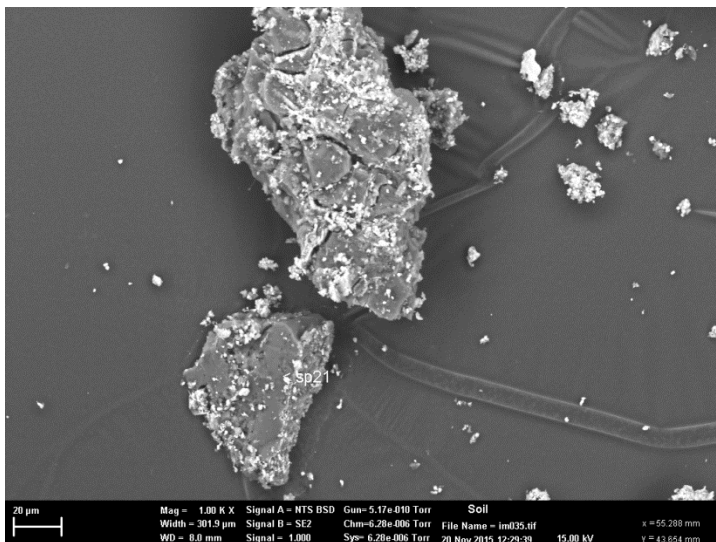


Figure 5.8 Carbon grain from a wombat burrow showing small angular to sub-angular clay particles adhered to the exterior.

Soil from bioturbation (the entrance to a wombat burrow) located approximately 150 meters east and down slope of the rockshelter shows the same general trend as the aerosol particles in the Castle Rock site. That is, a core block/crystalline form carbon grain with smaller clay/soil particles (Si, Al, Ti and K) stuck to the outside (Figure 5.8).



5.2.2 Air Filter Papers

A range of particles were observed on the filter papers. Examples of this range are illustrated in Figure 5.9.

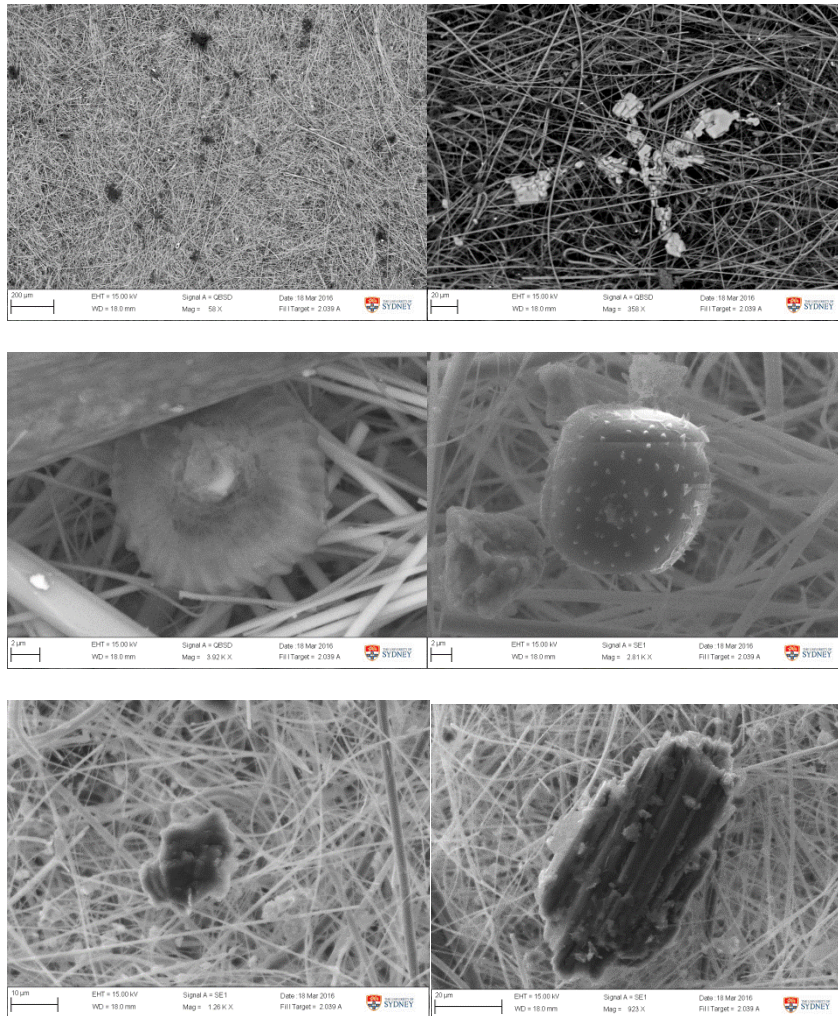


Figure 5.9 Montage of micrographs from air filter papers supplied by Wilpinjong Coal. Overview of grain density on filter paper 7827 [top left, scale 200 µm]; Detail of metallic particle from 7736 [top right, scale 20 µm]; pollen spores [centre, scale 2 µm]; pure carbon (bottom, backscattered electron image, scales 10 and 20 µm respectively).

The top right metal particle is very similar in morphology and composition to the metals described in road dusts by Bućko et al. 2011 (their Figure 8K). However, no pollen or metal particles were observed a WCP72. The morphology of carbon grains on the filter papers and at WCP72 is inconsistent with long travelled dusts observed incorporated into large dust storms on the east coast of Australia (De Deckker et al. 2008:7, comparative micrograph, their Figure 2). Long travelled charcoal particles illustrated by De Deckker et al 2008, are coated in dust, but display a much more fibrous and cylindrical morphology compared to the plated crystalline shape of the graphite grains found at Castle Rock, which are consistent with comparative coal covered soil from the wombat burrow down slope and the coal particles found on the supplied filter papers. The Wilpinjong samples also resemble the graphite grains found in association with graphite added to radiocarbon samples to make them appear older, reported by the independent analysis of samples from a controversial scientific dating program undertaken in north America in the 1990s (Beck et al. 1998).

Detailed reports from SEM sessions are provided in Appendix B, including EDS spectra and element maps.



5.2.3 Results Summary

1. What is the composition of the dust on the art panels at WCP72, and how does it compare with dust from the shelter floor and other dust sources in the adjacent coal mine?

pXRF and SEM analyses reflect the complex processes at work at the shelter and its surrounds. While the rock face, including the art panels at Castle Rock, has elevated traces of sulphur and calcium, chlorine is generally absent, which contrast the consistent chlorine abundances on the rock shelter floor. There were few coal grains observed from shelter floor samples; however the top of the deposit is dominated by compacted sheep and cattle faeces. Coal particles were ubiquitous in the soil sample situated 150m down slope from the site, which comprised wombat burrow spoil suspected of containing coal⁸. As particulates >15-20 µm settle nearer their source (Silver 2008:9), the size of the coal grains indicates the adjacent Wilpinjong open cut coal pit is their likely source (Figure 5.10).

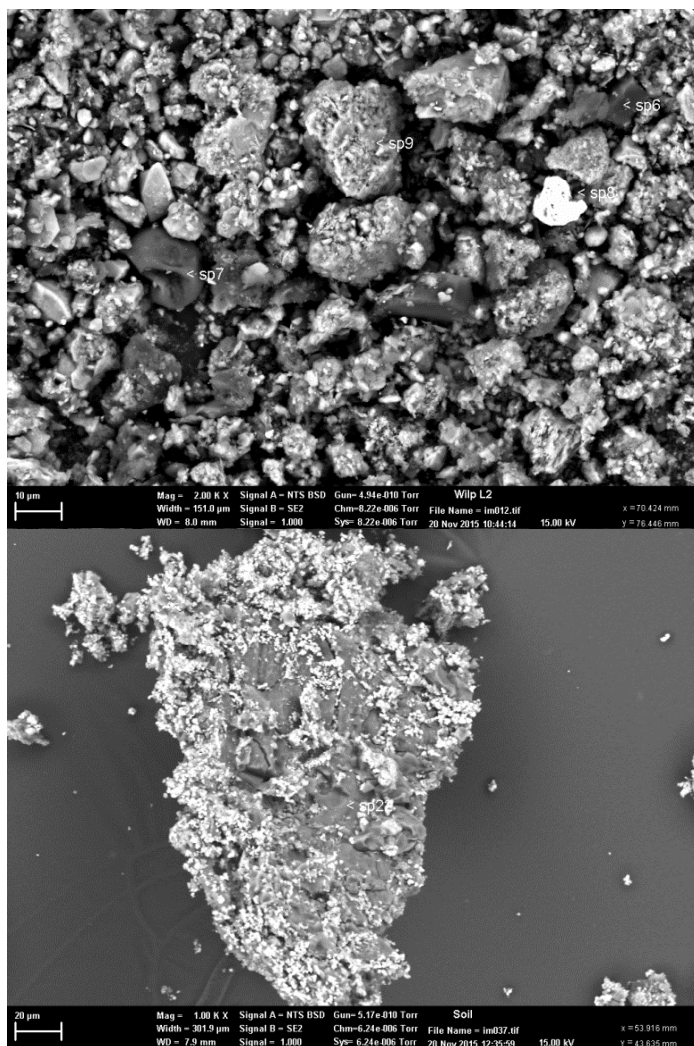
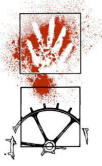


Figure 5.10 Dust from the shelter wall (L2) and a comparative coal grain 150m down slope to the east (soil). Both show smaller rounded to sub angular sediment particles adhered to larger grains, including coal.

Aerosol dusts were most evident on the walls, shelves and rock floors at the back of the shelter overhang. This is probably due to the sampling methodology and techniques employed. pXRF did not measure carbon (the major chemical constituent of the sheep/cattle faeces on the shelter floor), nor silicon which is the major constituent of both the shelter wall (sandstone) and soils in the floor deposit. Therefore the chemical signature of the floor deposit from the pXRF analyses was

⁸ This soil sample was not typical of the soils downslope of the site and was targeted as the thick back dusts were presumed to be coal.



dominated by calcium and potassium, with consistently high chlorine abundance and much lower yields of titanium when compared to the spectra from the shelter wall.

Dusts derived from the shelter floor are very likely components of the dusts deposited on the art panels. The lack of direct evidence for dung on the art panel during this study is probably due to the surface sampling (adhesive tape) deployed. Further quantification of the stratified dust deposits at Castle Rock may be undertaken with an SEM. A cross section of the rock face surfaces could be examined if flake exfoliation or a micro-sawed sample were taken. For now, this study has shown that the most recent dusts deposited at the site, which are still loose against the rock face, include airborne coal grains. Recent destocking of the fenced enclosure in which the Castle Rock shelter is situated, will considerably lessen dust generated from the floor deposits. However, threats to the rock art assemblage posed by the sheep/cattle faeces on the shelter floor are more complex than simply dust. For instance, dung is highly combustible material and the deposit therefore provides a fuel source inside the rockshelter were fires to occur.

The composition and morphology of samples Dust 2 to 7 was very uniform, with the exception of disparate heavier metal (Fe and Mn) and barium sulphide grains. Dust 1 was anomalous however, with reduced X-Ray yields, especially pronounced in heavier elements (< iron) in the pXRF spectra. This indicates the presence of a silica accretion. Though Si was below the detection limit of the pXRF instrument used, previous studies have shown the presence of a silica skins reduce yields in other light elements measured (> iron, see Huntley 2012). This spectra shows that geological weathering is active at the site. Mineral accretions are known to encase dust and micro-flora, permanently bonding these surface deposits to the art panel, thereby obscuring the art.

II. Are micro-organics such lichen or fungi spores present on the dust located on the shelter walls?

Lichens are present on the rock face at Castle Rock, and organic structures that resemble the morphology of fungal spores were also noted in association with the shelter floor (Figure 5.11).

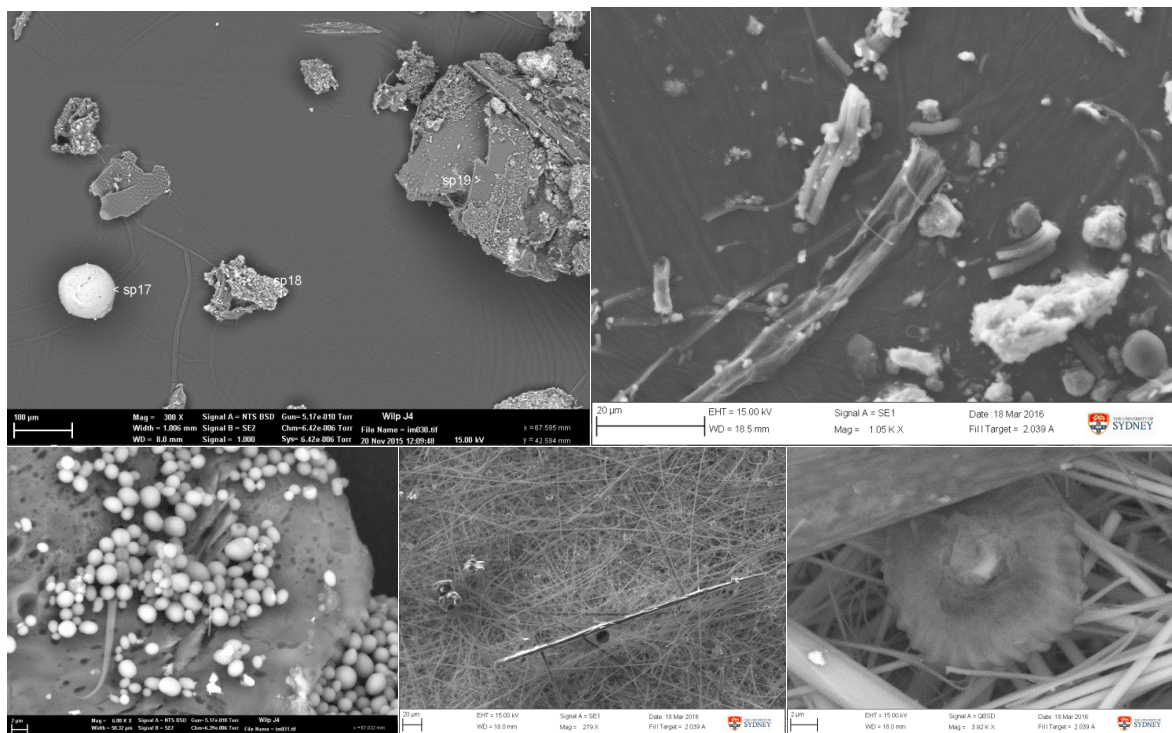


Figure 5.11 The range of organics observed including both animal (top left) and plant materials (lichen top right, bacteria bottom left, pollen spore bottom centre and right).



III. What is the composition and morphology of the shelter surface? Are mineral accretions present and if so, how are they contributing to the accumulation of dust?

pXRF and SEM analyses reflect the complex processes present at the site. Mineral accretions are present including gypsum or other geological salts (evaporites) and also silica skins (precipitates). The persistent presence and high abundance of phosphorus in the spectra from the shelter walls that were presumed to host micro-flora/bacteria (the mineral accretion and oxalate location) do indeed provide evidence that biological agents are present on the surfaces of Castle Rock.

Though the pXRF could not measure silicon, the element profile Dust 1 is indicative of a silica skin on the panel with consistently reduced yields compared to the other dust samples, particularly pronounced in iron and heavier elements (Huntley 2012), while elevated sulphur and calcium indicate gypsum (Wallis et al. 2015). Elevated chlorine indicates the floor of the shelter contains the detritus from cavernous weathering such as granular disintegration (Lambert 1980). This is consistent with the uncommon sulphide and iron rock grains found under SEM. Geological weathering products were however not as ubiquitous as the dust coated coal grains in the samples under SEM (Figure 5.10 above).

6. DISCUSSION

Silver (2008: 30) noted in her study of rock art dusts that the combination of unsealed roads and heavy vehicle traffic was producing large plumes of fine particle dust. This is an important point – the size of the vehicles in the adjacent Wilpinjong mining operations are likely to be compounding the dust problem at Castle Rock because the large machinery, such as dump trucks and water trucks, would be crushing the dust to very fine particles that can travel further before settling onto surfaces.

The microflora at castle rock might be a sufficient catalyst for the formation of oxalidic acid/oxalate coatings, a compound that has sufficient carbon content for radiometric dating (Watchman 1991; Watchman et al. 2005; Ruiz et al. 2006; Hess et al. 2008). The pXRF data (persistent high calcium yields) are consistent with oxalate mineralogy, however, the presence of oxalates can only be confirmed through further x-ray diffraction analyses.

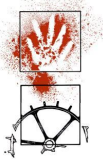
In relation to the microbial/fungal activity observed at the site, presumed to be lichens, it is recommended that a minimal approach be adopted in the consideration of any mitigation actions. Rockshelters are complex systems, particularly in relation to water and associated mineralisation. Altering one part of the rockshelter system can have unintended consequences in other parts. The reduction of dust in the shelter environment should minimize suitable environments for lichen colonization and therefore reduce lichen within Castle Rock (Chiari 2004, Tratebas 2004).

Lack of metals in the dust, and the regular crystalline, rather than twisted and irregular shape of the carbon particles, indicates they are not from a public road (Watchman 1998; Bučko et al 2011). Rather the morphology of the carbon grains is consistent with mineral carbon (graphite), very likely coal (Beck et al. 1998).

6.1 Observations about the Condition of Castle Rock

The premise of this investigation was increased accumulation and a visual darkening of dust deposits at Castle Rock, noted during the monitoring program for the site (NOHC 2015). This study has confirmed that the recent dust deposits are very likely the consequence of mining activities at the adjacent Wilpinjong open cut coal mine⁹. A number of findings also inform an assessment of the current condition of the rockshelter. Dynamic geological weathering processes are active within the shelter including granular disintegration and the deposition of minerals through evaporation (geological salts) and precipitation (silica skins). The continued presence of dust on the panels at Castle rock is likely to accelerate the rate of weathering, particularly physical processes, by holding

⁹ Though no mineralogy or absolute trace resolution chemistry has yet been undertaken (XRD and PIXE/PIGE) and therefore the provenance of the coal has not been determined.



more water against the rock face and by providing a habitat for micro-organisms such as lichens/bacteria, which could catalyse further mineral accretions such as oxalates.

6.2 Scientific Value of this Research

The research presented in this report is of international scientific value, chiefly because of the lack of previous dust studies associated with rock art, but also because Wilpinjong Coal's air motoring program has provided unprecedented contextual 'off art' samples. The findings reached in this investigation are globally unique and merit wider dissemination through peer reviewed scientific publication in venues such as *Journal of Archaeological Science: Reports, Studies in Conversation* or the *Journal of Cultural Heritage*.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

It will be necessary to take an incremental approach to intervention at the site, which is based on scientific principles and strictly follows conservation ethics. Applying blanket 'procedures' (such as the approach advocated by Lambert 2007) to conservation treatments without site specific studies, can cause irreversible damage. This study has tried to take a holistic approach, situating the investigation within the latest research on dust and in the context of the specific environment at Castle Rock.

Although this investigation has shown that aerosol dust particles evident in the WCP72 rock shelter include coal, the study has also shown that dynamic geological processes are active within the shelter. These may include several types of mineral accretions that can trap dusts and micro-organisms making them a permanent part of the site's fabric (Watchman 1990a; Watchman 1990b; Mardaga-Campbell et al. 2001; Watchman et al. 2000; Watchman et al. 2001).

7.2 Recommendations

- 1) A workshop should be held between the Wilpinjong Coal environmental management team, Aboriginal stakeholder representatives and a suitable qualified conservation scientist with the aims of presenting and discussing the findings and recommendations of this report and establishing a series of realistic conservation management objectives for the Castle Rock shelter¹⁰ (WP72/AHIMS number 36-3-0646).
- 2) A program of management actions should be conducted which has the following objectives:
 - a. The prevention or minimisation of the settling of airborne dust onto the WCP72 rock art panels over the period of time in which airborne dust from the Wilpinjong Mine area poses a significant risk of impact to the cultural and scientific values of the WCP72 site.
 - b. The removal of those dust deposits on the WCP72 rock surfaces which are known or likely to have been produced as a direct or indirect consequence of Wilpinjong Coal Mine activities, but only in circumstances where impact to any underlying cultural or other deposits of cultural or scientific value (such as pigment and pre-mine mineralisation) would not be significant.

¹⁰ A lack of rock art conservation science works in Australia since the 1990s often leads to disparity between the aspirations of Aboriginal stakeholders and what can be achieved in relation to the mitigation, rehabilitation and preservation of rock art sites. In order to achieve realistic outcomes that are satisfying for the indigenous peoples who hold custodial roles for cultural heritage, it is advised that stakeholders come together with a specialist conservation scientist to co-design conservation and management works.



- c. Ongoing consultation with, and the integral participation of, Aboriginal stakeholder representatives.
- 3) As a part of the program specified in recommendation 2, an initial study be conducted to identify the most appropriate methods for realising the objectives of the program of management actions. This study should include consideration of:
- a. Remediation in the form of temporary dust screens (short term) and vegetation buffers (long term) to be established with the aim of protecting the site from airborne dust.

Incremental mitigation measures should be undertaken outside the immediate footprint of the rock shelter in order to lessen the amount of dust that can reach the rock art panels in the future. For example, the slopes surrounding the site could be planted with fast growing shrubs and trees (preferably native species that are sympathetic to the ecological and cultural values of the area). This vegetation could provide a catchment for dust particles, preventing aerosols from reaching the rock art. To provide maximum benefit, these plantings should take into account the prevailing north westerly/south easterly winds. It is also important that the vegetation is planted far enough away from the shelter to ensure the micro-climate of Castle Rock, especially humidity at the site, remains unaltered.

During the interim period when plantings are establishing, a series of windbreaks¹¹ could be installed.

- b. Staged conservation intervention to be undertaken in collaboration with a suitably qualified conservation scientist to remove the subject dust from the WCP72 rock surfaces and art panels.

Rehabilitation of the art panels should be considered a priority. An incremental approach is advocated, which strictly adheres to basic conservation principles and ethics¹². A program or program(s) of dust removal may be trailed that preferences indirect methods such as compressed air and soft dry brush treatments.

- 4) In relation to the microbial/fungal activity observed at the site, presumed to be lichens, it is recommended that any interventions be minimal in scope and limited to instances involving direct impact to the visual amenity of the rock art.
- 5) Regular monitoring of the art site should continue in accordance with previous recommended conservation management strategy (NOHC 2005, 2015; WCPL 2006). A minimum interval of annual monitoring, or ideally bi-annual monitoring, should be undertaken at Castle Rock. It is further recommended that the minimum annual monitoring interval is not reviewed until five years of data have been obtained and assessed.
- 6) A specialist rock art/conservation scientist should be consulted where appropriate to help inform future mitigation and management decisions regarding the site.
- 7) Consideration be given to the drafting of an article based on the content of this study and its submission for publication by a peer reviewed scientific publication, in collaboration with Peabody Energy Australia, and the Aboriginal stakeholders.

¹¹ See <http://www.hortdevelopers.co.nz/services/wind-breaks> for examples - please note that we do not advocate the use of any particular product.

¹²<https://aiccm.org.au/sites/default/files/docs/AICCMBusinessDocs/CODE%20OF%20ETHICS%20AND%20CODE%20OF%20PRACTICE%20Australian%20Institute%20for%20Conservation%20of%20Cultural%20Material.pdf>



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APPENDIX A

PXRF DATA AND ABSOLUTE CHEMISTRY VALUES FOR INTERNAL STANDARDS AND CERTIFIED REFERENCE MATERIALS



Table A1 pXRF data from Castle Rock, including internal standards [AMIS] (continues over page).

pXRF location	pXRF ID	Ag	As	Ba	Bi	Ca	Ce	Cd	Cl	Co	Cr	Cu	Fe	Hg	K	La	Mn	Mo	Nb	Ni	P	Pb	Rb	S	Sr	Ta	Th	Ti	U	V	Y	Zn	Zr
Dust 1	#2	ND	ND	68	14	666	ND	ND	4014	ND	29	ND	655	ND	4059	ND	ND	ND	ND	ND	ND	ND	9.1	ND	310	ND	ND	1844	ND	25	ND	ND	278
Dust 2	#3	ND	6.1	217	18	3.90%	ND	ND	3047	ND	46	ND	8428	ND	1.61%	40	487	ND	3.8	17	ND	12.4	34	2741	649	3.8	ND	2717	ND	50	15.6	61	175
Dust 3	#4	2.9	3.6	680	ND	2.45%	53	ND	1098	ND	70	10	9527	ND	7750	44	454	ND	2.7	17	ND	29.9	34.3	1547	755	4	ND	3054	ND	137	12.4	76	355
Dust 4	#5	ND	10.2	862	16	1.39%	ND	ND	1730	ND	73	ND	7621	ND	1.10%	ND	6444	ND	ND	25	7156	36.8	15.2	1607	300	3.6	3	2217	ND	95	ND	70.9	176
Dust 5	#7	3.9	7.3	834	ND	1.75%	64	ND	1438	ND	51	13	8711	ND	7393	ND	3315	2.3	ND	34	ND	44	19.6	1859	596	3.8	7.4	2302	ND	58	28.1	112	278
Dust 6	#8	ND	4.4	347	15	2.15%	64	ND	4832	ND	43	10	7256	ND	1.01%	ND	449	ND	ND	14	ND	14.3	20.5	2036	350	3.1	ND	2632	ND	60	17.1	54	265
M1	#9	2.6	4.4	163	19	2.63%	ND	ND	376	ND	42	ND	3977	ND	5305	ND	9484	ND	ND	20	2.42%	6.9	12.8	4224	207	ND	ND	1761	ND	50	6.7	30.3	380
M2 (Replicate)	#10	ND	4.4	137	ND	13.09%	ND	ND	ND	ND	11	54	520	ND	2389	45	251	ND	ND	ND	4.27%	3.8	12.2	4.45%	168	ND	ND	191	ND	7.9	4.6	160	142
M3 (Replicate)	#11	ND	4.4	285	ND	2.70%	ND	ND	818	90	35	46	1784	ND	7376	ND	5977	ND	ND	43	2.72%	5.6	6.8	4731	270	ND	3.3	1335	6.9	64	11.8	64.7	304
M4	#12	ND	4.4	284	ND	4901	ND	ND	806	ND	57	101	1457	ND	5135	ND	61	ND	ND	9	4.27%	7.7	11.4	1414	567	ND	ND	581	10.9	21.1	13.1	27.2	149
O1 (Oxalate)	#13	ND	4.4	152	25	12.15%	ND	ND	6938	ND	69	ND	4149	ND	2.38%	ND	598	2.1	4	15	1.35%	17.9	32.5	1475	843	5	ND	4926	ND	81	8.4	106	142
O2 (Oxalate)	#14	ND	4.4	257	31	14.42%	ND	ND	7002	ND	55	ND	5744	ND	2.99%	ND	1271	ND	ND	16	3.08%	17.4	20.9	1676	590	3	ND	2675	ND	71	24	157	166
O3 (Oxalate)	#15	ND	4.4	234	25	14.91%	ND	ND	3224	ND	42	6.9	4225	ND	1.61%	32	734	ND	ND	14	2.80%	13.1	15.5	1308	594	2.3	4.7	2203	ND	67	12.7	101	165
F1	#16	ND	4.4	130	ND	1.24%	ND	ND	1.21%	ND	12	13	4884	ND	4.41%	ND	444	ND	7.6	ND	ND	4.1	44.8	1702	151	2.3	3	814	ND	17	7.2	85	269
F2	#17	ND	4.4	133	ND	1.45%	ND	ND	4569	ND	6	24	4706	ND	1.97%	ND	665	ND	17.5	ND	ND	2.7	28.9	1246	205	4.1	ND	760	ND	18	5.7	162	218
F3	#18	ND	4.4	150	ND	1.06%	ND	ND	8259	ND	ND	12	3153	ND	2.89%	ND	372	ND	5.6	ND	ND	3.2	29.4	1011	170	ND	ND	505	ND	12.6	5.6	87	164
F4	#19	ND	4.4	133	ND	1.72%	ND	ND	4436	ND	ND	21	3220	ND	1.98%	ND	532	ND	15.5	ND	ND	ND	26.2	1179	223	ND	ND	428	ND	10.8	7.2	138	178
S1	#20	ND	4.4	255	ND	4.25%	ND	ND	2779	ND	53	ND	3413	ND	2.66%	ND	1731	ND	ND	23	ND	15.3	15.9	4596	486	ND	ND	1998	ND	45	2.9	58	202
S2	#21	ND	4.4	181	ND	3794	ND	ND	2236	ND	13	9	3989	ND	4.54%	ND	255	ND	6.3	20	ND	17.7	23.8	1245	518	2.8	5.2	434	ND	15	10	68	263
W1	#22	ND	4.4	249	13	1.00%	ND	ND	ND	ND	77	ND	1.44%	ND	7,639	34	185	ND	ND	9	10.55%	9.5	11.1	807	440	2.6	ND	2601	4.9	82	8.2	44.5	312
W2	#23	ND	4.4	319	ND	2.68%	62	ND	547	ND	78	ND	1.68%	ND	8494	ND	417	ND	ND	ND	6.84	20.3	11.3	4421	896	3.2	ND	3167	ND	105	9.3	53.4	326
F5	#24	ND	4.4	185	ND	808	ND	ND	515	ND	53	ND	5281	ND	ND	43	49	ND	7	ND	ND	9.7	23.8	205	554	5	4.9	3173	ND	41	11.3	7.2	401
M5	#26	ND	4.4	167	ND	944	ND	ND	289	ND	30	ND	4683	ND	4650	ND	101	ND	ND	ND	ND	13	15.7	705	405	3.5	3.3	1454	ND	23	5.9	12.4	184
Dust 7 (Base of outlier)	#27	ND	4.4	128	ND	3374	ND	ND	296	ND	56	ND	5845	ND	6844	ND	253	ND	ND	ND	ND	12.9	20.7	679	109	3.5	ND	2311	ND	74	9	27	226



25/10/2015

Standard designation	pXRF ID	Ag	As	Ba	Bi	Ca	Ce	Cd	Cl	Co	Cr	Cu	Fe	Hg	K	La	Mn	Mo	Nb	Ni	P	Pb	Rb	S	Sr	Ta	Th	Ti	U	V	Y	Zn	Zr
AMIS 0401	#5	6.2	13	660	257	20.92%	ND	ND	828	ND	169	1394	26.46%	ND	1.68%	ND	3.19%	4.5	10.2	59	2.31%	ND	74.10%	4.46%	339	ND	15.5	2365	23	75	17	75	258
AMIS 0055	#6	ND	26.1	438	23	23.71%	61	ND	ND	ND	280	157	1.39%	2.9	7974	ND	505	72	ND	24	23.24%	ND	13	668	1087	3.6	ND	999	2853	39	29.7	123	641
AMIS 0424	#7	3.4	14.9	270	ND	44.35%	369	ND	1037	ND	206	6798	9.38%	ND	631	198	860	ND	3.9	92	5.66%	16.6	7.8	4017	2336	4.3	60	1749	19	152	24.5	60	978

26/10/2015

Standard designation	pXRF ID	Ag	As	Ba	Bi	Ca	Ce	Cd	Cl	Co	Cr	Cu	Fe	Hg	K	La	Mn	Mo	Nb	Ni	P	Pb	Rb	S	Sr	Ta	Th	Ti	U	V	Y	Zn	Zr
AMIS 0401	#28	4.8	12	643	229	21.35%	73	ND	808	ND	160	1390	25.93%	ND	1.70%	ND	3.21%	4	9.2	ND	2.58%	11	74.30%	4.46%	343	6	14.8	2543	22	80	17.8	77	263
AMIS 0055	#29	ND	27.4	643	ND	23.81%	ND	ND	ND	ND	284	161	1.48%	3.7	7939	ND	618	96	ND	30	23.86%	ND	32	754	1207	5.4	ND	1005	3107	41	39.2	127	736
AMIS 0424	#30	5.7	28	643	ND	52.37%	658	ND	1320	ND	230	1.10%	14.79%	7.1	ND	304	1043	ND	11.9	138	8.15%	24	11.4	4242	3739	5.6	98	2060	19	177	43.2	101	1635

Key

- M - Manganese
- O - Oxalate
- F - Floor
- S - SCAT (Bird droppings)
- W - Wall (Red staining)
- ND - Not detected

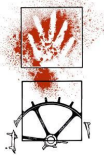


Table A2 Absolute element concentrations for customized internal standards (AMIS) using desktop XRF. Values in italics are calculated oxide concentrations. AMIS0401 is a milled Skarn¹³, AMIS0424 a milled carbonate and AMIS0055 a milled Phosphatic Sandstone. **LOI**= Loss on Ignition, a measure (expressed as a percentage) of the weight loss when a sample is heated to 1000°C, is used to account for the material not detected by XRF (< Na).

CRM ID	AMIS0401	AMIS0424	AMIS0055
Ag	2.00	1.20	-
Al	35,000.00	2,600.00	25463.21
Al₂O₃	66,700.00	4,900.00	48,100.00
As	11.50	24.10	
Au	6.54	0.10	
Ba	342	408	431
Be	1.40	0.23	4.24
Bi	284.00	1.30	0.30
Ca	104,000.00	224,000.00	194710.51
CaO	151,000.00	316,800.00	272,400.00
Cd	0.75	0.30	0.63
Ce	30.80	538.00	26.10
Co	17.50	85.80	33.40
Cr	132.00	69.30	419.00
Cr₂O₃	240.00	100.00	700.00
Cs	20.20	0.25	0.90
Cu	1,637.00	11,500.00	272.00
Dy	3.4	15.1	3.98
Er	2.10	3.70	8.34
Eu	0.79	12.1	0.621
Fe	186,000.00	127,000.00	24,300.00
Fe₂O₃	270,000.00	177,000.00	35,800.00

CRM ID	AMIS0401	AMIS0424	AMIS0055
MgO	36,000.00	72,700.00	32,400.00
Mn	28,206.00	979.00	697.13
MnO	38,500.00	1,300.00	900.00
Mo	7.70	0.85	0.58
Na	1,200.00	300.00	2,340.00
Na₂O	1,600.00	300.00	3,300.00
Nb	7.20	6.50	2.63
Nd	15.50	325.00	13.80
Ni	63.00	135.00	59.60
P	677	14541	88,300.00
P₂O₅			212,200.00
Pb	11.70	38.30	163.00
Pb	11.70	38.30	163.00
Pr	3.60	76.40	3.55
Rb	76.60	13.20	23.50
Sb	1.10	2.10	3.02
Sc	7.80	11.40	17.10
Si	141,000.00	52,000.00	222,000.00
SiO₂	296,300.00	110,800.00	357,700.00
Sm	3.4	31.1	2.81
Sn	4.3	5.2	0.918
Sr	341.00	3,460.00	1,067.00

¹³ Calc-silicate rock, the metamorphic zone developed in the contact area around igneous rock intrusions when carbonate sedimentary rocks are invaded by large amounts of silicon, aluminium, iron and magnesium.



CRM ID	AMIS0401	AMIS0424	AMIS0055
Ga	10.40	6.90	8.86
Gd	3.70	32.60	2.95
Ge	0.66	0.76	0.11
Hf	1.80	6.80	0.08
Ho	0.76	1.40	1.50
In	0.20	0.11	0.04
K	14,000.00	2,000.00	5560.17
K ₂ O	16,000.00	2,200.00	6,700.00
La	14.70	232.00	16.00
Li	86.00	2.20	11.50
LOI	35,100.00	235,800.00	40,500.00
Lu	0.26	0.21	2.39
Mg	21,000.00	41,000.00	19541.62

CRM ID	AMIS0401	AMIS0424	AMIS0055
Tb	0.61	4.00	0.48
Te	1.00	0.43	0.16
Th	5.60	161.00	5.91
Ti	2,400.00	1,900.00	1258.99
Tl	5,700.00	0.04	0.39
Tm	0.3	0.29	3423
U	6.50	38.90	3,423.00
v	75.80	97.90	45.30
W	744.00	0.23	0.85
Y	20.00	50.80	536.00
Yb	1.80	1.60	16.8
Zn	72.90	65.50	187.00
Zr	60.4	149	4.18



APPENDIX B

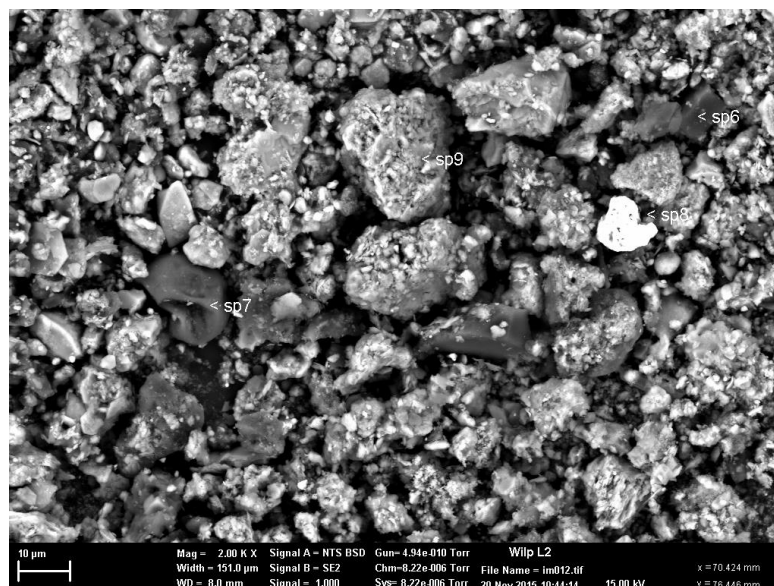
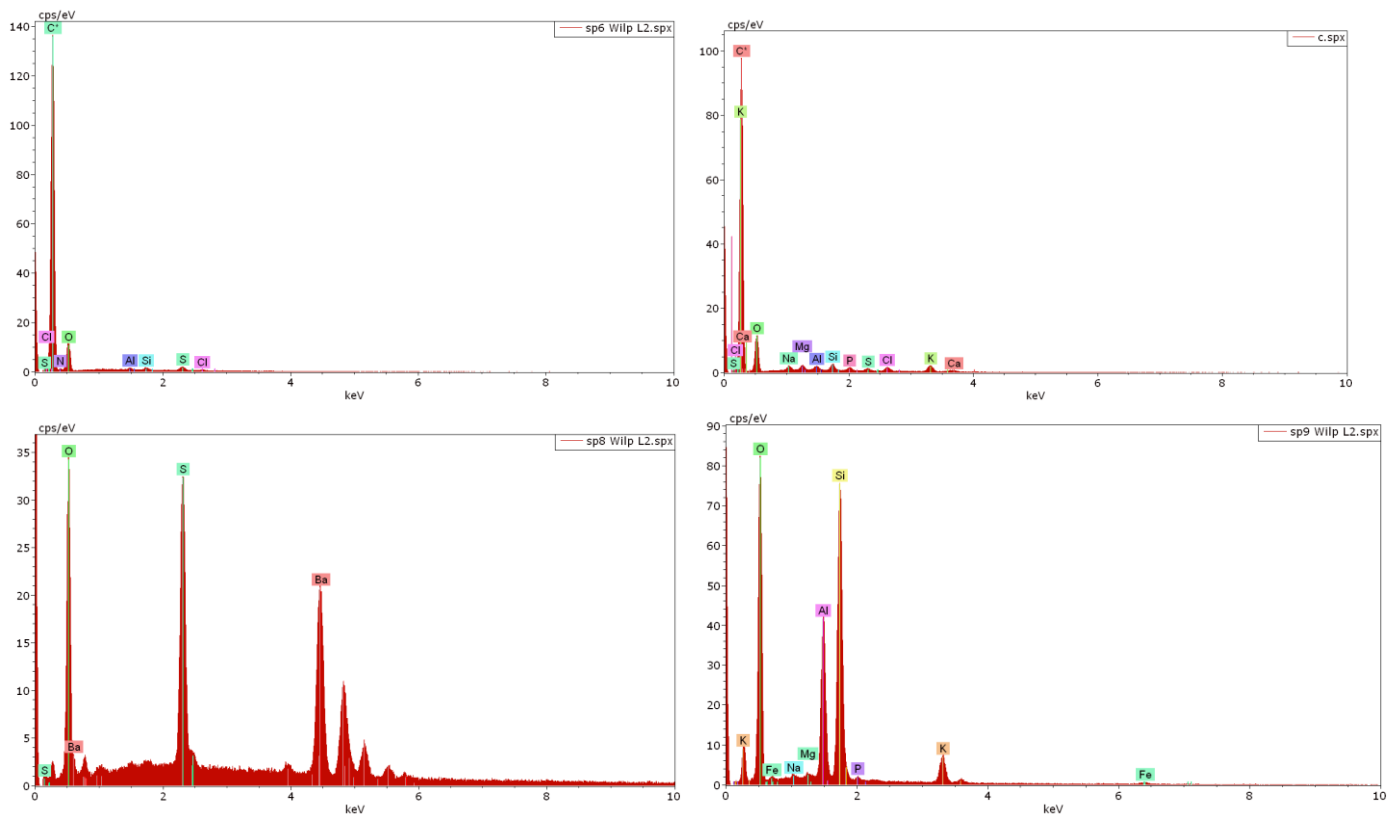
SEM DATA



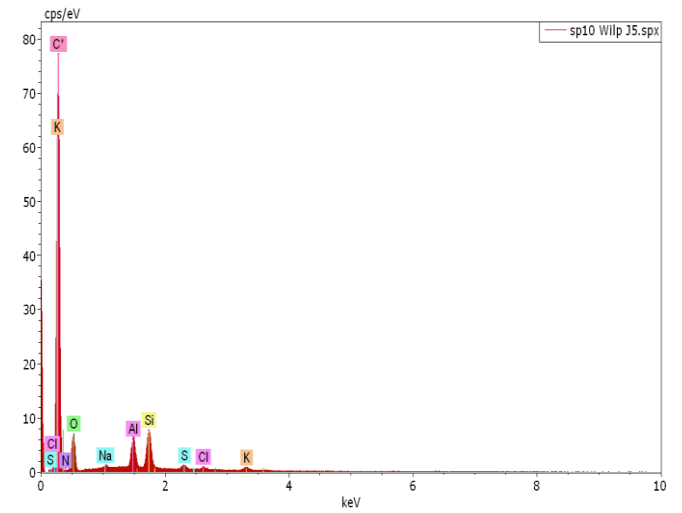
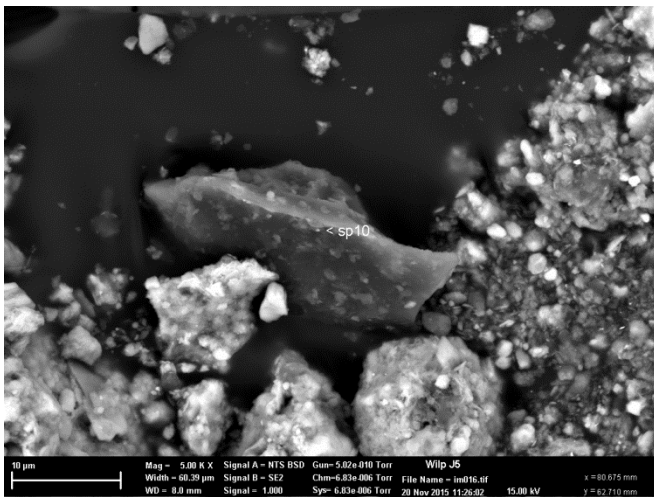
B.1 Orientation

This Appendix provides the SEM data gathered during the study, listed by sample name. The location of samples is illustrated in Appendix C. Note that the background from the conductive carbon coat for both Newcastle EMX and ACMMA Sydney analyses are in the order of 20 counts per second (cps – derived from the x-ray responses of the energy dispersive probe, similar to the analytic seconds described for the pXRF).

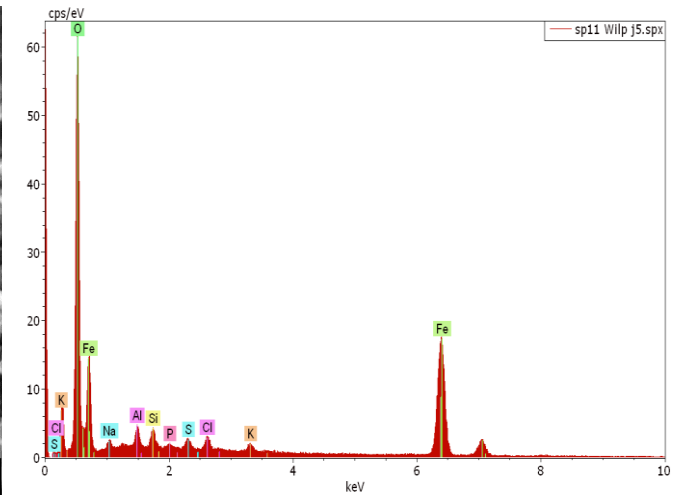
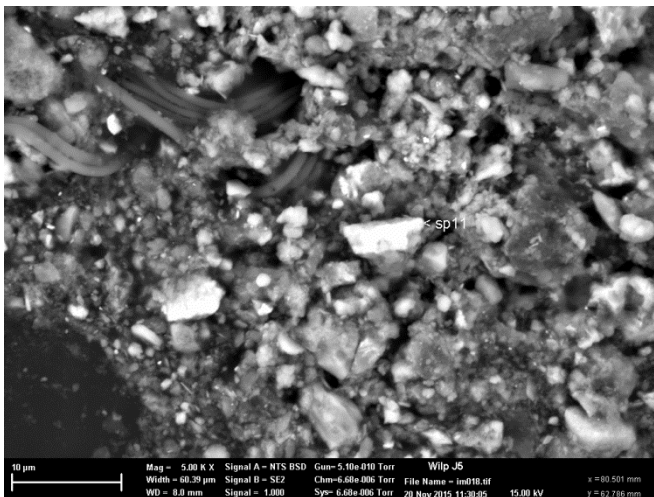
B.2 Castle Rock Samples – Newcastle EMX



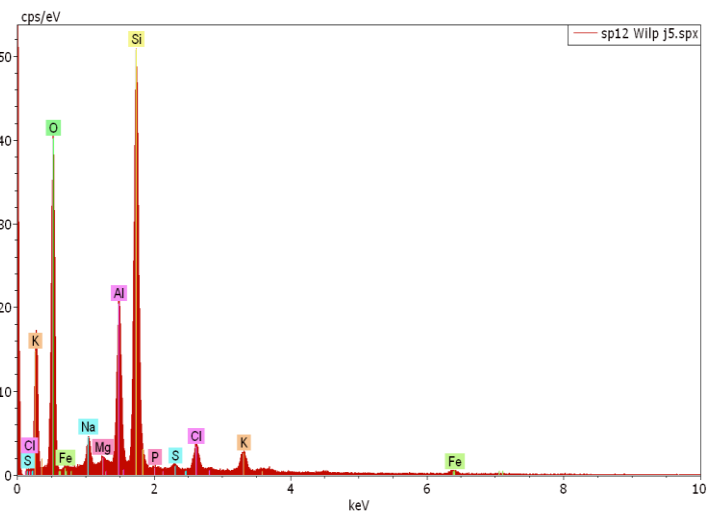
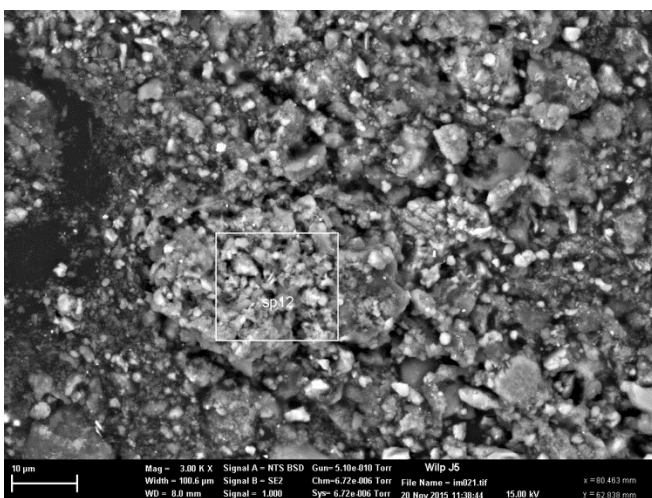
L2 – Spectra 6 to 9. Spectra 6 and 7 show the dark block shaped grains to be pure carbon. Spectrum 8 shows the brightly charging particle to be high in sulphur and barium, probably a barium sulphide mineral. Given the white accretion present on the panel at this location, barium sulphide is most likely an evaporite rather than an aerosol. Spectrum 9 is typical of clay.



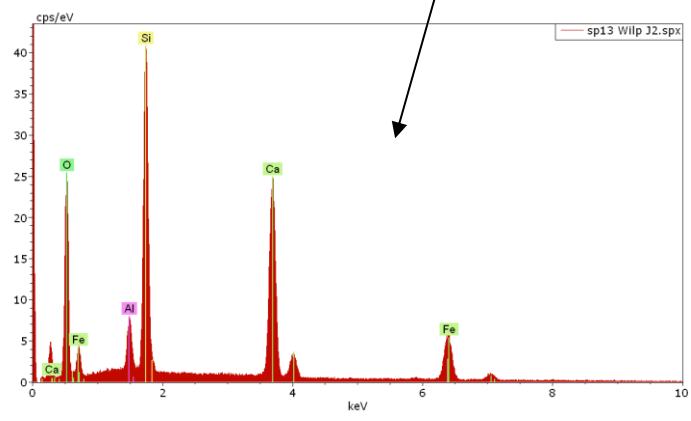
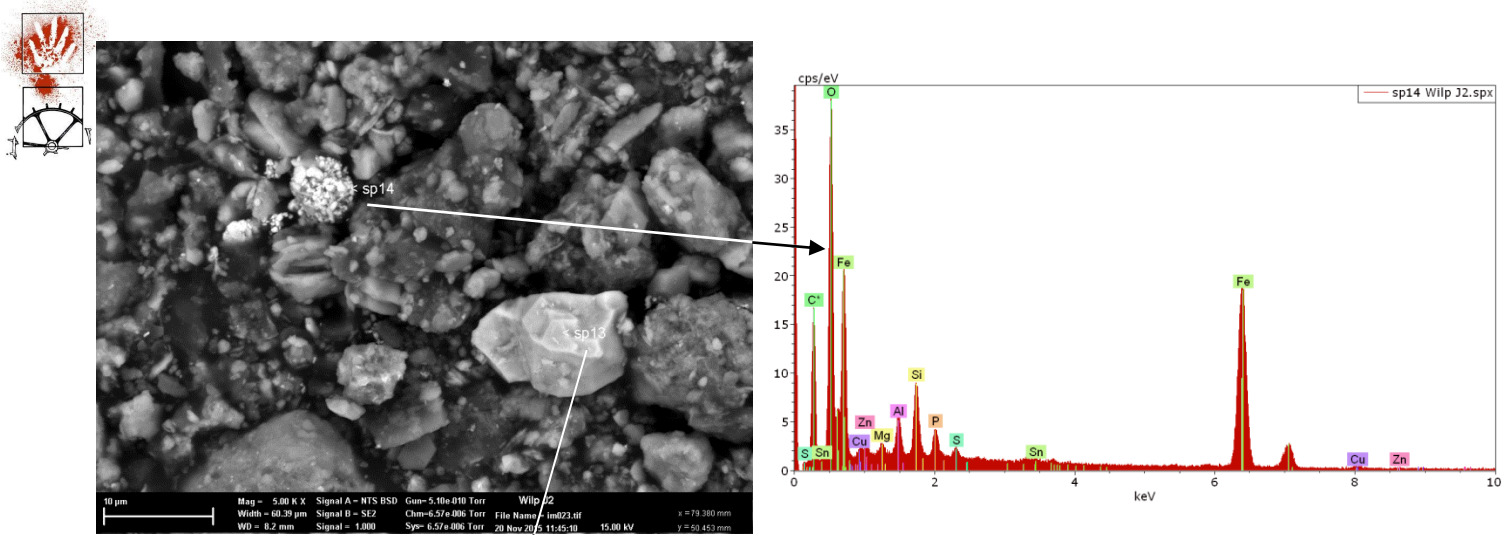
J5 - elevated carbon and block morphology indicates this is a coal grain, with low abundances of Aluminium, silicon and potassium suggesting the smaller lighter particles stuck to the outside are clay/soil.



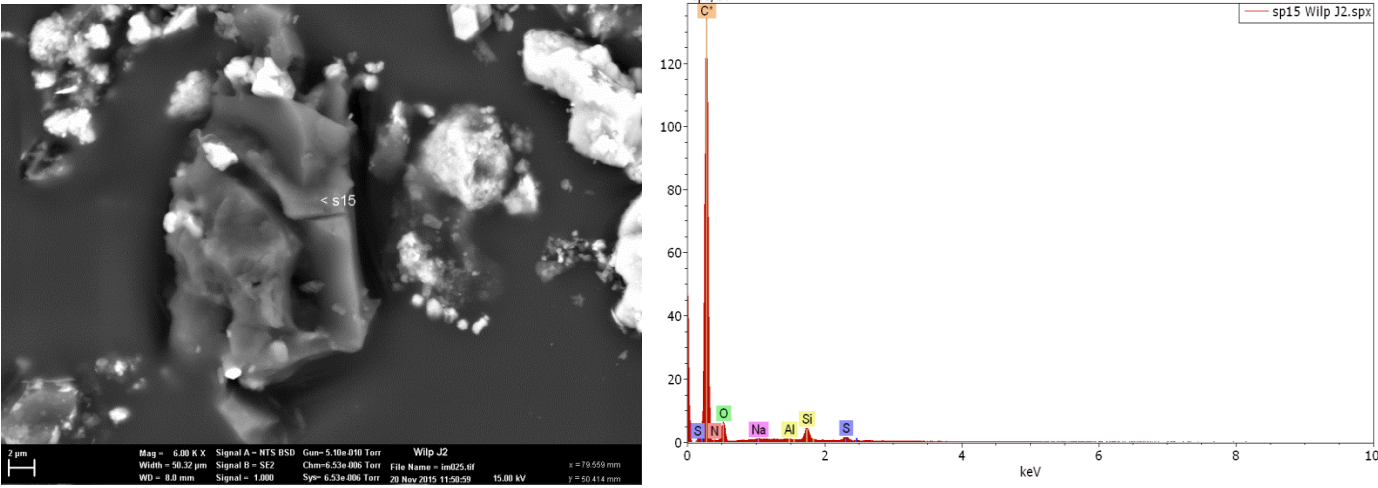
J5 – Iron grain.



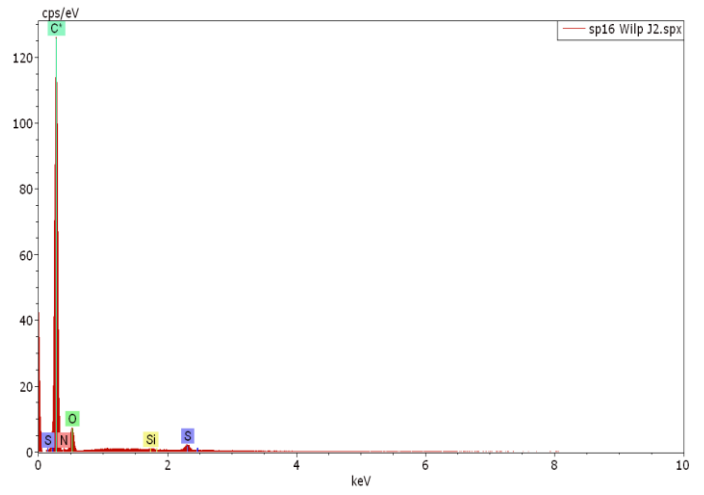
J5 – Area analysis revealing typical clay chemistry indicative of dust from the local landscape/unsealed roads.



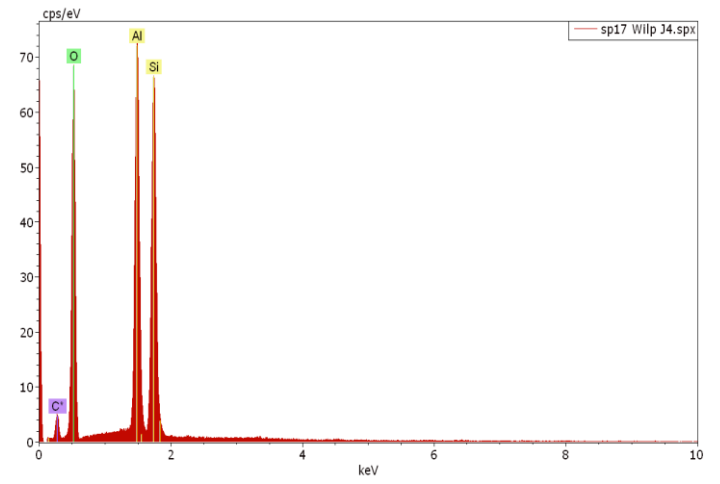
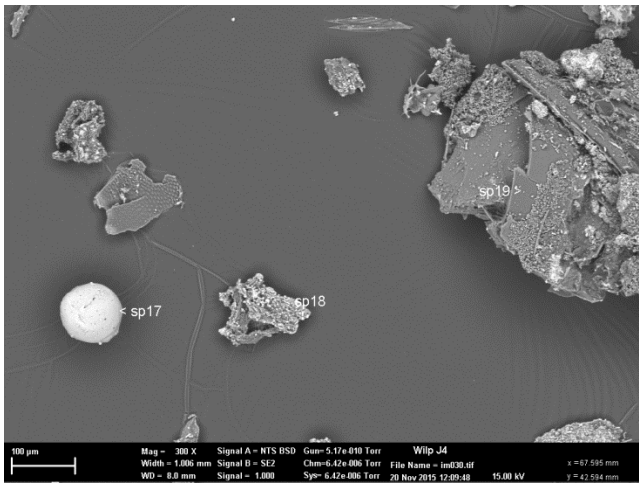
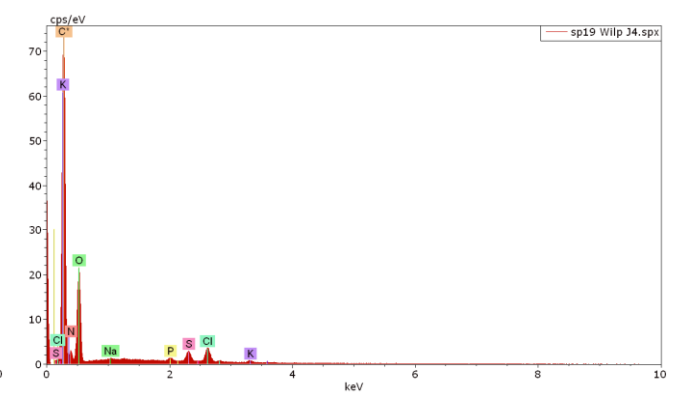
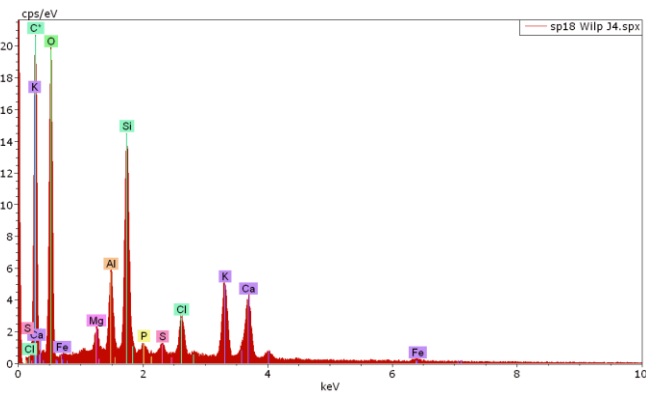
J2 – Spectrum 13, quartz grain with calcium and iron impurities. Spectrum 14, metal grain.



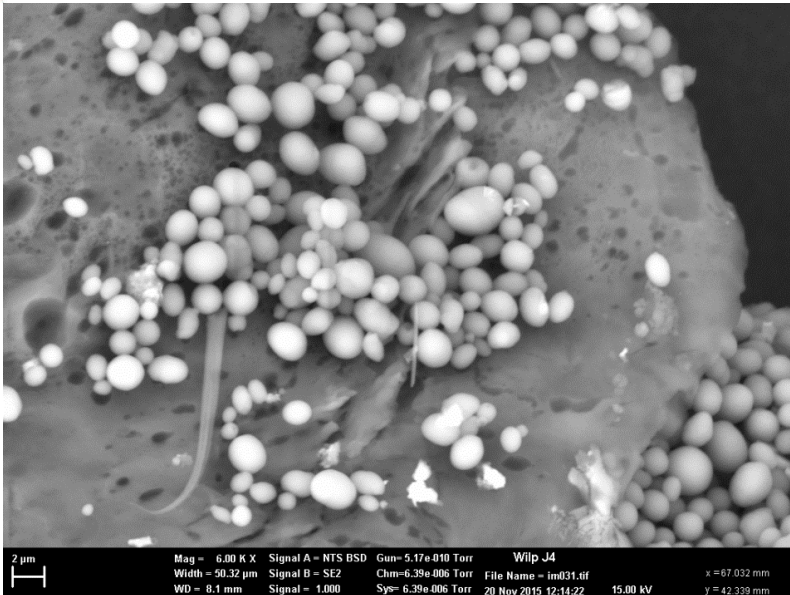
J2 – Coal grain



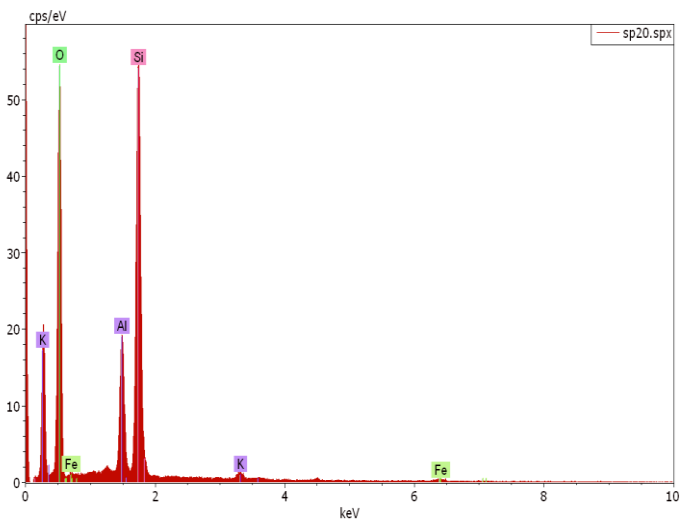
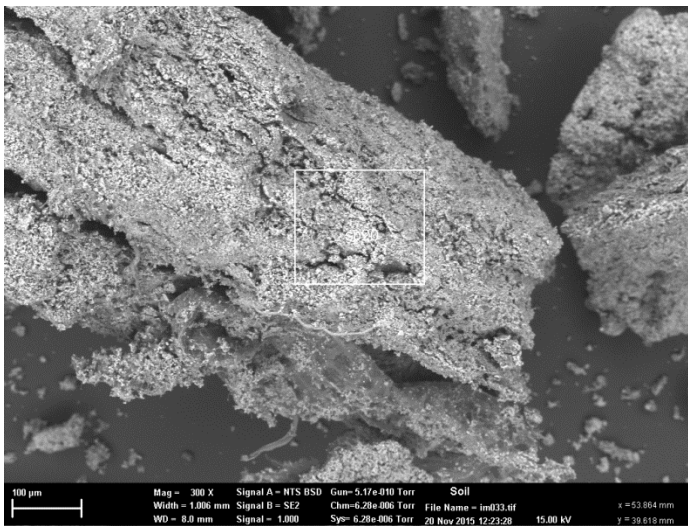
J2 – Coal grain



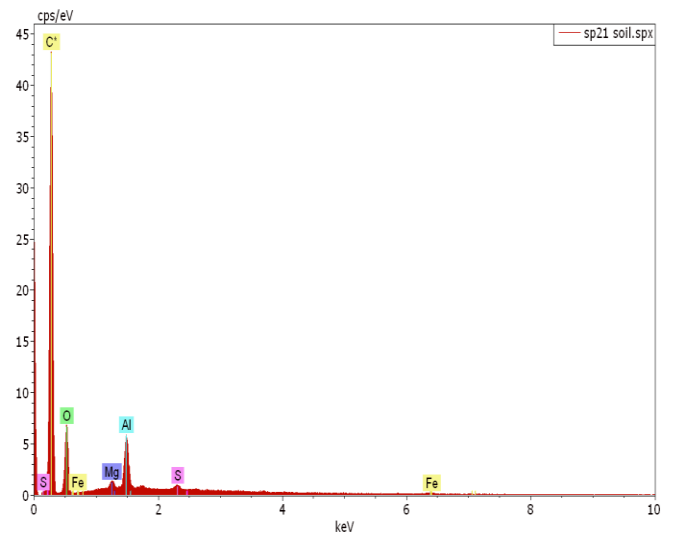
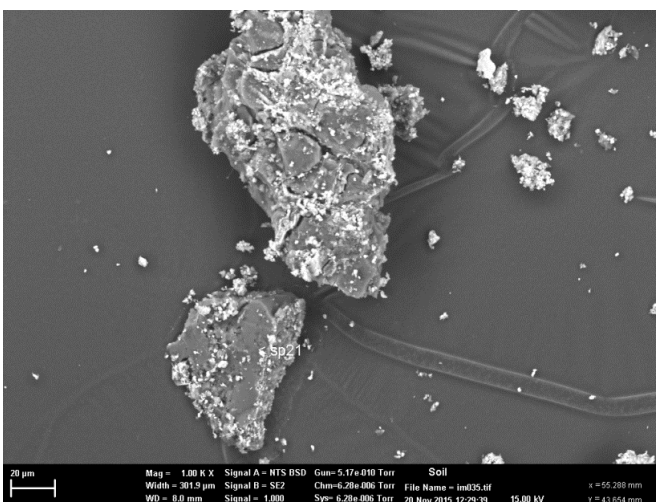
J4 – Overview of organic matter and unusual spherical grain.



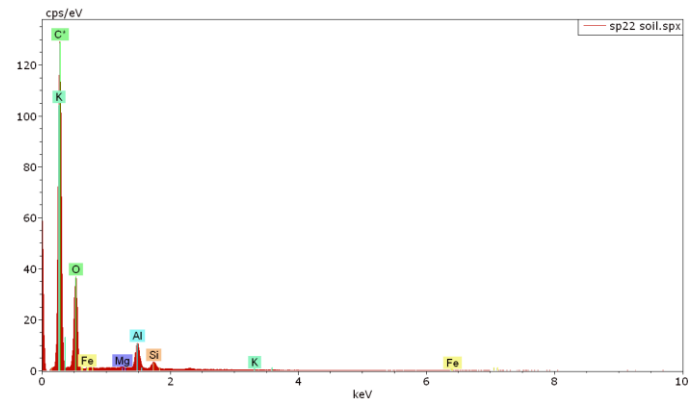
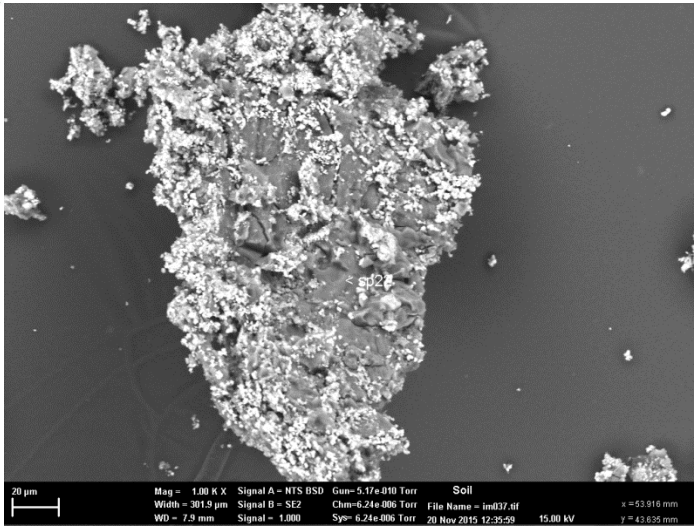
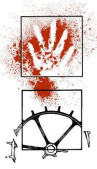
J4 – Detailed image of bacterial/fungal structure near the location of Spectrum 18 (above).



Soil – Sample from the entrance of a wombat burrow. Spectrum typical of clay.

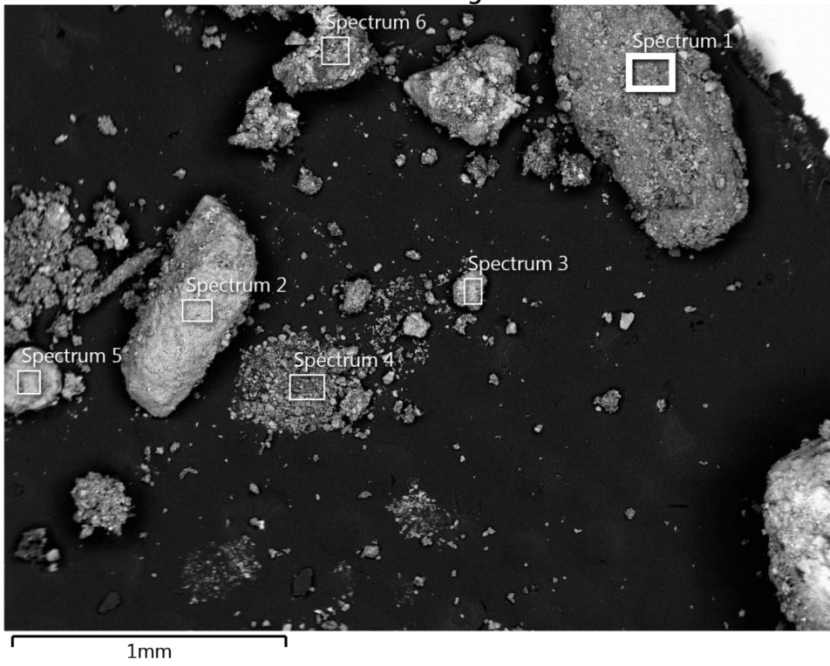


Soil - Spectrum indicates organic content with small peaks of aluminium, magnesium and sulphur - concluded to be sheep droppings.

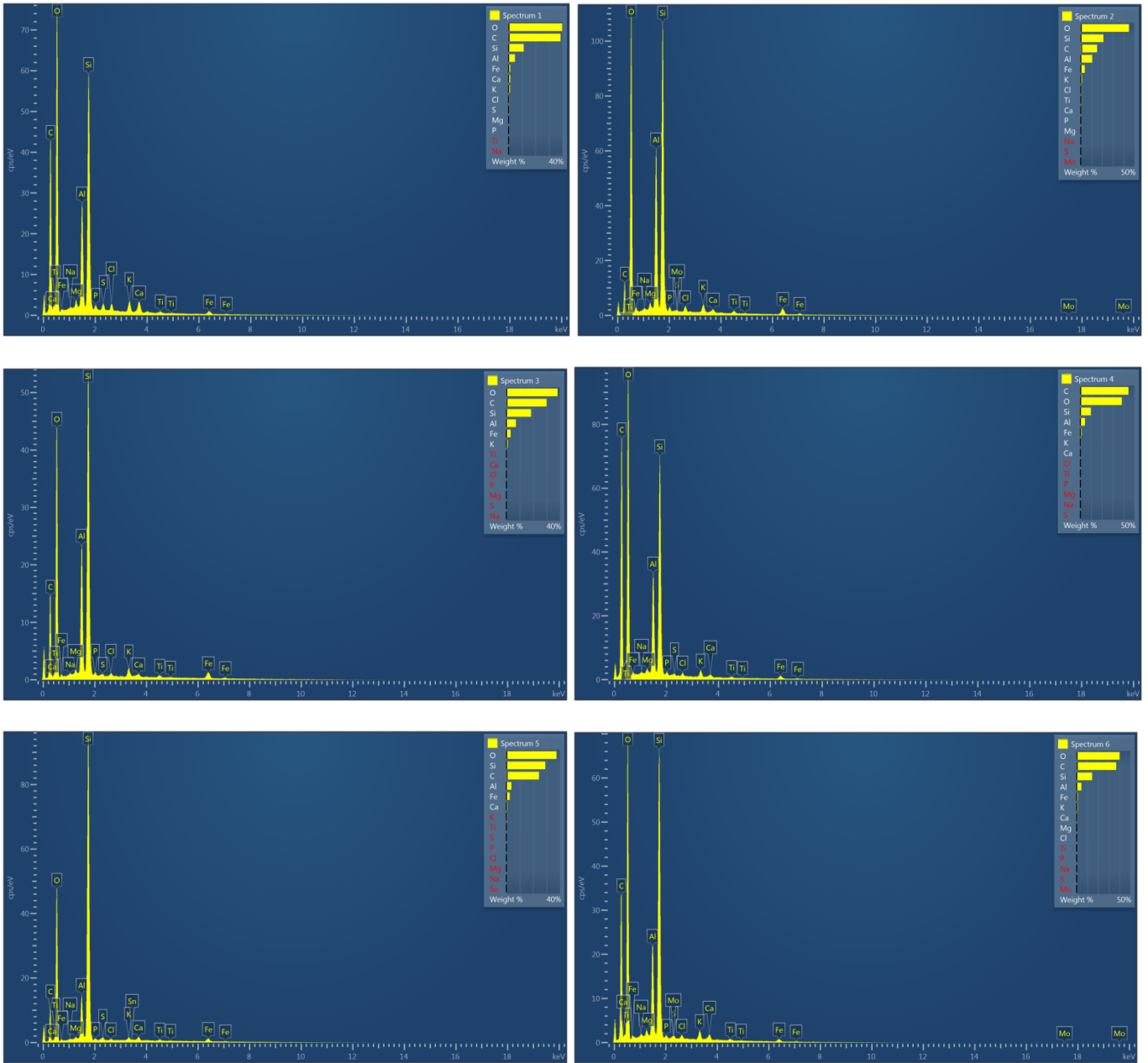


Soil - Another grain with the same composition as the two grains above (carbon with small aluminium and silicon peaks)

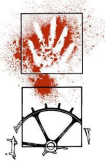
Electron Image 1



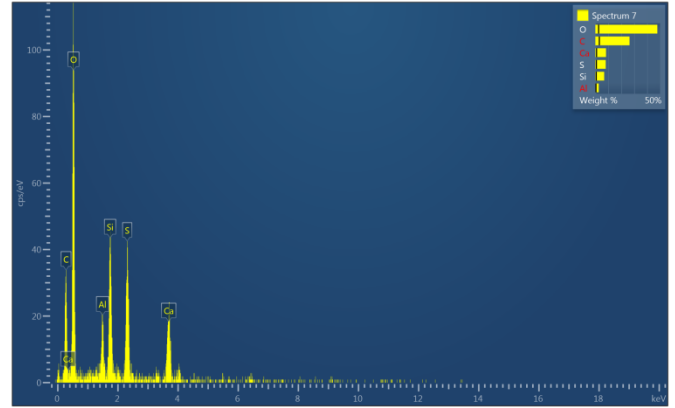
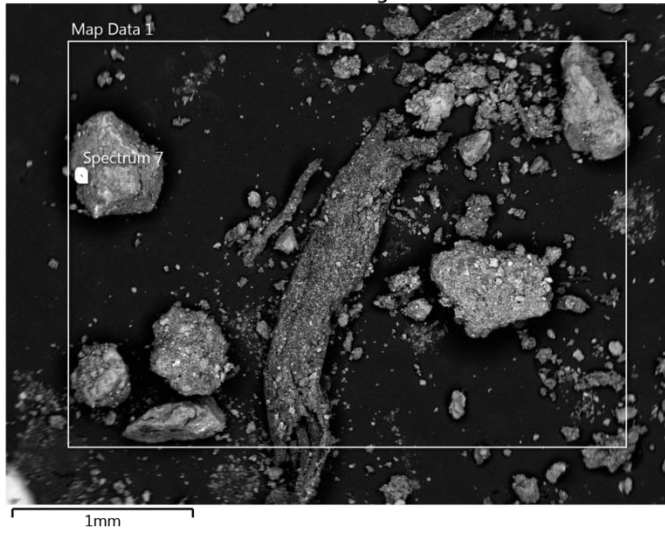
J1 – Area Analyses – Spectra overleaf.



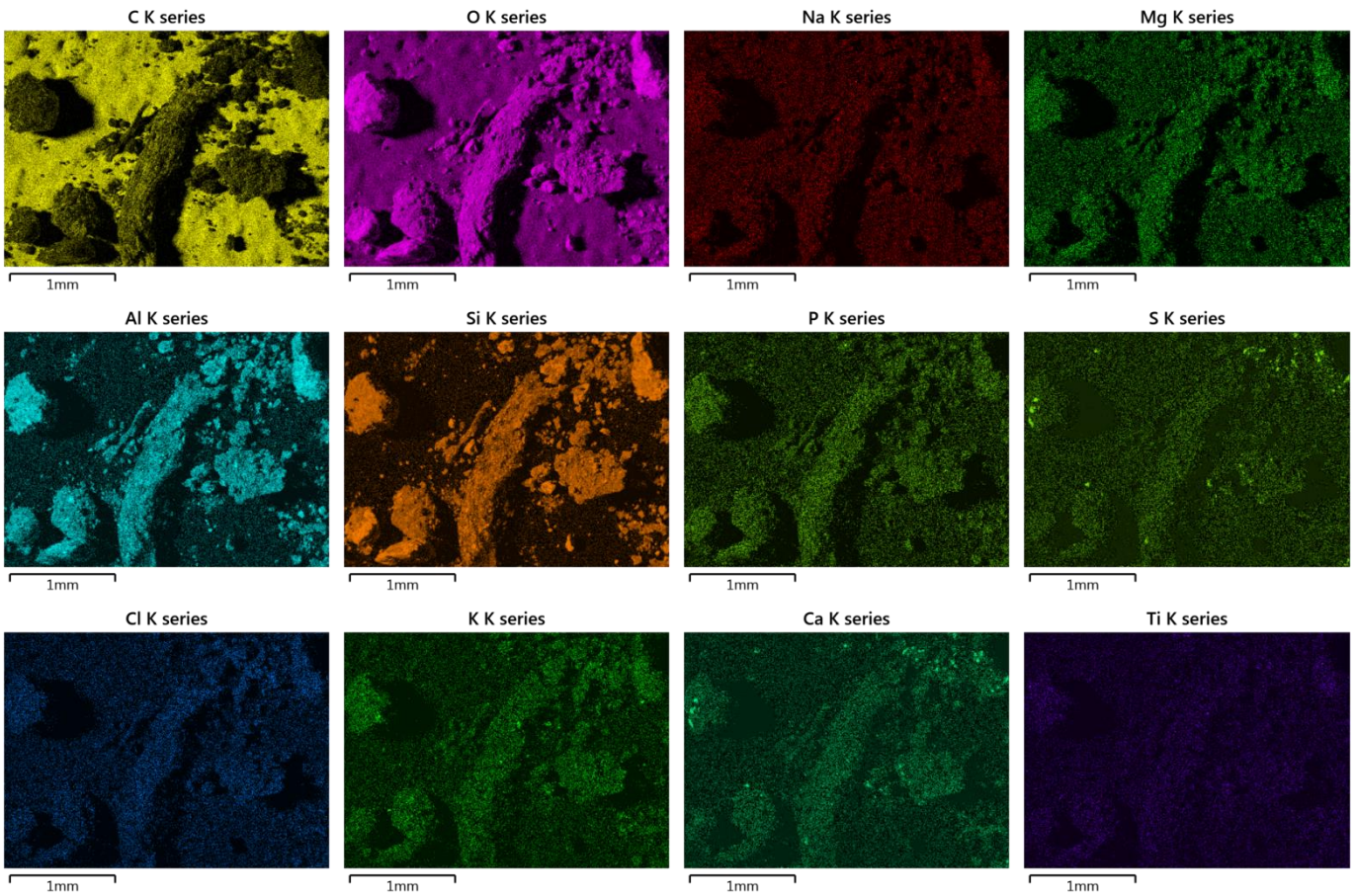
J1 – Spectra for area analyses, image showing their location, previous page.



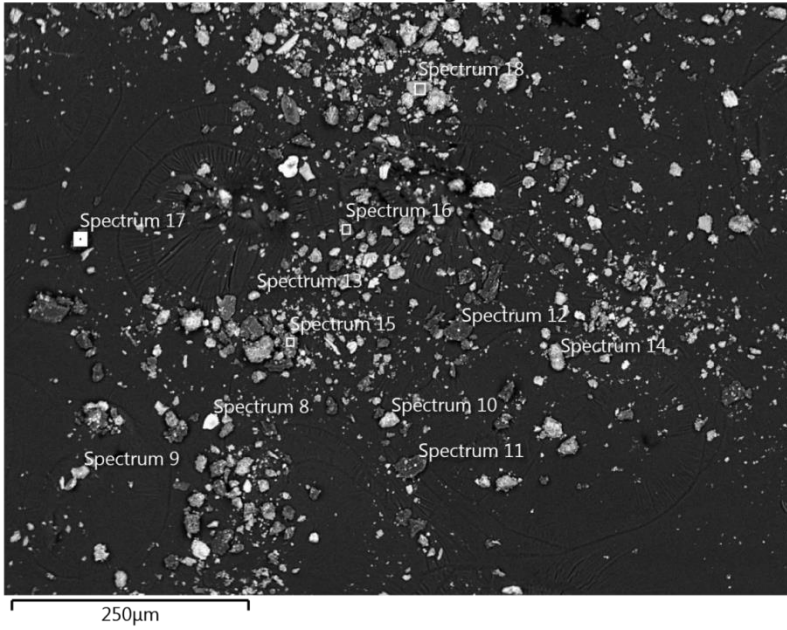
Electron Image 3



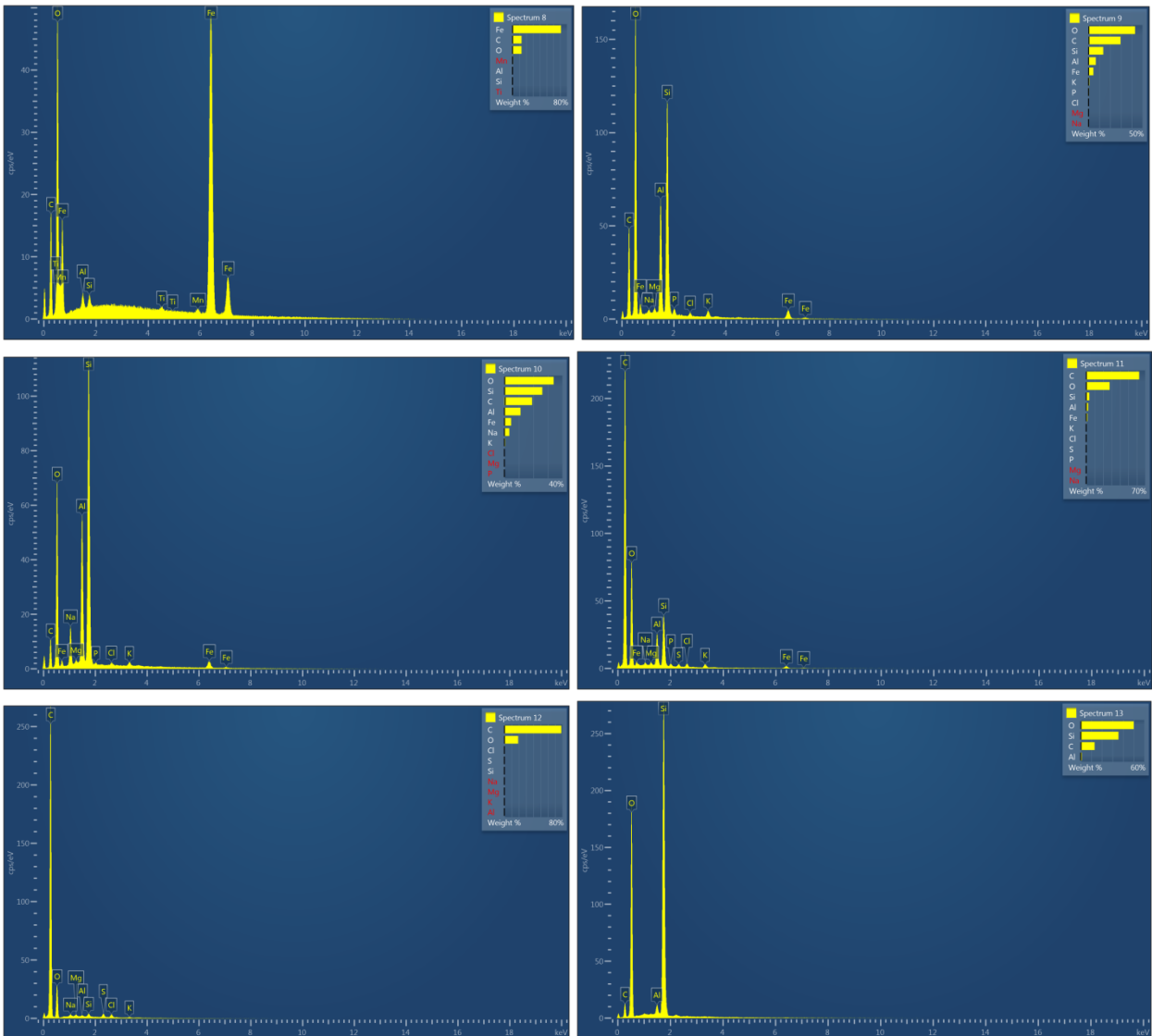
J1 – Spectrum 7 above (clay and geological salts). Element maps below of the central cylindrical grain show it has a similar composition to the composite clay/gypsum smaller angular particles surrounding it. The slightly elevated carbon count suggests there is a small organic component in the central grain also.

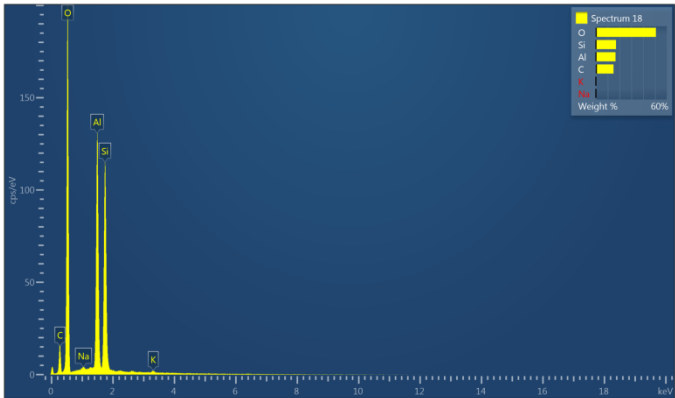
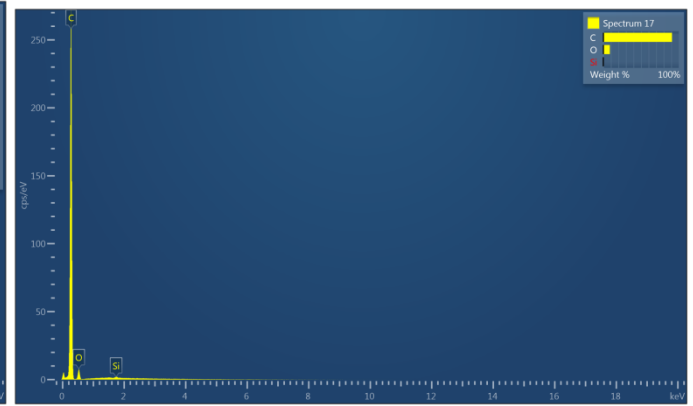
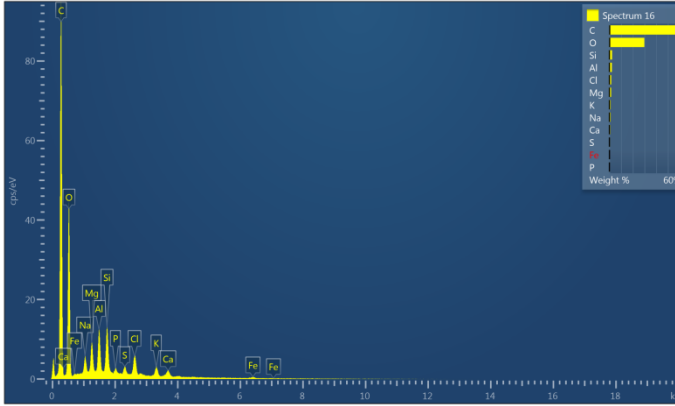
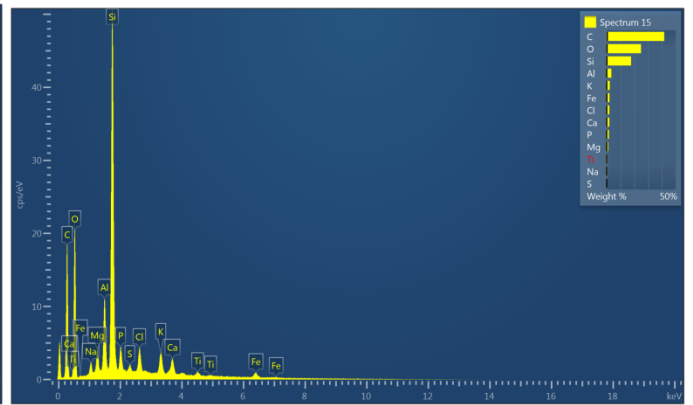
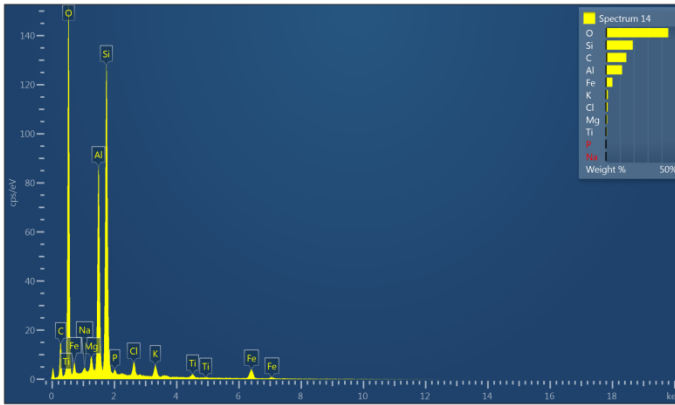
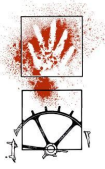


Electron Image 4



J3 – Image above show spectral locations. Spectra 9 to 17, below and overleaf. Spectrum 8 is an Fe grain with small amounts of clay (indicator elements Si, Al, Ti) and trace amounts of manganese. This is likely to be a natural precipitate within the sandstone rather than derived from a vehicle or other machinery.

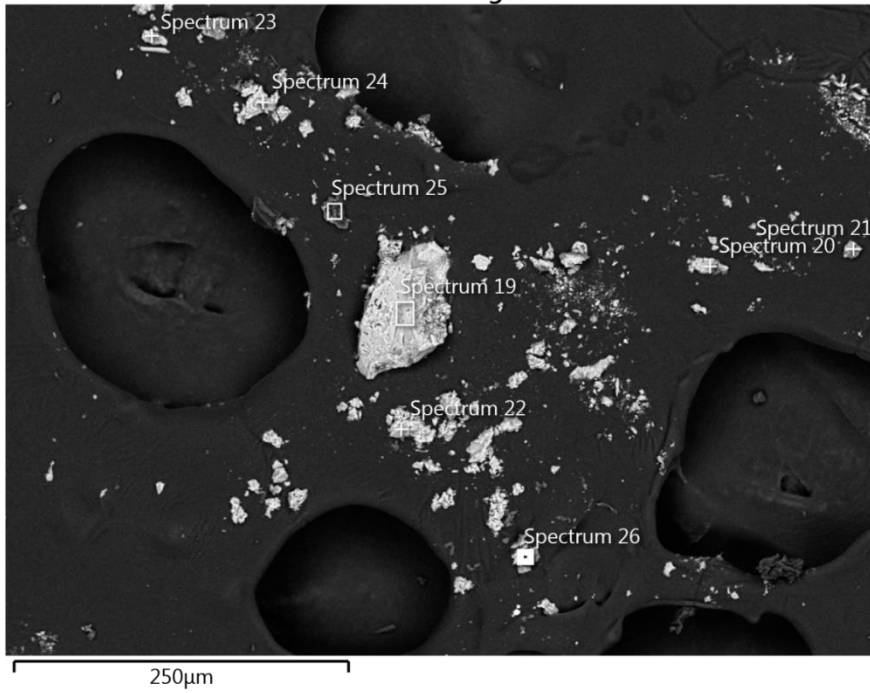




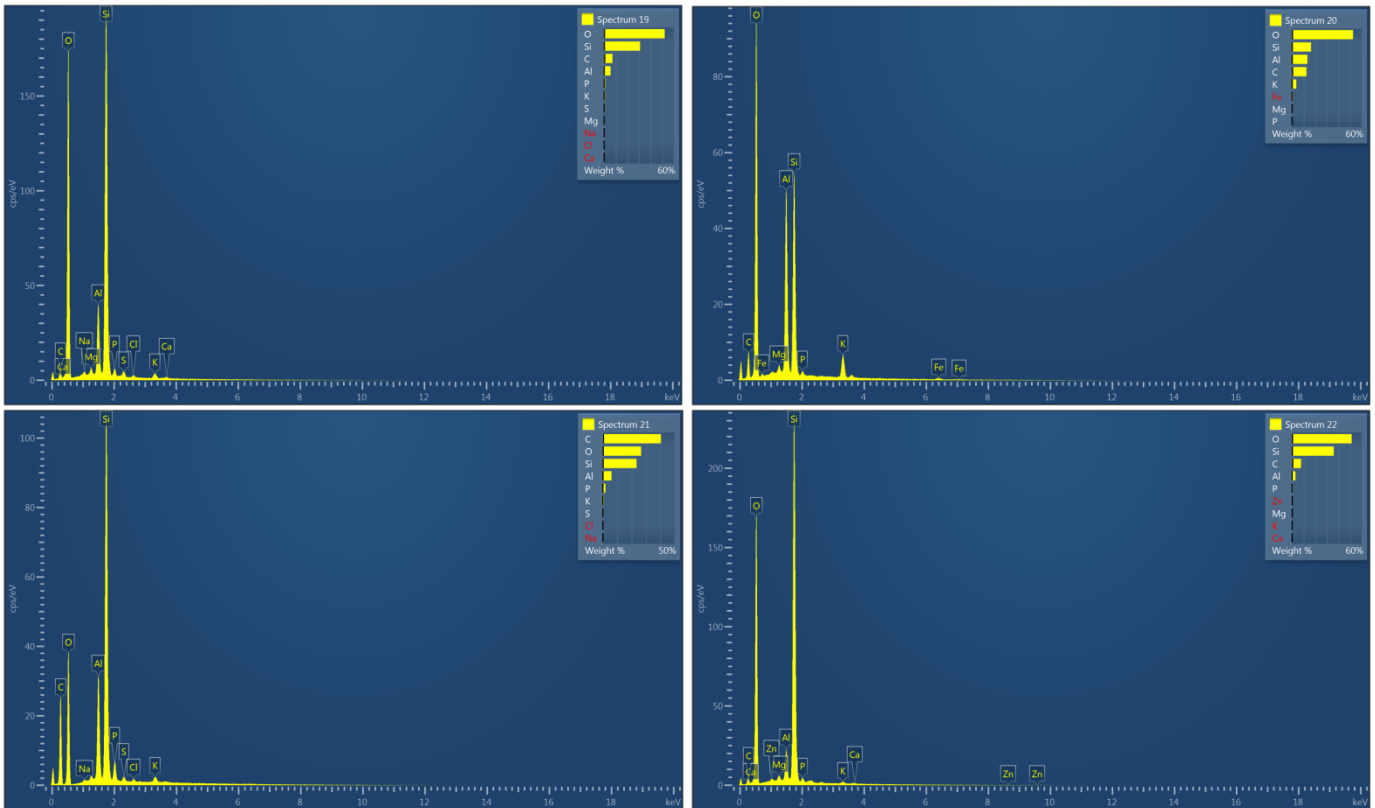
J3 - continued.

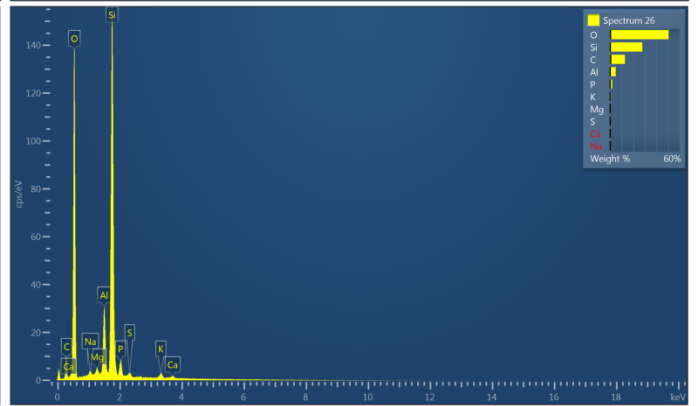
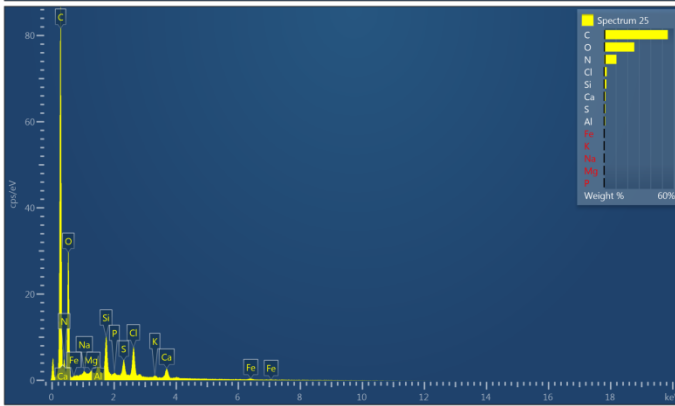
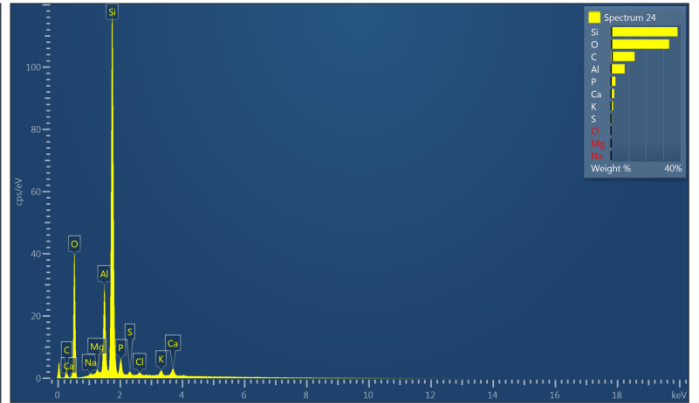
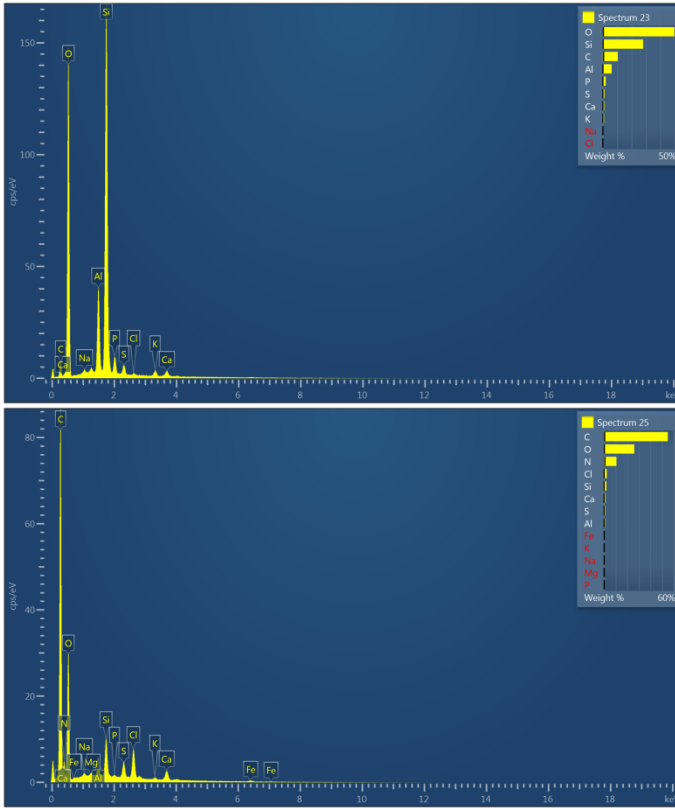
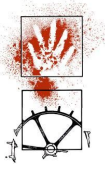


Electron Image 5



L1 – the above image illustrates light quartz and dark charcoal grains and spectral locations. EDS spectra below and overleaf.

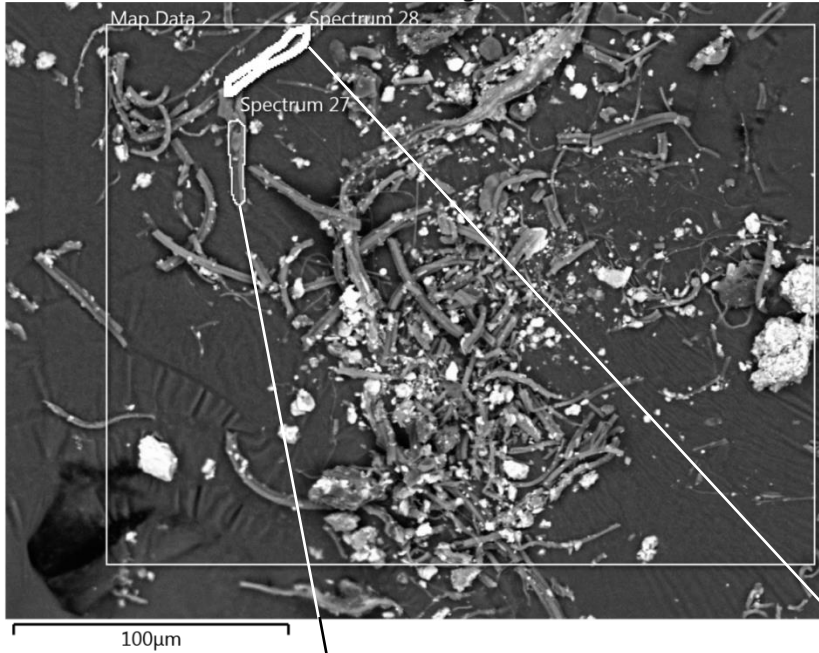




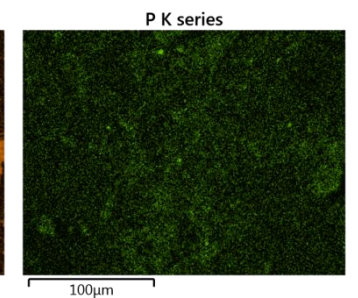
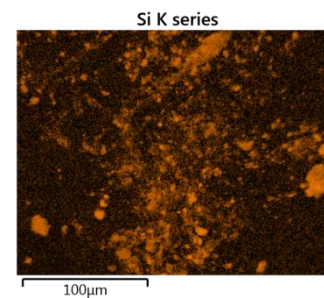
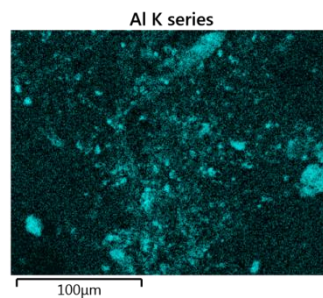
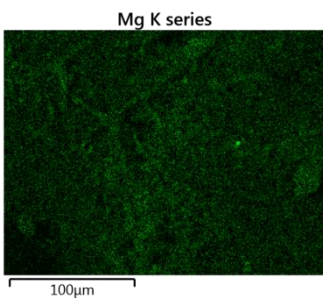
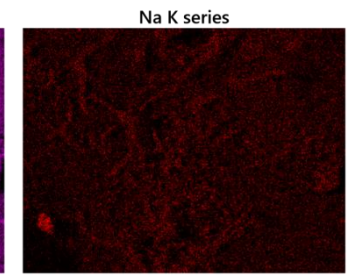
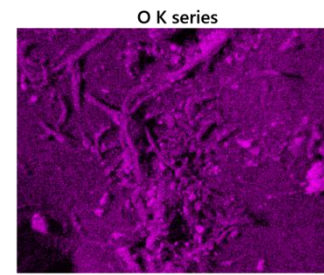
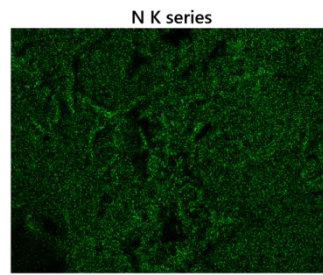
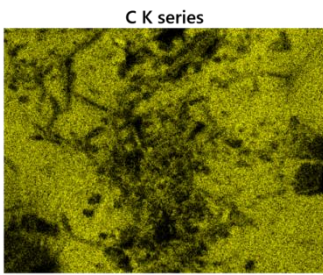
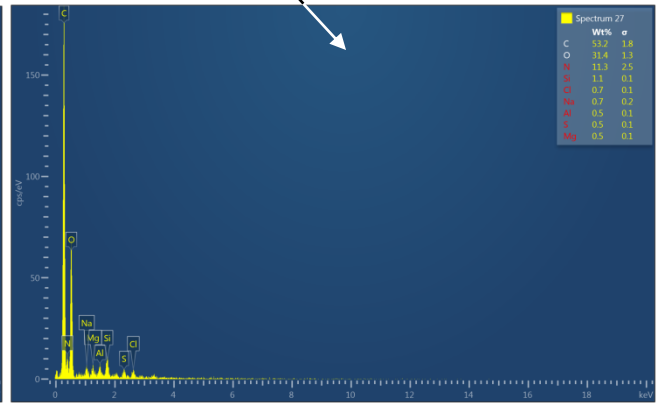
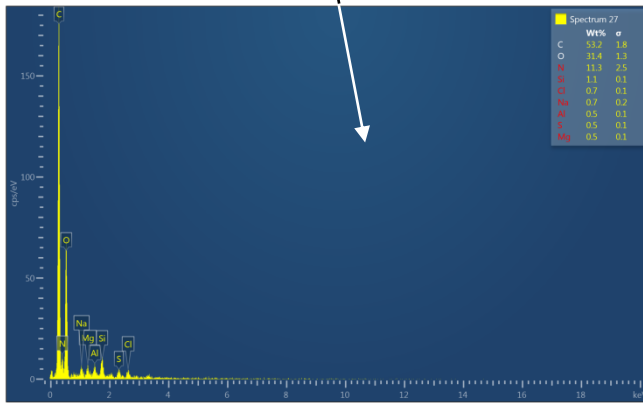
L1 continued.

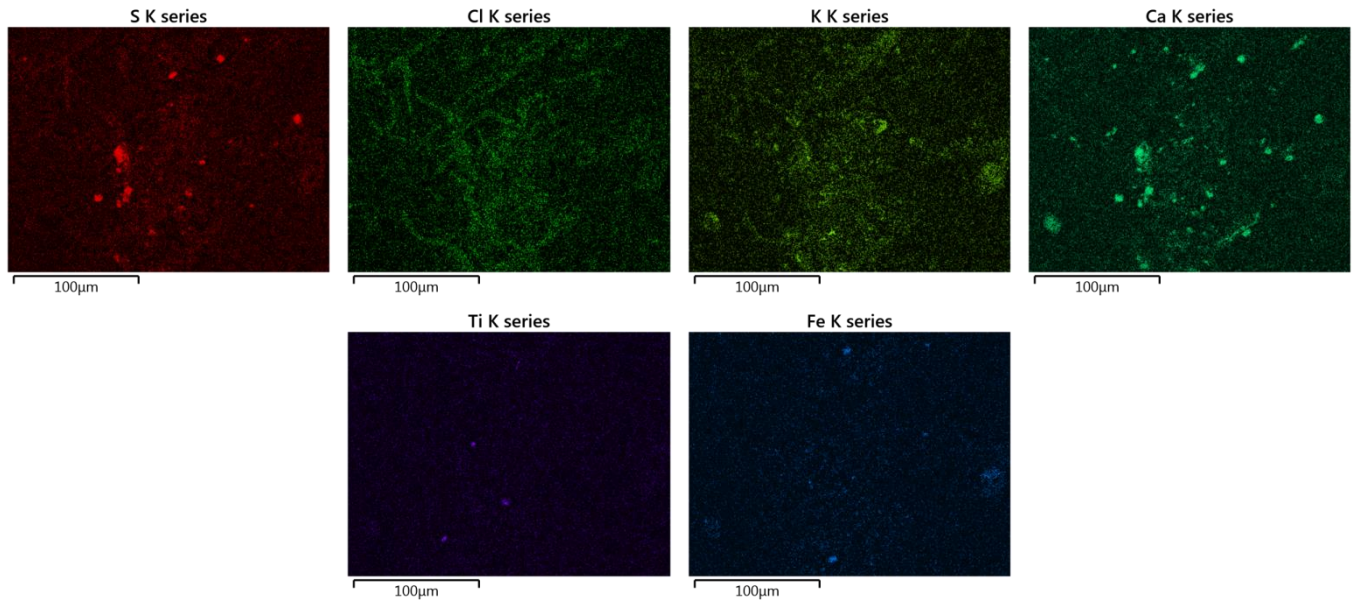
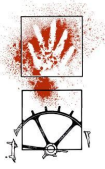


Electron Image 6



L1- lichen with clay/soil grains (clay/alumino-silicate) and evaporate salts. Element maps below and overleaf show elevated carbon, nitrogen and chlorine in the fibrous (organic) structures.



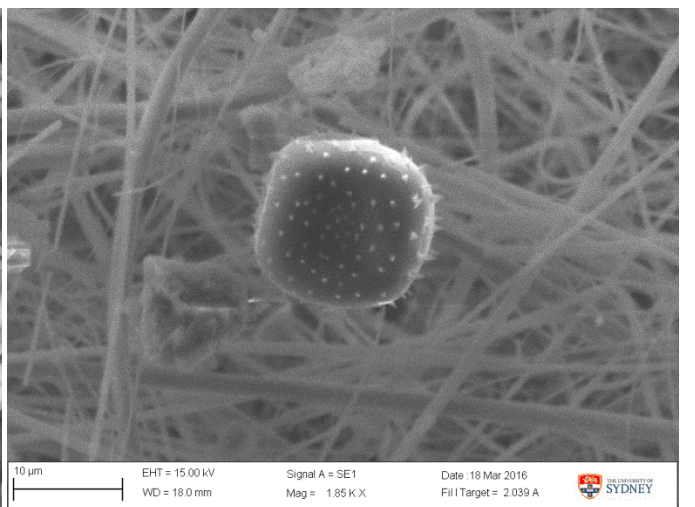
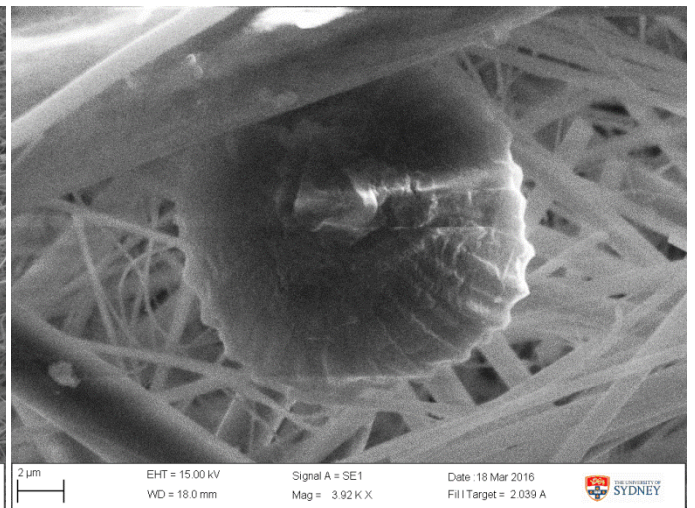
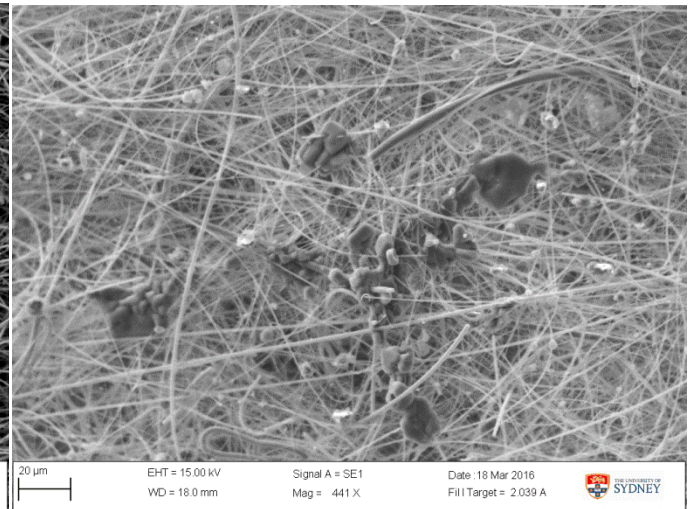
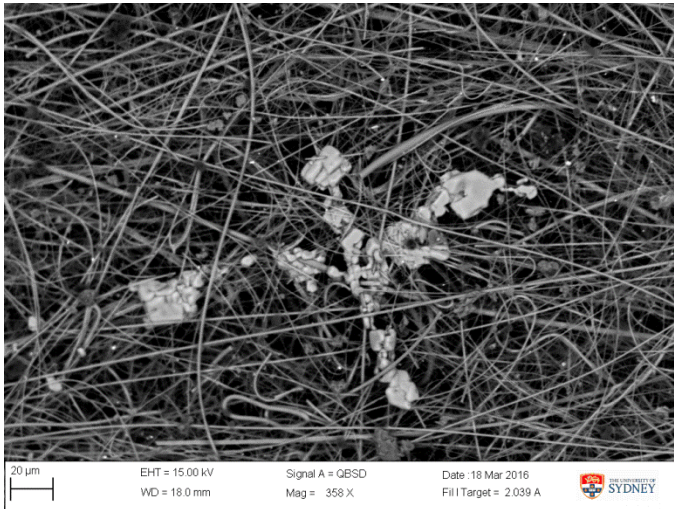




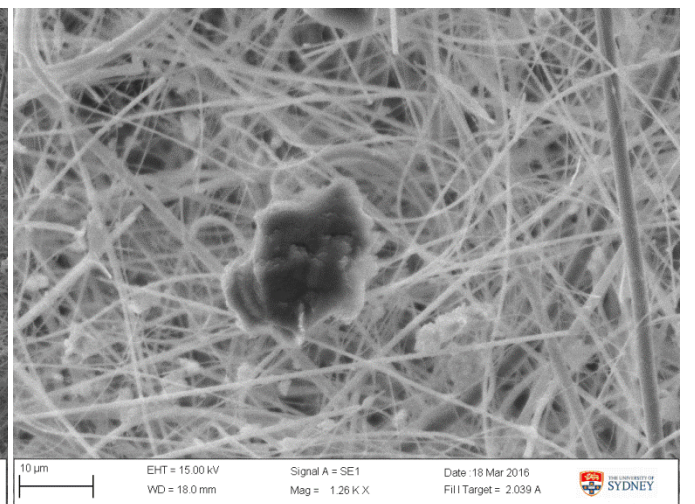
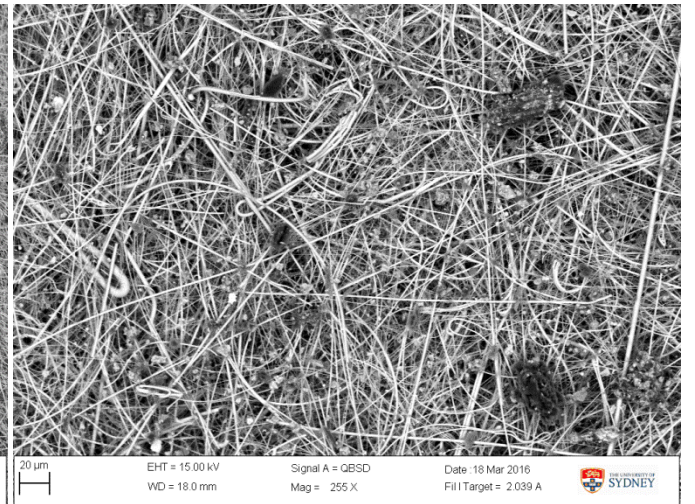
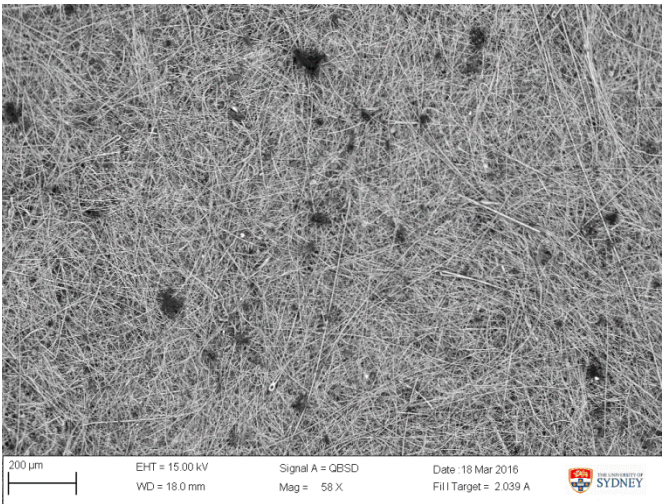
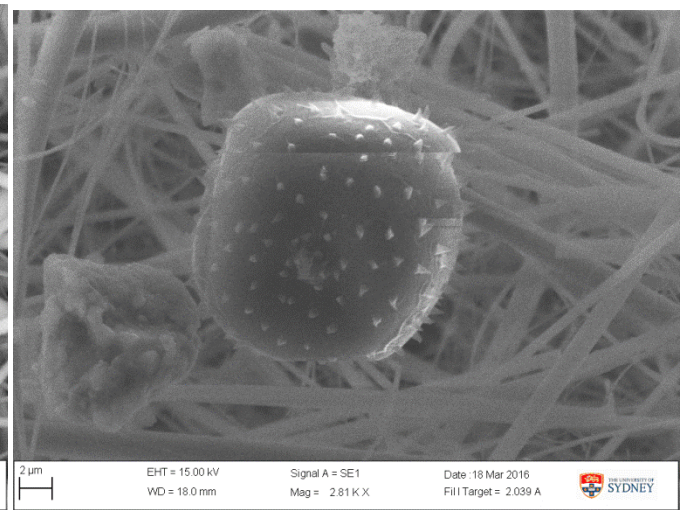
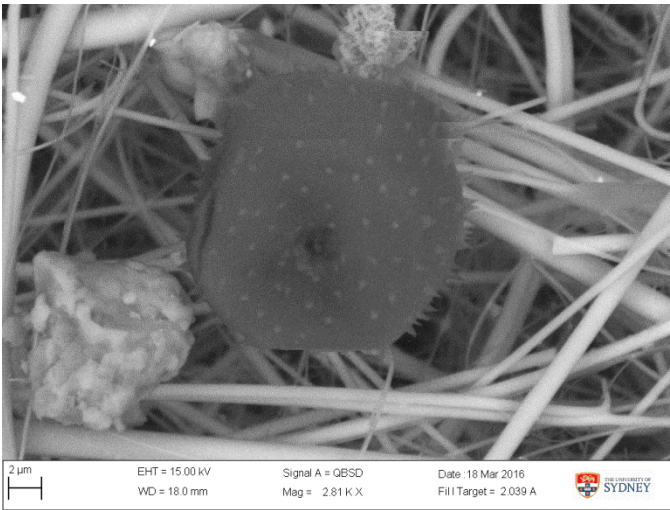
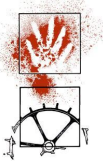
B.4 Image analysis from ACMMA Sydney.

BSD = Backscattered Electron Image.

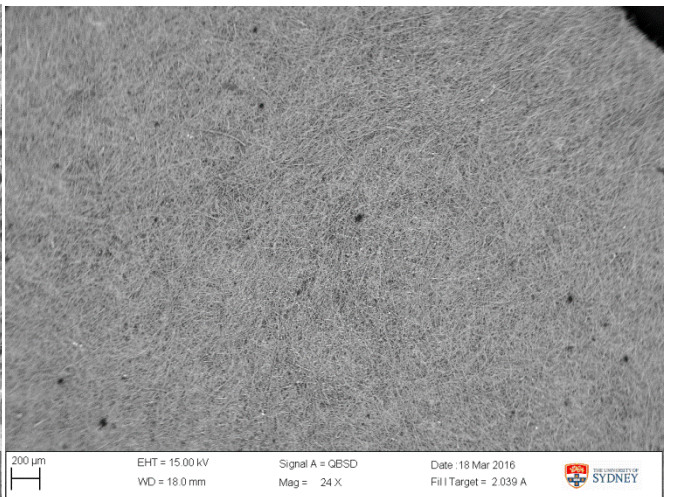
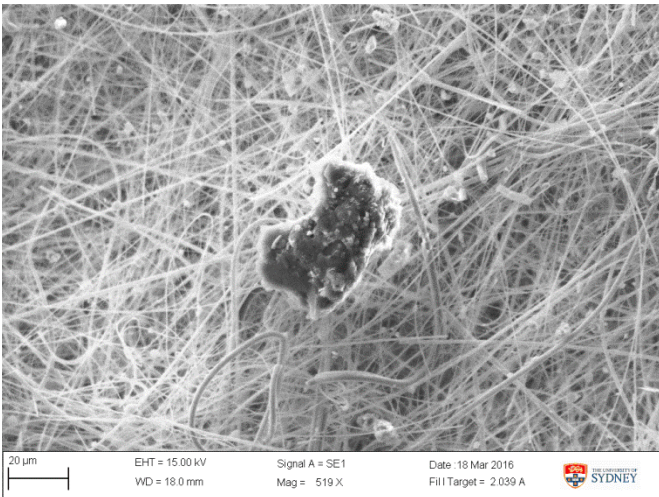
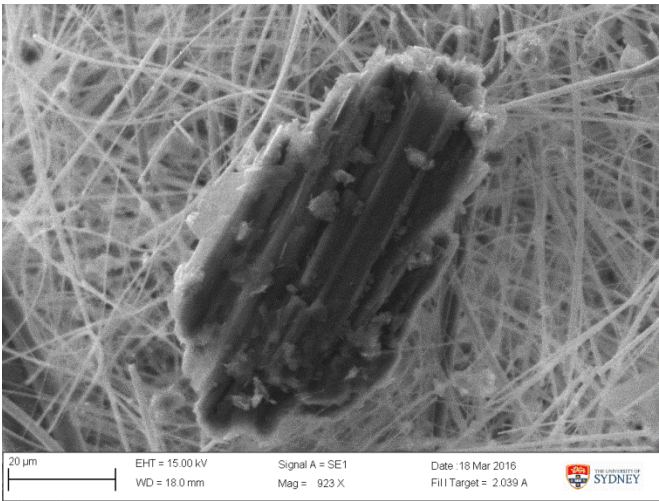
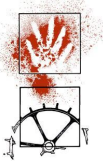
SE1 = Secondary Electron Image.



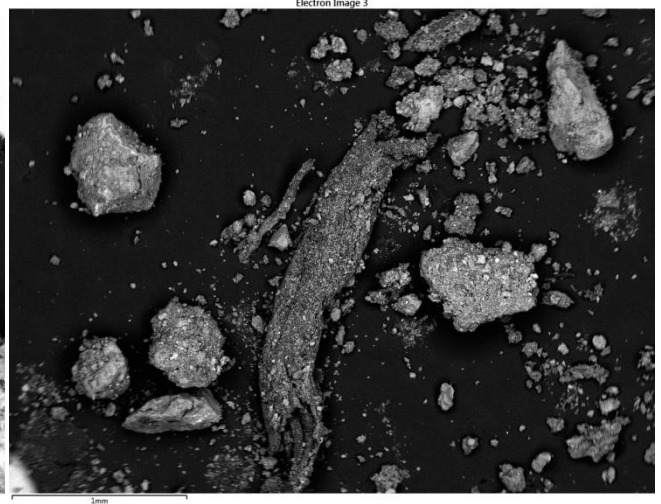
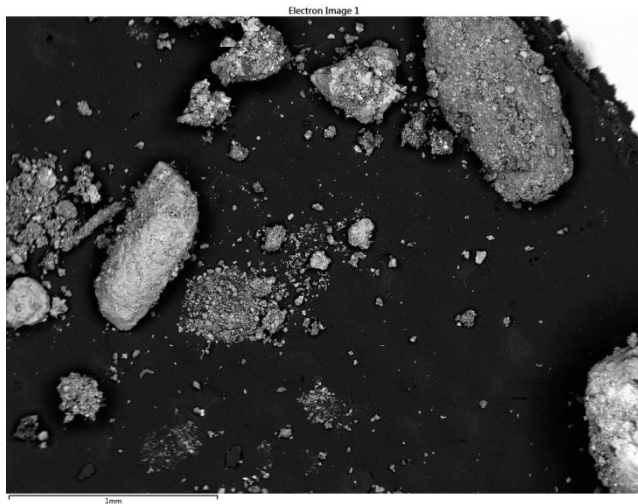
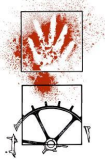
Air monitoring, filter papers Top is a twisted metal composite (BSEI left, SE1 right) presumed to derive from a vehicle. Central and bottom images are organic pollen spores.



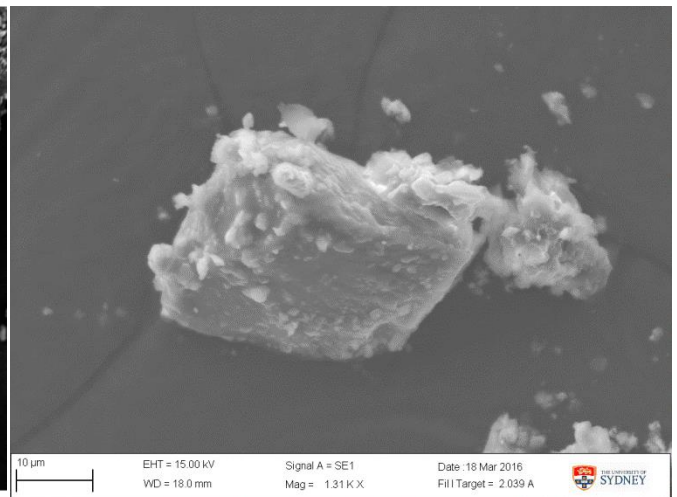
Air monitoring, filter papers More pollen spores (top). Central and bottom images are overviews showing the morphology of coal grains.



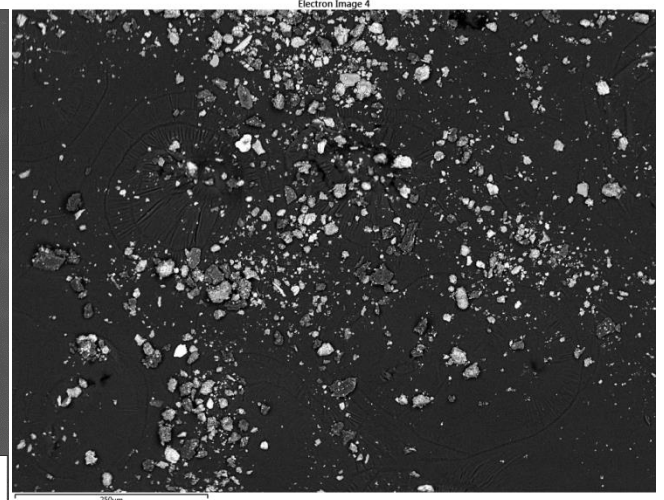
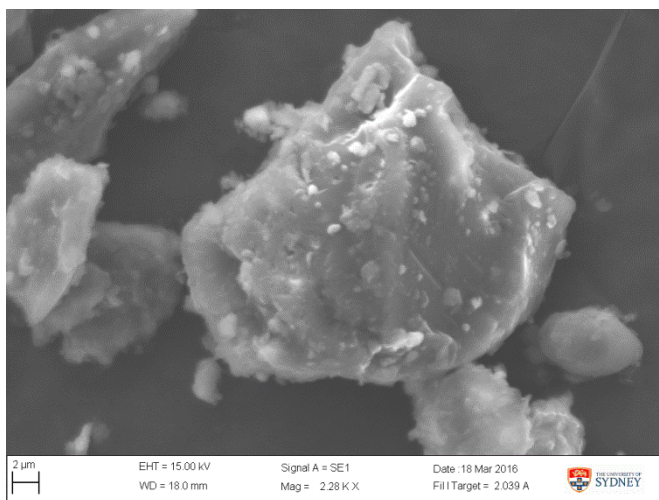
Air monitoring filter papers Left and bottom right show coal grains. Top right is an organic particulate presumed to be part of a plant.



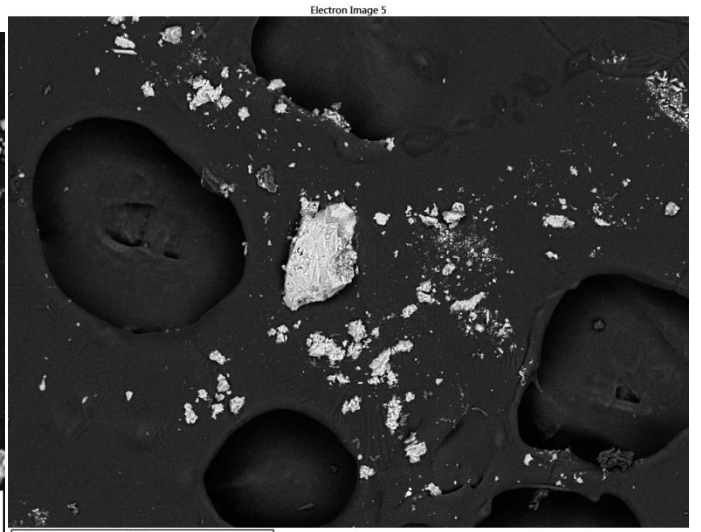
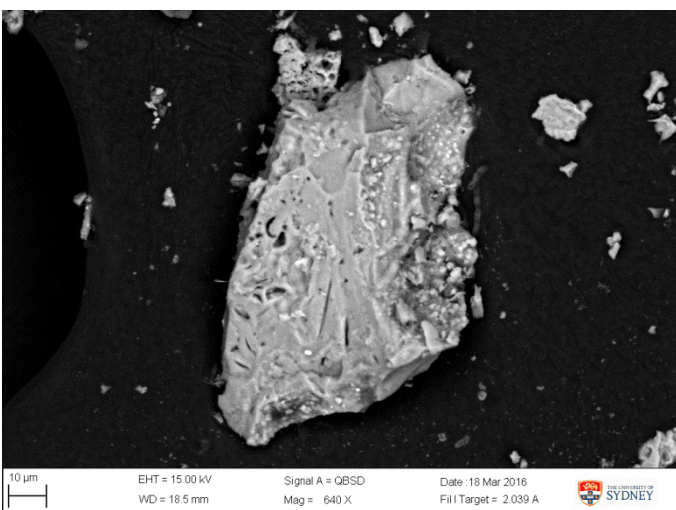
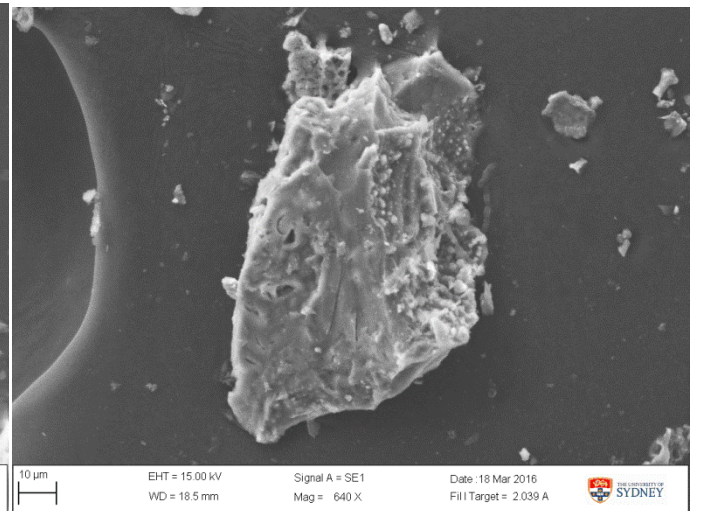
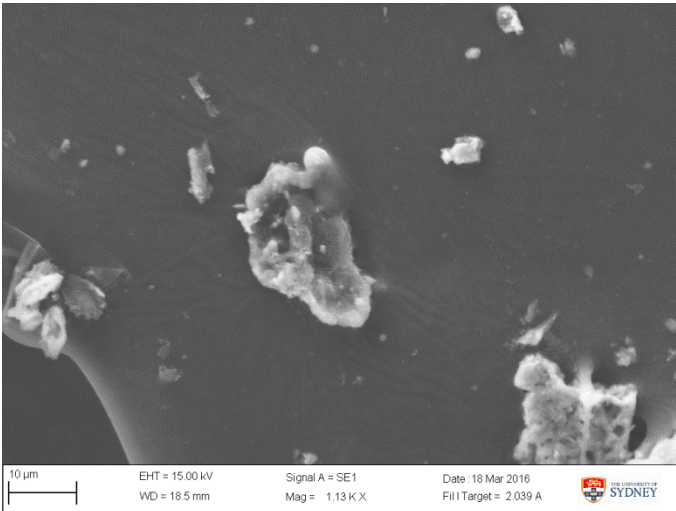
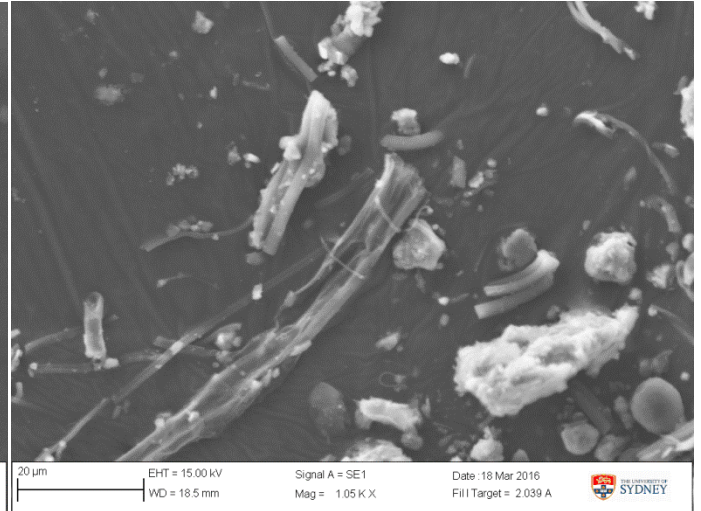
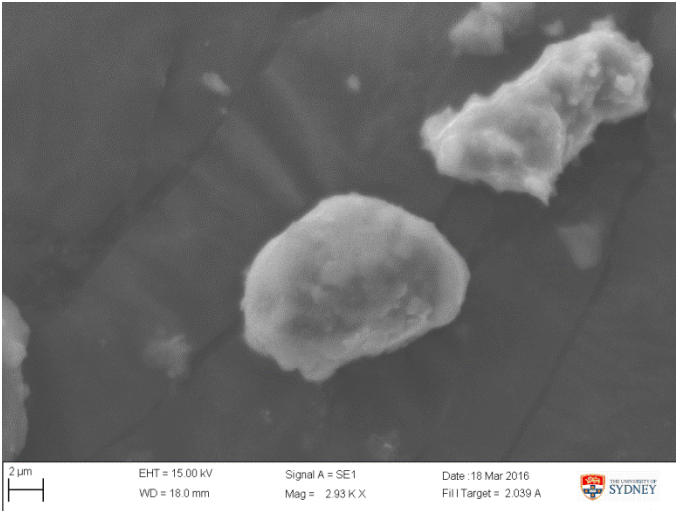
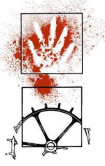
J1 BSE1 and **J1 BSE2** (above left and right).



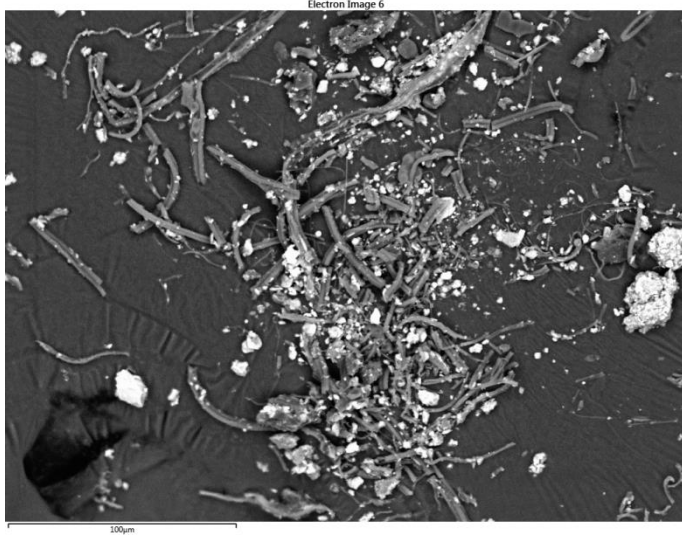
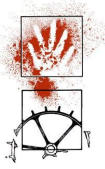
J1 BSE, Close up of suspected fibre (above left, close up of top right). **J1 SEI Cola Grain** (above right).



J3 BSE1 Overview of particles (above right). **SEI J3** Close up of coal grain (above left).



L1 BSEI Overview of all grains (bottom right). Close up of etched quartz grain (BSEI bottom left and SEI central right). Smaller particles of carbon (SEI top left) and clay/sulphide composite (SEI central left). Carbon organic structure, probably lichen (SEI top right).



L1 BSE1 overview of suspected lichens (above).



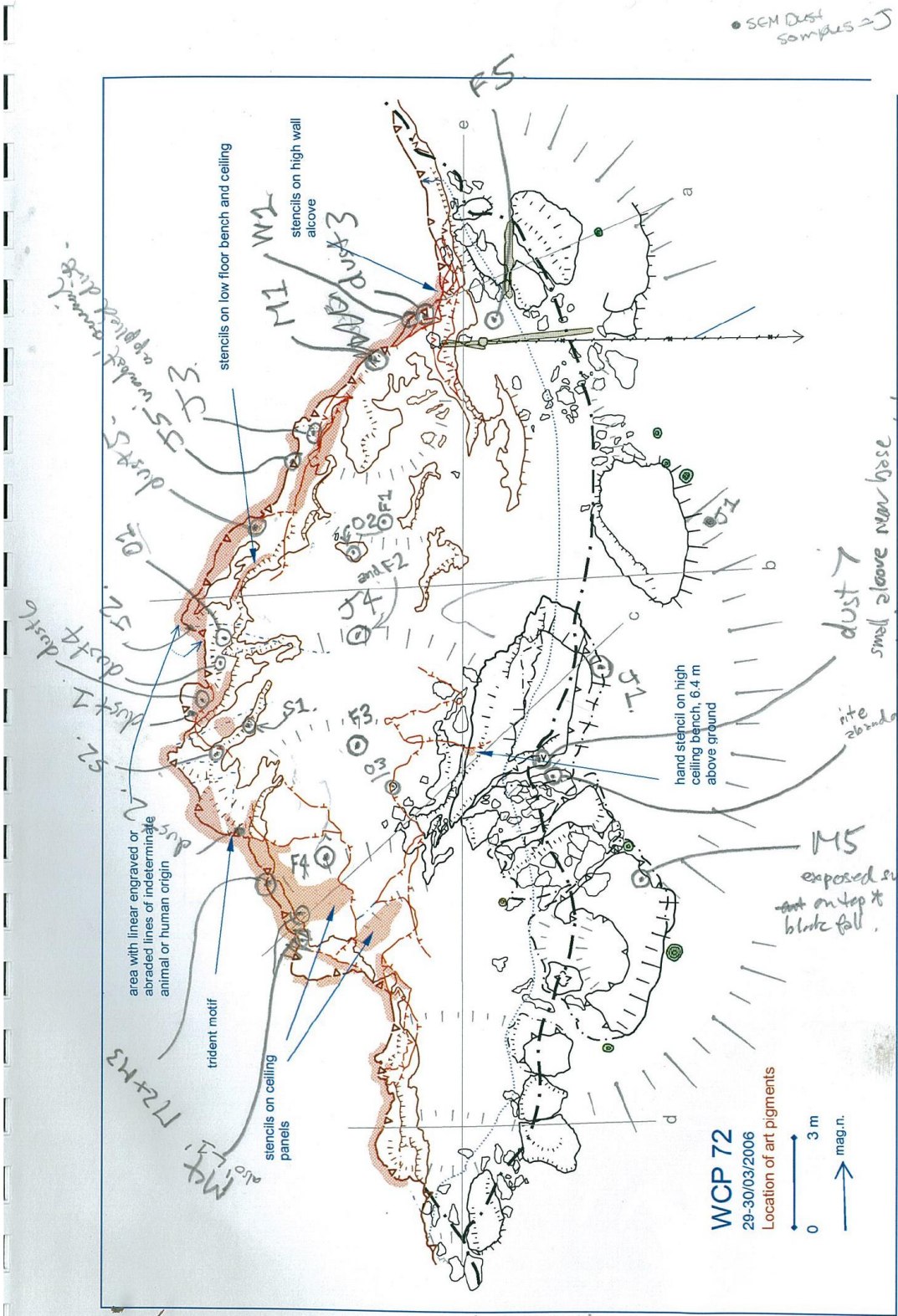
APPENDIX C

FIELD NOTES ON LOCATION OF ROCKSHELTER SAMPLES

Annotations have been made over figures from baseline recording report (NOHC 2006)

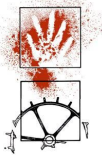
Note that material identifications were indicative at the time of fieldwork and do not necessarily reflect subsequent results of analysis

• SCM Dust samples 25



S1 = bird scat/streak on rock floor.

Baseline recording of Aboriginal rock art sites WCP72, 152 and 153
Navin Officer Heritage Consultants Sept. 2006



W2

W1

L2 J2



Figure 4.10 General view of lichen growing on dust deposits on an upward facing micro-ledge (photo 404)



Figure 4.11 View of pigment covered abraded lines which may be animal or human in origin (photo 334)

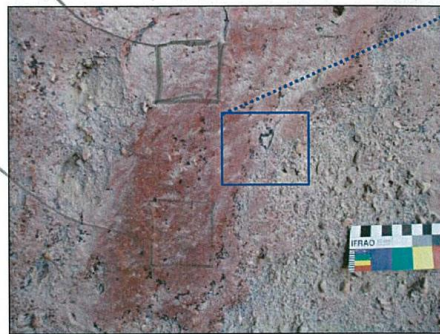


Figure 4.12 General view of lichen growth (photo 389)



Figure 4.13 Close up of lichen growth, showing growth pattern behind a formerly (no gone) semi-detached exfoliation spall (photo 391)



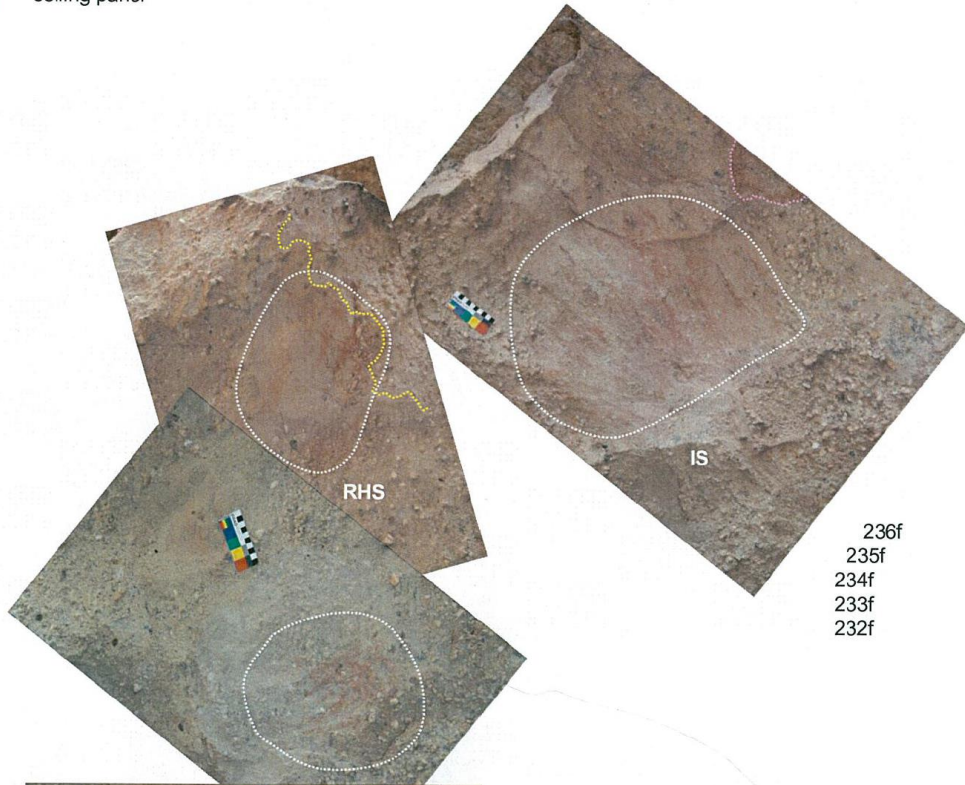
Figure 4.14 Close up view of surface deposit or bird dung overlying dust deposits which in turn overly red art pigments (photo 386)



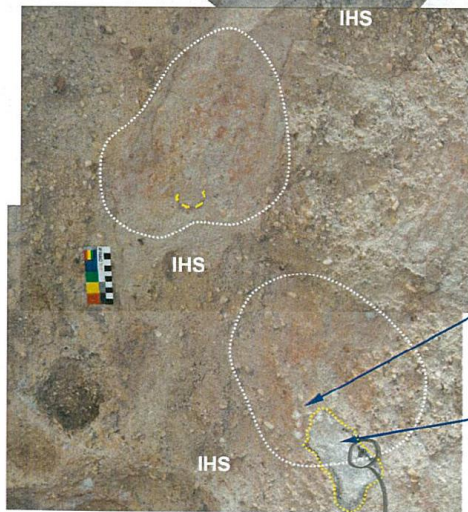
Figure 4.15 General view of Fairy Martin 'mud-bottle' nest remains (one relatively intact) on ceiling (photo 294)



ceiling panel



236f
235f
234f
233f
232f



small and broad areas of thin layer surface spall exfoliation variously evident across most of panel

fresh spall scars (small white patches)

scar from single exfoliation spall revealing dark surface mineral (or organic) deposits which accumulated under spall when partly detached

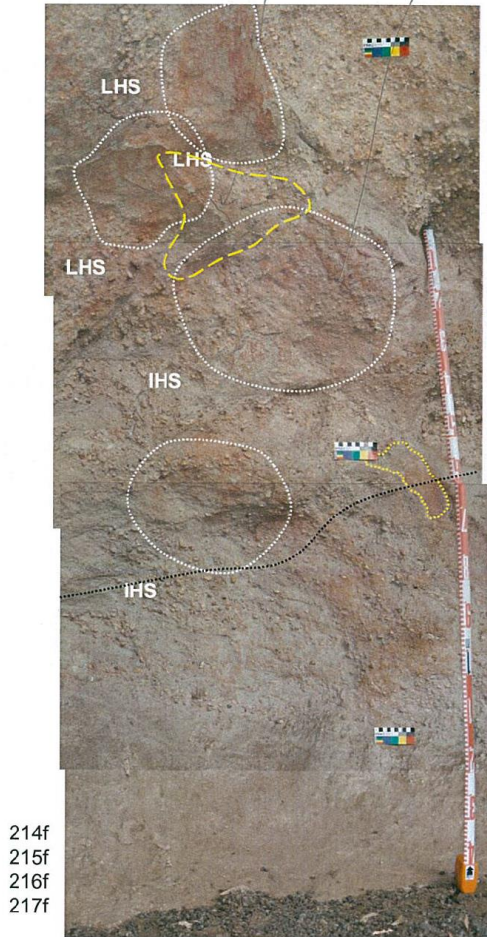
*M4
also L1.
Sampled 'organic' dark deposit*



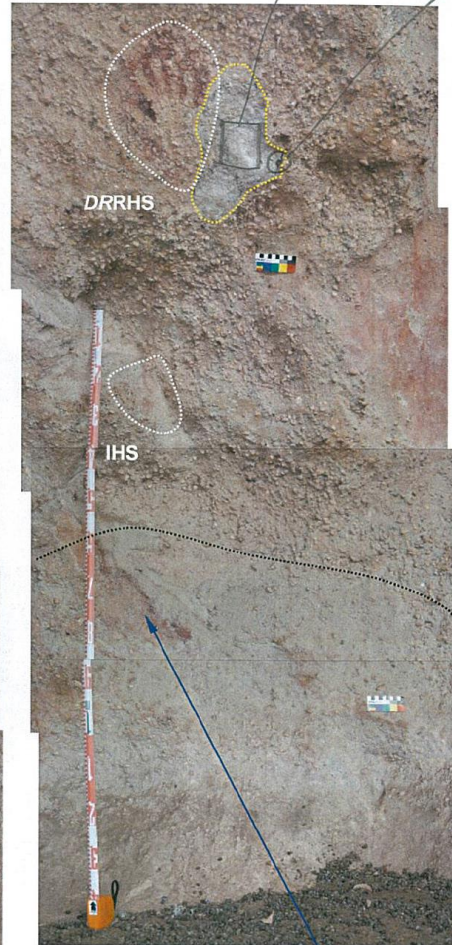
Possible new cracks? ^{check phosphorus?}
existing

M2 white salts.

M3. disk instead at edge of exfoliation area.



214f
215f
216f
217f



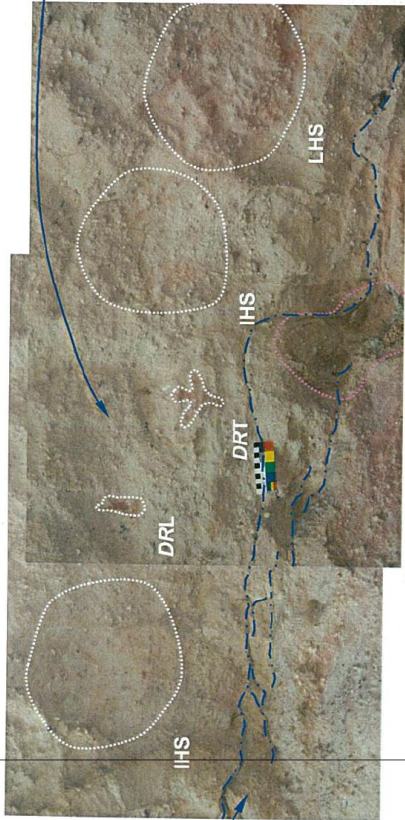
218f
219f
220f
221f

surface deposits of red oxides of indeterminate natural or art origin, variously across lower panel surfaces

small and broad areas of thin layer surface spall exfoliation variously evident across most of panel



These two graphics are two of only three clear motifs (as opposed to stencilled objects) in this shelter

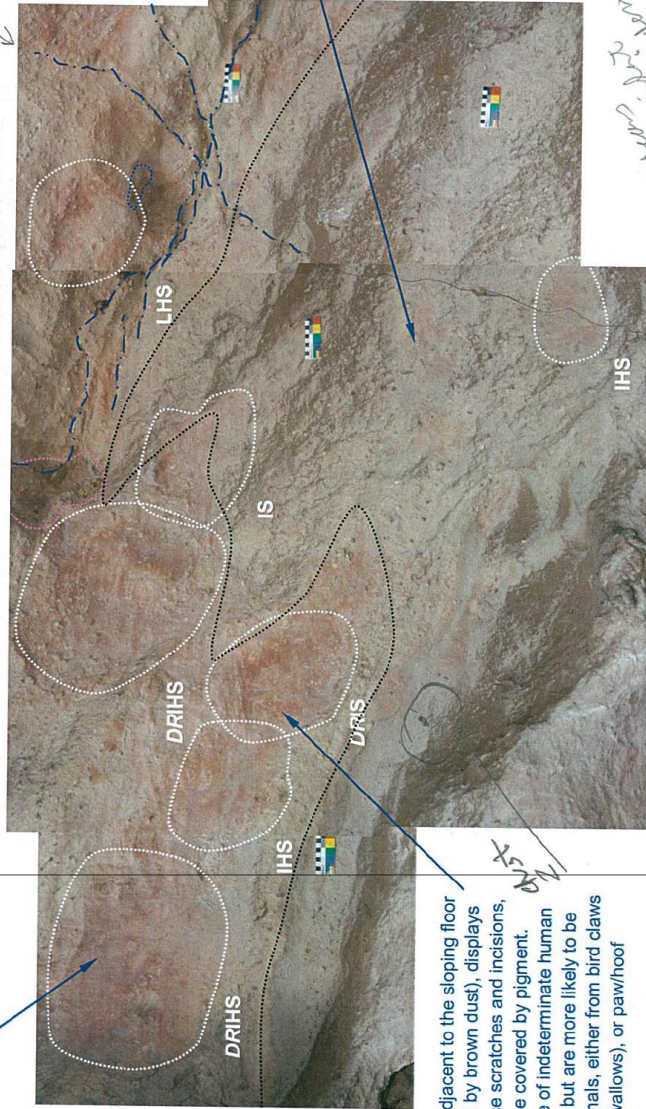


this crack appears to be more endore and possibly wider in aperture.

248f 249f

numerous cracks across this art panel suggest stress fractures

darker red stencils (circled) appear to superimpose older orange-red pigments, probably the remains of earlier stencils



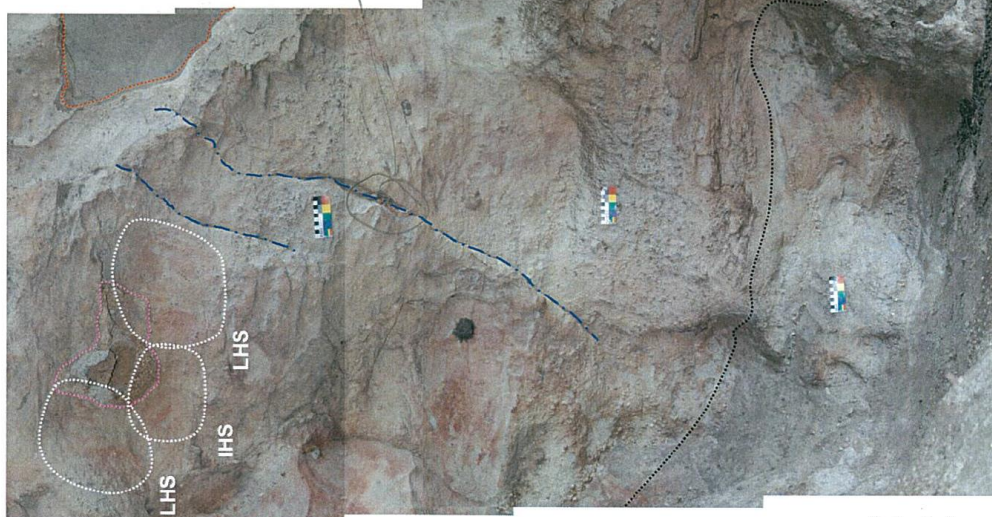
extensive dust deposits on lower upward facing surfaces, obscure probable art pigments, and provide nutrients for lichen

252f 253f 256f 254f 257f

This art panel, adjacent to the sloping floor bench (indicated by brown dust), displays fine linear surface scratches and incisions, most of which are covered by pigment. These marks are of indeterminate human or animal origin, but are more likely to be the result of animals, either from bird claws (such as from swallows), or paw/hoof impact.

Baseline recording of Aboriginal rock art sites WCP72, 152 and 153
Navin Officer Heritage Consultants Sept 2006

Handwritten note: This crack appears to be more endore and possibly wider in aperture.



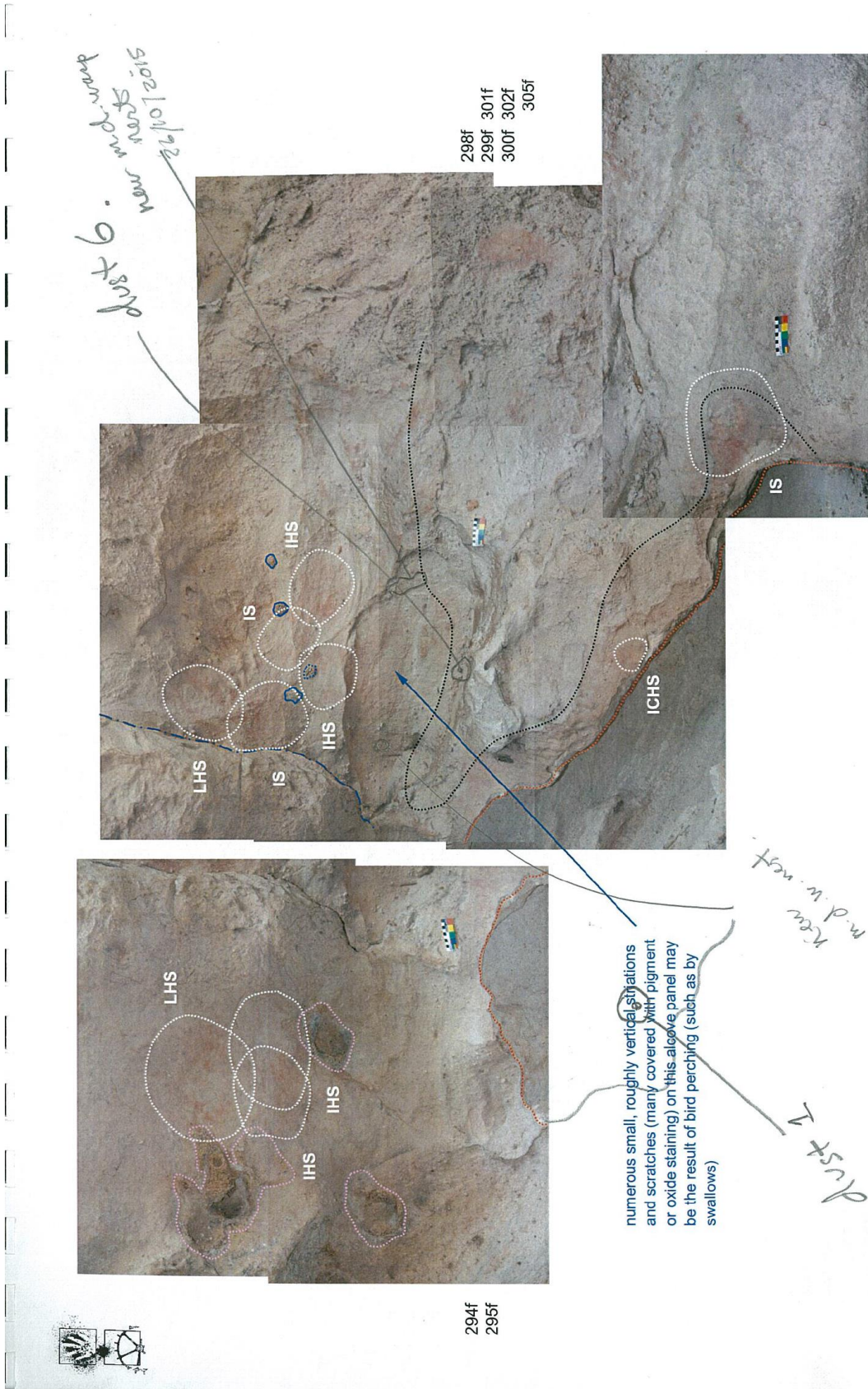
rocks appear to be weathered
with evidence to both sides of
crack - in weather marks

282f
283f

278f
279f
280f
281f

Baseline recording of Aboriginal rock art sites WCP72 and 153
Navn Officer Heritage Consultants
Sept 2006

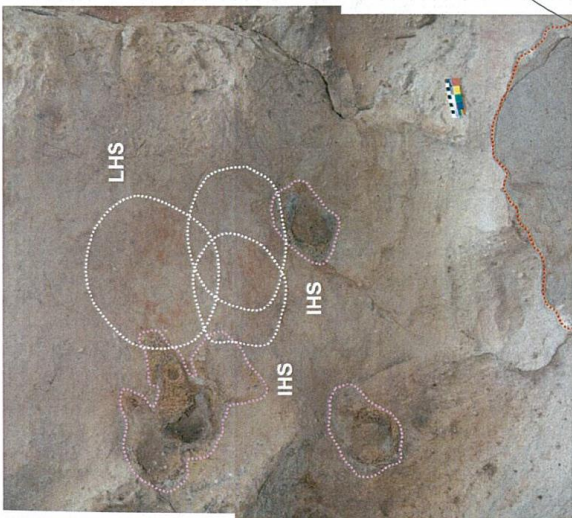
52.



dust 9.
 brown dust
 26/10/2015

298f
 299f 301f
 300f 302f
 305f

dust 46.

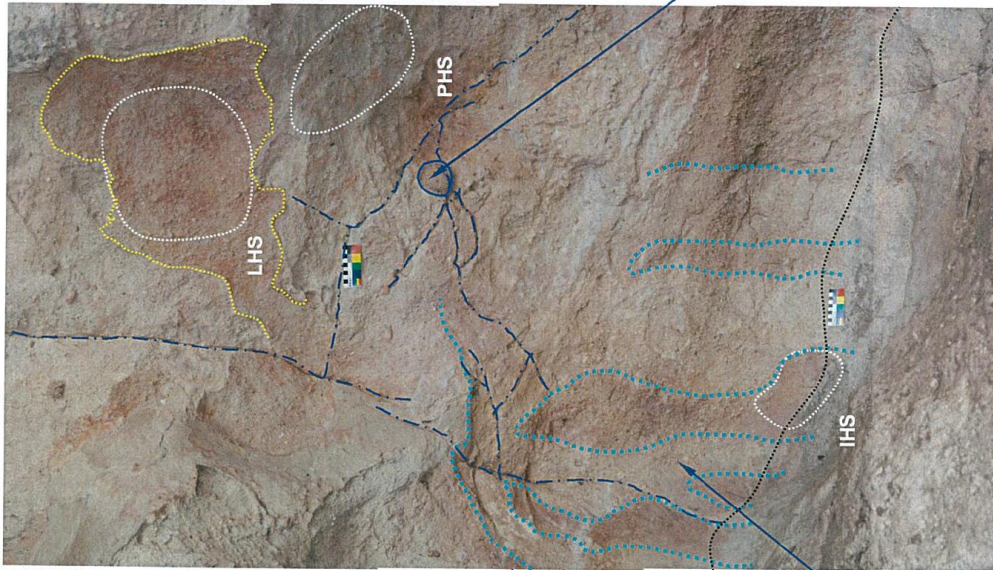


294f
 295f

numerous small, roughly vertical striations and scratches (many covered with pigment or oxide staining) on this alveole panel may be the result of bird perching (such as by swallows)

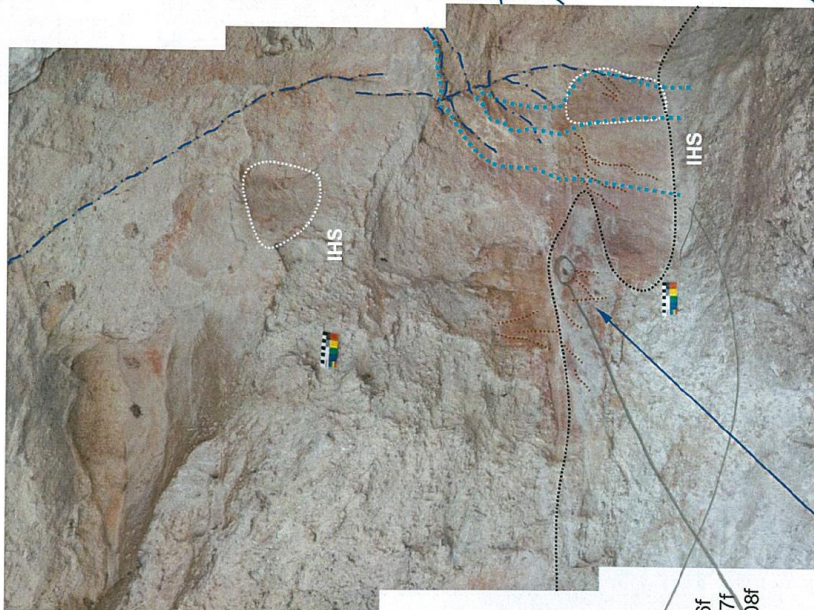
dust 1
 brown dust

Baseline recording of Aboriginal rock art sites WCP72, 152 and 153
 Navin Officer Heritage Consultants Sept. 2006



old and mineralised mud daubed wasp nest, a possible source of dating and research material

309f
310f
311f
312f



The lower art panel has been substantially impacted in the past from surface water wash originating from the network of cracks along the back wall. This has redeposited pigment on the lower surfaces. There was no evidence for recent water flows from this source.

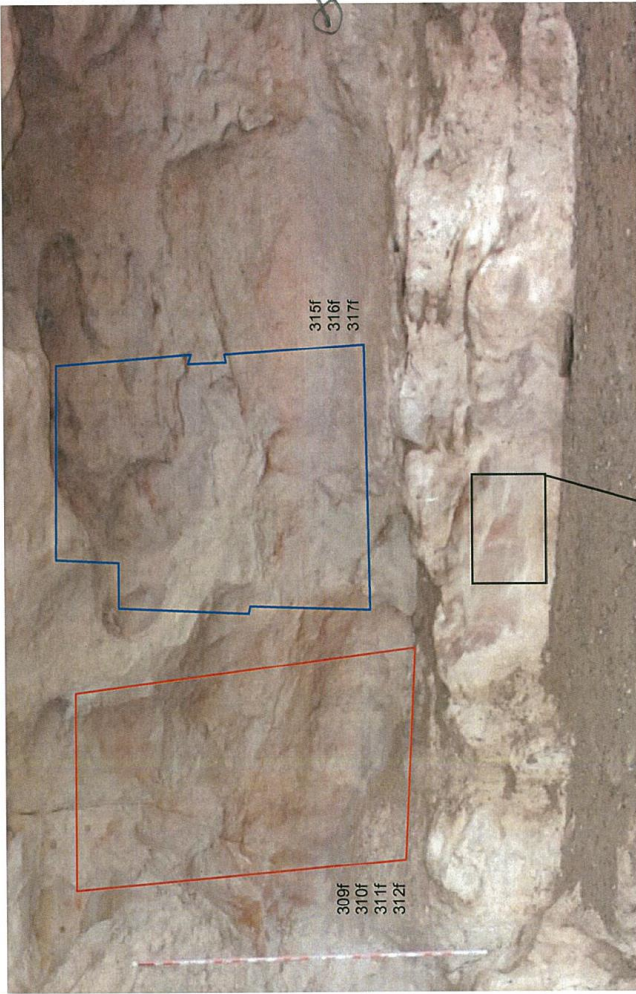
This art panel, displays fine linear surface grooves (indicated in dark red), like scratches or incisions, most are covered by pigment. These probably have an animal origin, such as from birds claws or mammal paws/hoooves, but may also relate to natural bedding features

306f
307f
308f

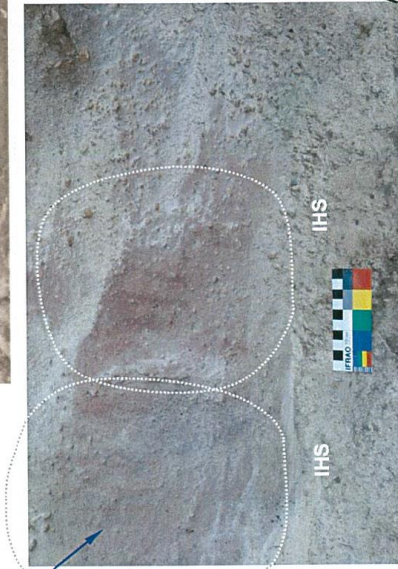
*Paint will in future of
water seeps through
activated cracks & Ad
the on example of Ad
expant water seeps through cracks*



Baseline recording of Aboriginal rock art sites WCP72, 152 and 153
Navin Officer Heritage Consultants Sept 2006



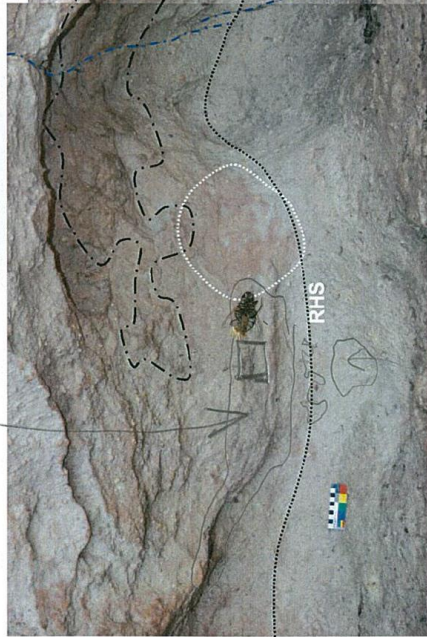
a well bonded layer of light grey dust, (probably also partially mineralised) is evident across this panel and superimposes the art pigments



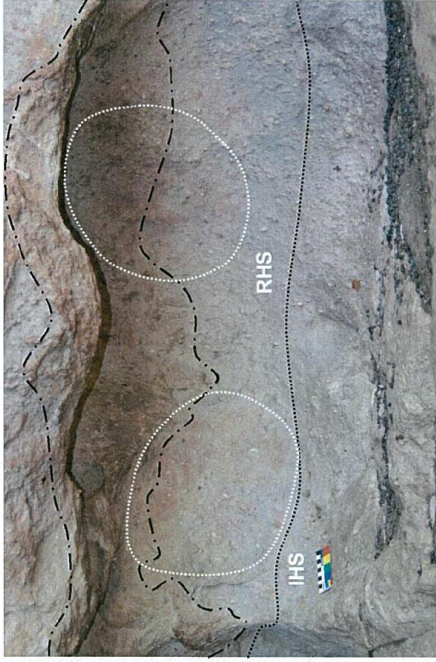


refer 352f - 362f for upper art panel

55



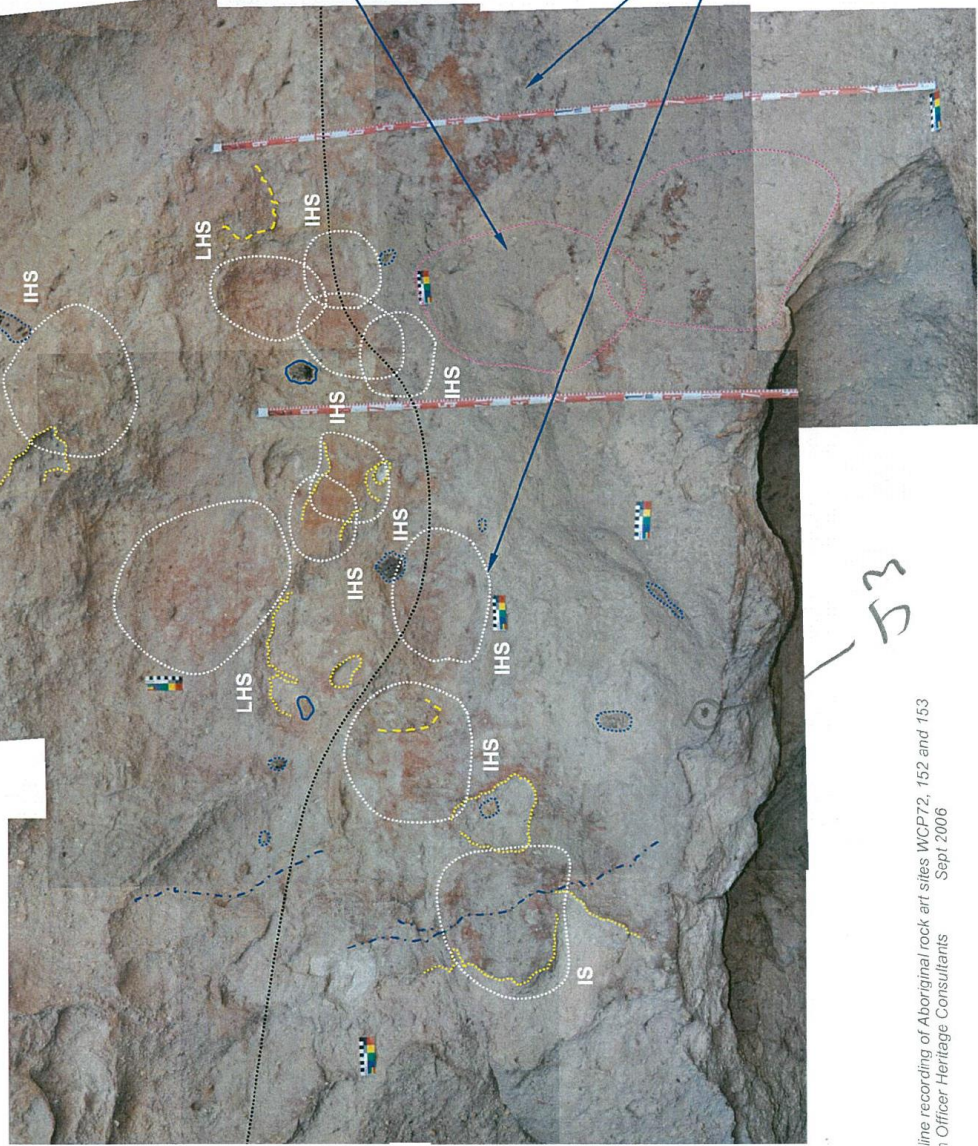
347f 348f



349f

Handwritten notes:
at 'unf' sites
applicable / panel
from 'unf' on
on 'unf' on
'unf' on 'unf' on
'unf' on 'unf' on
'unf' on 'unf' on

Baseline recording of Aboriginal rock art sites WCP72, 152 and 153
Navin Officer Heritage Consultants Sept 2006



small and broad areas of thin layer surface spall exfoliation variously evident across most of panel

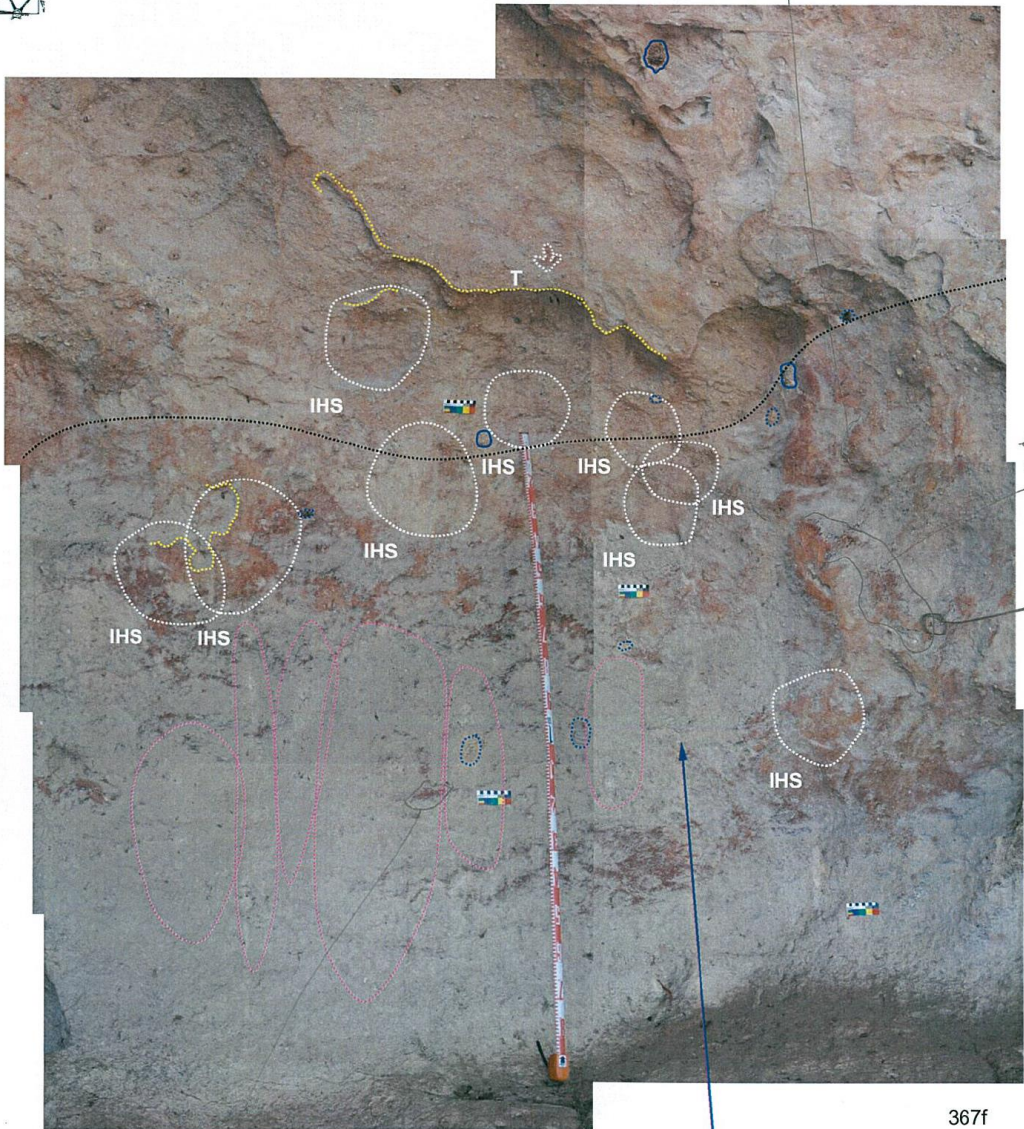
bird faeces on upward facing surfaces relates to bird perches

a well bonded, dense, (and probably partially mineralised) layer of light grey dust overlies and obscures a formerly extensive ...

- 352f 355f 359f 358f
- 353f 356f 360f
- 354f 357f 361f
- 362f

53

Baseline recording of Aboriginal rock art sites WCP72, 152 and 153
Navin Officer Heritage Consultants Sept 2006



existing crack

existing organics

M1 ✓

363f
364f
365f
366f

367f
368f
369f
370f

existing organics
evident over pigment

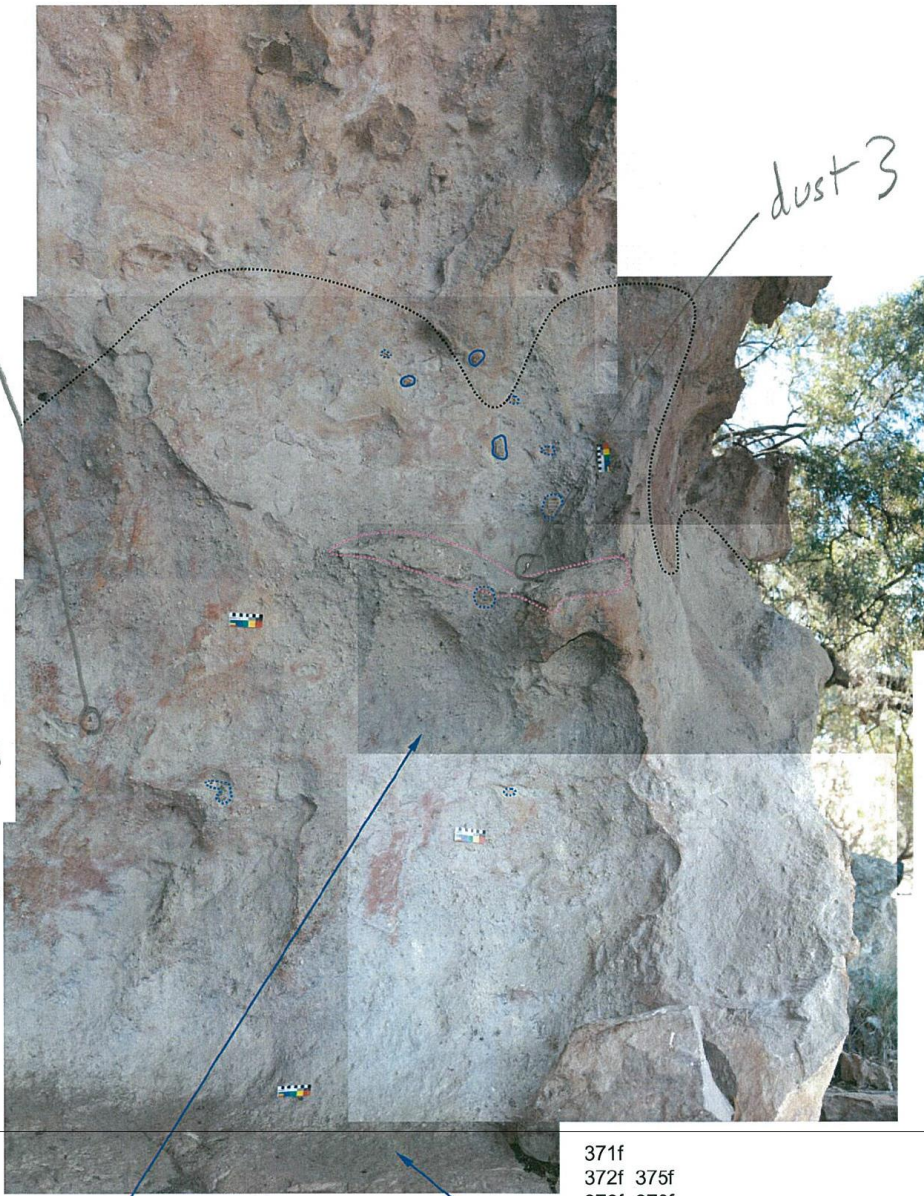
a well bonded, dense, (and probably partially mineralised) layer of light grey dust overlies and obscures a formerly extensive panel with art (stencil) pigments

Baseline recording of Aboriginal rock art sites WCP72, 152 and 153
Navin Officer Heritage Consultants Sept 2006



171

interestingly that grey dust noted, but later down, & dug derived. ⇒ an argument to say, it is extending up the walls



dust 3

- 371f
- 372f 375f
- 373f 376f
- 374f 377f

A well bonded, dense, (and probably partially mineralised) layer of light grey dust overlies and obscures a formerly extensive panel with art (stencil) pigments. The dust deposit extends up to 3m from the floor at the northern shelter end. There may also be an important organic component to this deposit, such as lichen growth.

The contemporary dust being deposited in the shelter is dark grey in colour and substantially derived from the dung deposited by stock animals. The deposition of the light grey dust may therefore relate to a period prior to the use of the shelter by European stock animals.

Baseline recording of Aboriginal rock art sites WCP72, 152 and 153
Navin Officer Heritage Consultants Sept 2006

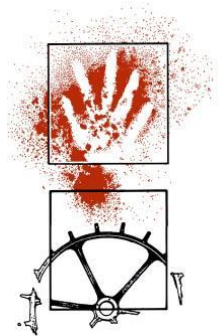


Wilpinjong Coal Mine

Aboriginal Cultural Heritage Clearance Works

Areas 3, 7, 19 (part) and Wollar Road Fence Line

September 2016



**Navin
Officer**

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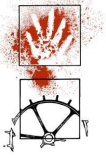
fx 02 6282 9416



Report Register

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

Issue No.	Notes/Description	Issue Date
v1	Draft for proponent comment	24 August 2016
v2	Final following proponent comment	78 September 2016
v3	Final	8 September 2016



EXECUTIVE SUMMARY

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.

The following report explains the results of pre-clearance archaeological survey and surface salvage of Areas 3, 7, 19 (part) and the Wollar Road Fence Line.

Area 3

One previous Aboriginal site recording occurs within Area 3:

WE22

No surface artefactual evidence was detected at WE22 during the current investigation.

Site WE22 could not be re-found and pose no constraint to the project.

One probable Aboriginal scarred tree constitutes a new site recording:

WCP630

WCP630 was identified by RAP field representatives as a culturally significant modified tree. Further mitigation actions required prior to impacts.

Seven confirmed artefacts were collected from four new previously unrecorded site locations during this assessment. These are:

WCP631, WCP632, WCP633 and WCP634.

Area 7

Eight previous Aboriginal site recordings occur within Area 7:

WE6, WE8, WE9, WE10, WCP21, WCP224, WCP536 and WCP537

WE6, WE8, WE9, WE10, WCP536, WCP537 and WCP224 were re-visited as part of this assessment

Sites WE6, WE8 and WE9 could not be re-found and pose no constraint to the project.

Site WE10 is located outside Area 7.

Eighty two lithic items were collected including fifty five confirmed artefacts from three of the seven previously recorded sites located within or near Area 7. These sites are:

WCP536, WCP537 and WCP224.

Sites WCP536 and WCP537 have undergone clearance and pose no constraint to the project.

WCP224 requires further investigation prior to receiving clearance status.



Twenty-seven lithic items including sixteen artefacts were collected from fourteen previously unrecorded site locations. Of these ten locations contained confirmed artefacts and constitute new recordings. The new sites are:

WCP635, WCP636, WCP637, WCP638, WCP639, WCP640, WCP641, WCP642, WCP643 and WCP644.

Area 19 (part)

Thirty three previously lodged site recordings occur in or near Area 19 (fifteen rock shelters and eighteen open artefact sites). These are:

WCP482 WCP483 WCP486 WCP484 WCP485 WCP211 WCP487 WCP489 WCP215
WCP216 WCP490 WE38 WCP491 WCP492 WCP493 WCP209 WCP494 WCP495 WE39
WE40 WE41 WCP115 WCP116 WE50 WCP117 WCP118 WCP119 WCP120, WCP210
WE42 WE55 WCP497 and WCP500

Six of these sites are located within part of Area 19 yet to be assessed (WCP115, WCP116, WCP117, WCP500, WE50 and WE55).

Twenty seven previously recorded sites were re-visited as part of this assessment. These sites are:

WCP482, WCP483, WCP486, WCP484, WCP485, WCP211, WCP487, WCP489, WCP215,
WCP216, WCP490, WE38, WCP491, WCP492, WCP493, WCP209, WCP494, WCP495,
WE39, WE40, WE41, WE42, WCP118, WCP119, WCP120, WCP210 and WCP497.

No surface artefactual evidence was detected at sixteen of the twenty seven previously recorded sites during the current investigation and pose no constraint to the project. These sites are:

WCP482, WCP489, WCP215, WCP216, WCP490, WE38, WCP491, WCP209, WCP495,
WE39, WE40, WE41, WE42, WCP120, WCP210 and WCP497.

Fifty lithic items were collected including thirty five confirmed artefacts from eleven of the twenty seven previously recorded sites located within or near Area 19. These sites are:

WCP483, WCP486, WCP484, WCP485, WCP211, WCP487, WCP492, WCP493, WCP494,
WCP118 and WCP119.

Sites WCP483, WCP486, WCP484, WCP485, WCP211, WCP487, WCP492, WCP493 and WCP494 have undergone clearance and pose no constraint to the project.

Sites WCP118, WCP119 and WCP120 require further mitigation actions prior to receiving clearance status.

Twelve lithic items including six artefacts were collected from four previously unrecorded site locations. Of these four locations contained confirmed artefacts and constitute new recordings WCP645 through to WCP648. Each of the remaining four site locations consisted of non-artefactual material and are identified as collection locations (CL).

Wollar Road Fence Line

Two previously lodged site recordings occur in Wollar Road fence line area. These are:

WCP64 and WCP448.

WCP64 and WCP448 previously recorded sites were re-visited as part of this assessment.

One confirmed artefact was collected from one new previously unrecorded site location during this assessment. The new site name is:



- WCP649

Conclusions and Recommendations

Twenty new Aboriginal sites, WCP630 to WCP649, have been recorded within the Wilpinjong project boundary as a result of this assessment. AHIMS site cards are attached for these sites.

Area 3 will be cleared for impact following the salvage of WCP630 (modified tree).

Area 7 is cleared for impact excluding the area shown in Figure 32b as site WCP224.

A limited program of two archaeological test excavation 0.5 x 1.0 metre pits placed on WCP224 spur crest located within Area 7 would enable the identification of the extent of archaeological deposit and subsurface artefact potential. The salvage of the historical trough should be considered prior to any impacts.

Area 19 requires the remaining unsurveyed area to be investigated prior to any impacts in that area.

Consistent with the WCPL ACHMP rock shelters WCP118/119 and WCP120 should be avoided by the project. Sites WCP482, 483 and 489 are not included in the WCPL ACHMP however consistent with the WCPL ACHMP these sites should be avoided by the project.

A program of archaeological salvage excavation within rock shelters WCP118/119 should be undertaken prior to impact.

Rock shelter WCP483 possibly contains imported rocks placed at back of shelter. This has been interpreted by the Aboriginal representatives as a possible burial site within shelter. This rock shelter should be avoided by the project and fenced during any mining activity occurring near the site.

If avoidance is not feasible at rock shelters WCP120, 482 and 489. These sites should be recorded in detail either by using 3D scanning or detailed archaeological recording and dependent upon the results of the excavation of WCP118/119 may also require salvage excavation.

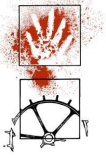
It is unclear if impacts to the rock shelters or the recommended salvage excavation is covered under the current WCPL ACHMP. If impacts are anticipated to the rock shelters, then WCPL may require additional approvals from the Department of Planning.

Area 19 is cleared for impact to the extent shown in Figure 54, This area avoids rock shelters WCP118/119, WCP120, WCP482, 483 and 489. Rock shelters WCP118/119, WCP120, WCP482, 483 and 489 should be fenced during the life of operations in Area 19 when mining operations come within 20 metres. Impacting these sites must be avoided until their significance is re-assessed by a qualified Archaeologist.

Wollar Road Fence Line will be cleared for impact following the installation of suitable protection fencing for WCP64 (Aboriginal scarred tree).

Recommendations:

1. Newly recorded Aboriginal sites WCP630 to WCP649 should be entered on the Wilpinjong sites database.
2. Modified tree WCP630 located in Area 3 be included in a scarred tree salvage program (see Appendix 1) based upon an assessment of its Aboriginal cultural heritage value and origin.
3. Area 7 is cleared for impact excluding the area shown in Figure 32b as site WCP224.



4. Site WCP224 undergo a limited Archaeological test program on the spur crest located within Area 7 to identify the extent of the archaeological deposit and as a means to provide an infield assessment of the potential for subsurface salvage within this area.
5. Site WE10 is located outside Area 7, This site should be fenced for protection where mining operations come within 20 metres of this site. Impacting the site must be avoided until its significance is re-assessed by a qualified Archaeologist.
6. Area 19 is cleared for impact in the area shown in Figure 54. This area avoids rock shelters WCP118/119, WCP120, WCP482, 483 and 489. Rock shelters WCP118/119, WCP120, WCP482, 483 and 489 should be fenced during the life of operations in Area 19 when mining operations come within 20 metres. Impacting these sites must be avoided until their significance is re-assessed by a qualified Archaeologist.
7. Modified tree WCP64 be protected with a suitable visual fence prior to impacts in Wollar Road Fence Line area.
8. The current recorded locations for Rock Shelters WE10, WCP482, WCP483, WCP118/119 and WCP120 and Modified Tree WCP64 should be updated on relevant databases. New GDA recordings for these sites are:

WE10 - 769414.6416787

WCP482 – 766989.6418826

WCP483 – 766997.6418822

WCP118/119 – 767122.6418143

WCP120 – 767124.6418109

WCP64 - 774419.6415951



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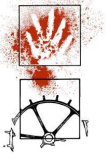


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BACKGROUND

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 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).

The ACHMP includes an Ancillary Disturbance Area Protocol which includes:

1. Pre-clearance archaeological survey (conducted with the assistance of Aboriginal representatives). This survey would include consideration of the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage.
2. Avoidance of the identified Aboriginal object/sites by realigning or adjusting infrastructure/disturbance area if practicable.

If the object/site cannot be avoided:

1. Consider surface salvage (advice from Aboriginal representatives and/or an archaeologist will be sought).
2. If relevant, consider the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage (subject to review of the ACHMP and consultation with Aboriginal representatives and/or an archaeologist).
3. Conduct surface salvage (and subsurface salvage if necessary) with the assistance of Aboriginal representatives and an archaeologist.
4. Store salvaged artefacts in the "Keeping Place".
5. Post-rehabilitation, replace artefacts onto the rehabilitated landform.

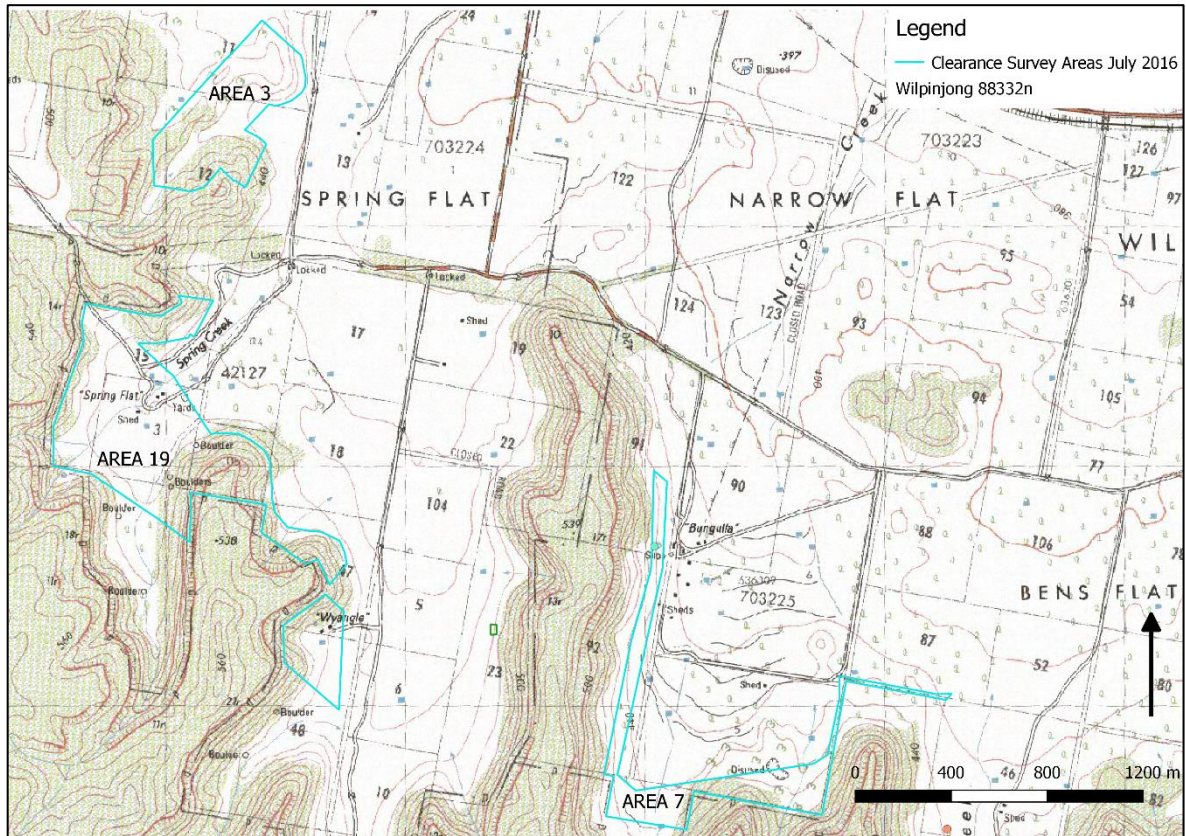
Surface Salvage

The ACHMP specifies that surface salvage will involve the systematic recovery of all evident surface artefacts from a representative sample of open artefact scatters and from selected isolated finds at known sites within the project disturbance area. Surface collections will occur on a progressive basis prior to the commencement of ground surface disturbance works within an area.

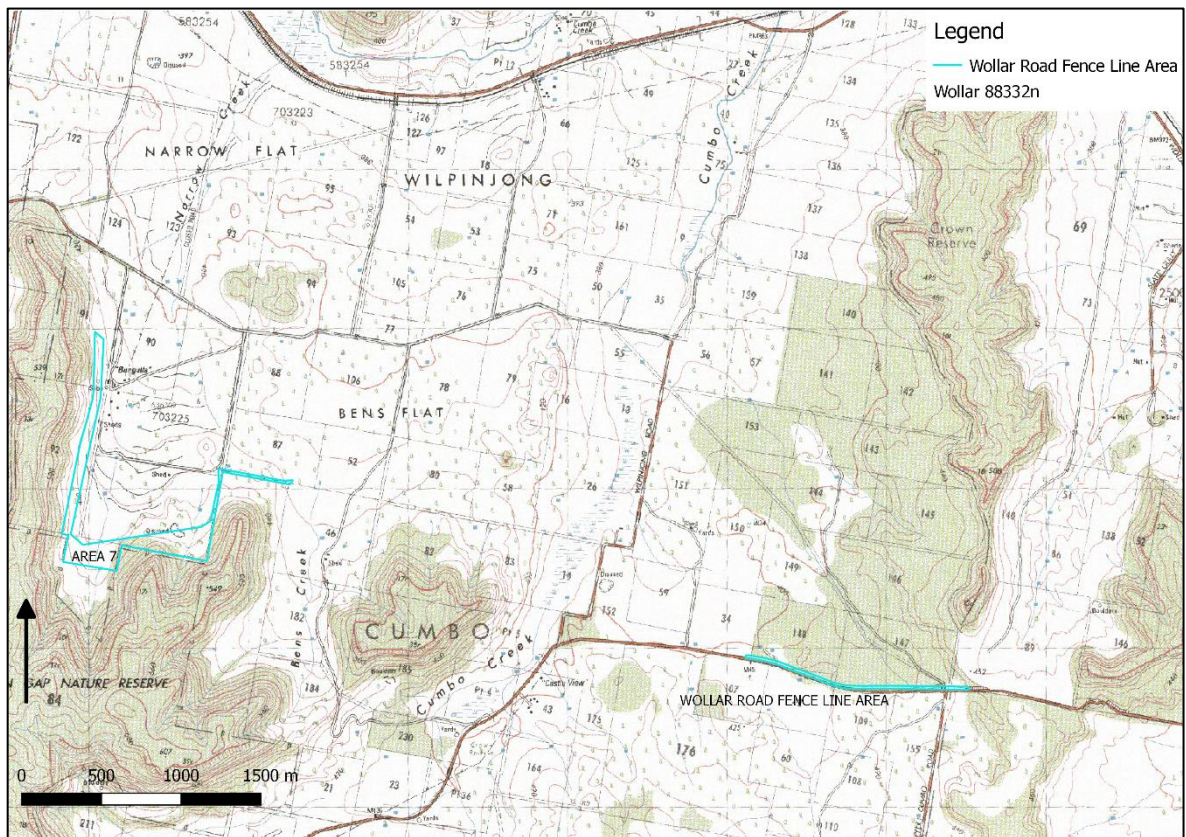
A basic level of recording will be conducted on all recovered artefactual surface material including location, technological traits, and stone type. This analysis will be conducted by a qualified lithic specialist.

This Report

This report presents the results of a pre-clearance archaeological survey and surface salvage of Areas 3, 7, 19(part) and Wollar Road Fence Line (Figures 1.1 and 1.2). All areas are situated within the boundaries of the approved project area (05-0021) and are thus subject to the ACHMP.



**Figure 1.1 Location of Areas 3,7 and 19 (part)
(Base map Wollar 1:25 000 8833-2-N.)**



**Figure 1.2 Location of Area 7 and Wollar Road Fence Line
(Base map Wollar 1:25 000 8833-2-N.)**



AREA 3

Area 3 is shown outlined in blue in Figure 2 and was surveyed as part of this clearance work program on 5 July 2016.

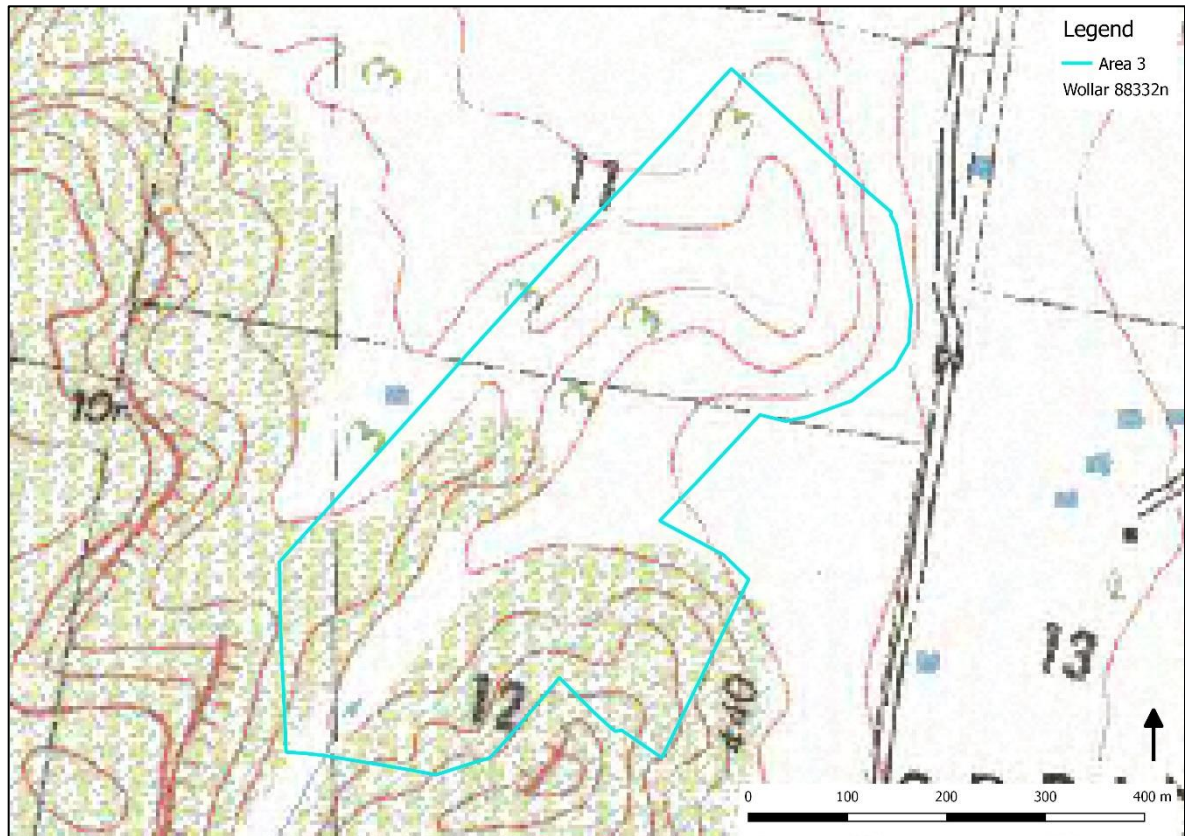


Figure 2 Area 3 (Base Map Wollar 1:25 000 8833-2-N)

Clearance Survey Results

Summary

Previously recorded rock shelter site WE22 location was re-visited as part of this assessment.

WE22 could not be re-found during this assessment.

One probable Aboriginal scarred tree constitutes a new site recording. This is:

- WCP630

Seven confirmed artefacts were collected from four new previously unrecorded site locations during this assessment. These are:

- WCP631, WCP632, WCP633 and WCP634.



Previously Recorded Sites

One previously lodged site recording occurs in Area 3:

WE22 – rock shelter with PAD (Kayandel 2006). This site is listed in the ACHMP.

No rock shelter with PAD was detected at location WE22. All of Area 3 was surveyed with the view to identifying another location for WE22, areas outside Area 3 were also surveyed. Following this investigation, a cluster of rock shelters was detected atop a scrubby wooded knoll outside of proposed impact Area 3. It was suggested these rock shelters have been previously recorded by Kuskie (South East Archaeology) approximately 2 years ago (Larry Foley pers. comm., July 2016) and were therefore not re-recorded. Further investigation revealed the rock shelters in question were previously recorded by South East Archaeology in 2014 as sites WCP475 and WCP476.

Sites Recorded in the current assessment

One probable Aboriginal scarred tree constitutes a new site recording WCP630.

WCP630 was identified by RAP field representatives as a culturally significant modified tree. Further mitigation actions required prior to impacts.

Seven confirmed artefacts were collected from four previously unrecorded locations and constitute four new recordings WCP631, WCP632, WCP633 and WCP634 (see Table 4).

WCP630

GDA 767423.6419483

This site consists of one probable Aboriginal scarred tree (Figures 3 and 8). The site was located along the crest of a minor spur line adjacent to current mining operations.

Tree condition: dead but sturdy; missing crown; height 10-15 metres.

Tree species: unverified.

Scar occluded.

Original scar length: 120cm; with regrowth: 52cm

Original scar width: 35cm; with regrowth: 10cm

Depth of regrowth: 15cm.

Base of original scar mark to ground: 23cm; from base of regrowth to ground: 59cm

Tree diameter taken at 150cm from ground: 300cm.

Visible steel axe marks at top and bottom of scar. One axe mark at base of scar and two parallel axe marks at top. Distance between the primary top and bottom axe marks: 16cm.

WCP630 was identified by RAP field representatives as a culturally significant modified tree. WCP630 believed to have been scarred by Indigenous people creating a shield, most likely a ceremonial shield (Larry Foley, pers. comm. 5 July 2016).

Further mitigation actions required prior to impacts based upon an assessment of its Aboriginal cultural heritage value and origin.

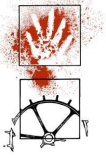


Figure 3 WCP630 scarred/modified tree

WCP631

GDA 767525.6419863

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figures 4 and 8). The site was located along the crest of a minor spur line adjacent to current mining operations.

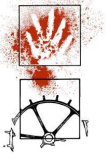
Ground surface disturbance consisted of vegetation clearance and sheet erosion. The disturbance incidence was 80% with 30% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact, a quartz core, was collected from this site (see Table 4).



Figure 4 WCP631 view east



WCP632

GDA 767430.6419846

This site consists of two lithic items situated within an area of 5 x 5 m. (Figures 5 and 8). The site was located along the crest of a low spur line adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance and sheet erosion. The disturbance incidence was 80% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 4).



Figure 5 WCP632 looking east

WCP633

GDA 767287.6419794

This site consists of one artefact situated on an upper slope within an area of approximately 1 x 1 m. (Figures 6 and 8). The site was located on the same low spur line as site WCP630 adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance. The disturbance incidence was 10% with 20% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 4).



Figure 6 General site location of WCP633

WCP634

GDA 767187.6419616

This site consists of four artefacts situated within an area of approximately 5 x 1 m (Figure 7 and 8). The site was located on a crest of a spur line adjacent to current mining operations.

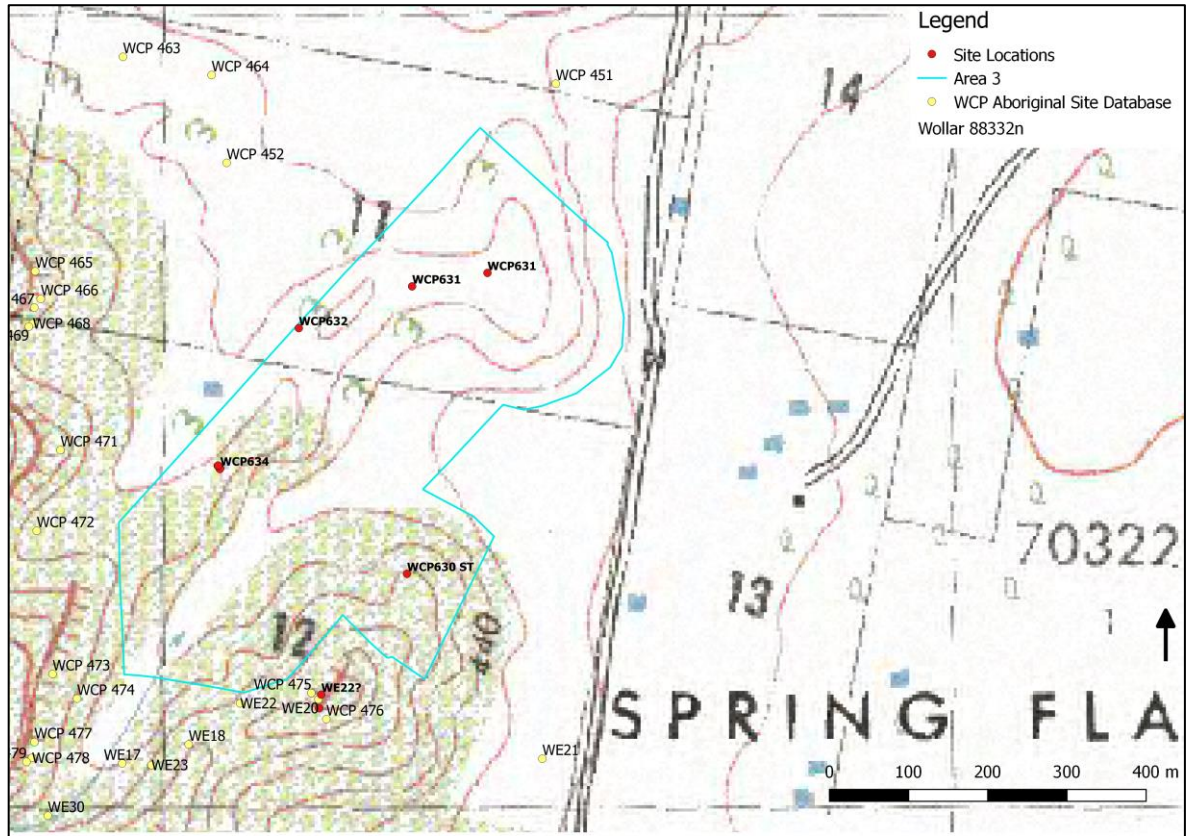
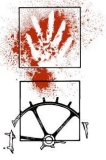
Ground surface disturbance consisted of vegetation clearance, animal treadage and sheet erosion. All artefacts were located on bare ground. The disturbance incidence was 70% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Four confirmed artefacts were collected from this site (see Table 4).



Figure 7 WCP634 looking south east



**Figure 8 Locations of newly recorded sites and WCP Aboriginal Site Database previously recorded sites – Area 3
(Base Map Wollar 1:25 000 8833-2-N)**



AREA 7

Area 7 is shown outlined in blue in Figure 9 and was surveyed as part of this clearance work program on 6 and 7 July 2016.

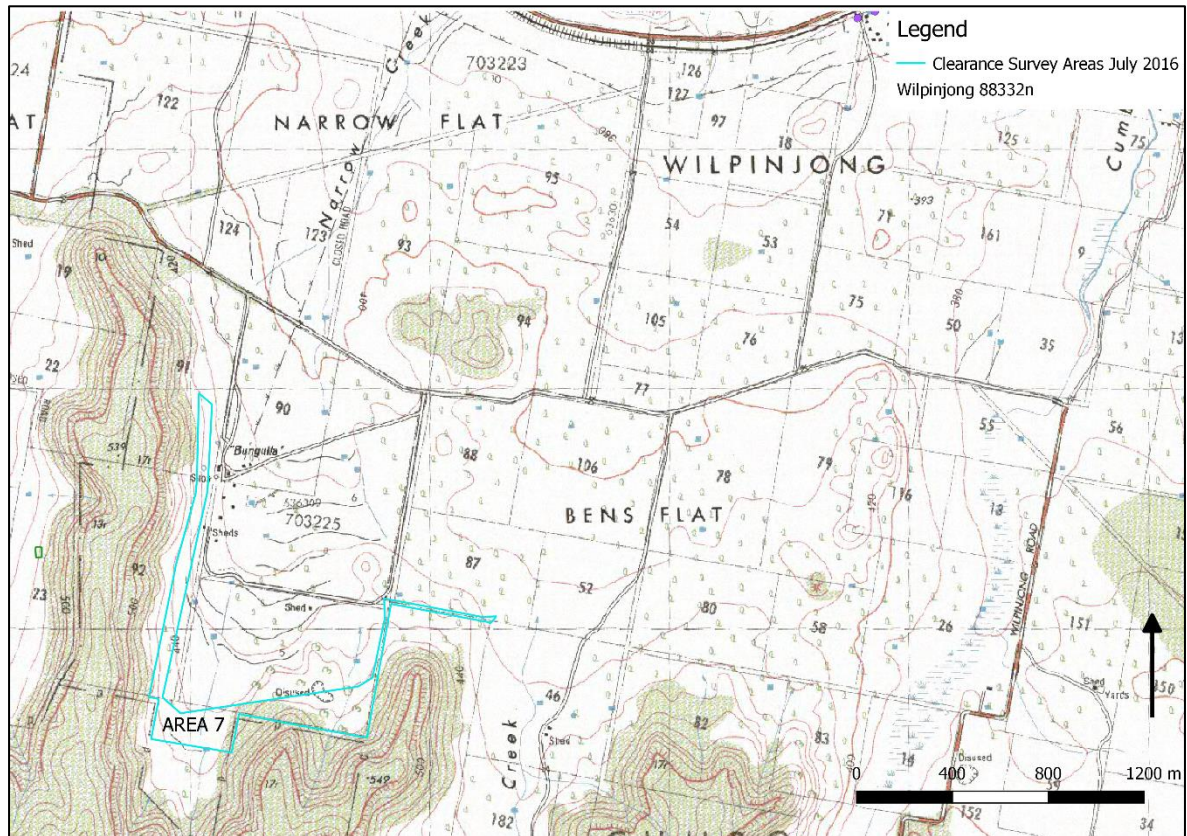


Figure 9 Area 7
(Base Map Wollar 1:25 000 8833-2-N)

Clearance Survey Results

Summary

Seven previously recorded sites were re-visited as part of this assessment (WE6, WE8, WE9, WE10, WCP536, WCP537 and WCP224).

Eighty two lithic items were collected including fifty six confirmed artefacts from three of the seven previously recorded sites located within or near Area 7. These sites are:

- WCP536, WCP537 and WCP224.

It is proposed site WCP224 undergo a limited archaeological test program on the spur crest located within Area 7.

Fourteen previously unrecorded site locations were detected during this current survey of Area 7.

Twenty-seven lithic items including sixteen artefacts were collected from fourteen previously unrecorded site locations. Of these ten locations contained confirmed artefacts and constitute new recordings. The new sites are:



- WCP635, WCP636, WCP637, WCP638, WCP639, WCP640, WCP641, WCP642, WCP633 and WCP644.

Collection was undertaken at the remaining four locations, following an analysis of the collected items they were found not to be artefacts, they are:

- Collection Locations 1-4 (CL1, CL2, CL3 and CL4)

One previously unrecorded non-Aboriginal scarred tree location; and

One previously unrecorded historic site location consisting of a manmade rock trough.

Previously Recorded Sites

Seven previously lodged site recordings occur in Area 7: They are:

WE6 – rock shelter with PAD. This site was assessed by Kayandel Archaeological Services (2006).

WE8 – rock shelter with PAD. This site was assessed by Kayandel Archaeological Services (2006).

WE9 – rock shelter with PAD. This site was assessed by Kayandel Archaeological Services (2006).

WE10 – rock shelter with artefacts, waterhole and PAD. This site was assessed by Kayandel Archaeological Services (2006).

WCP21 – open artefact site (Navin Officer Heritage Consultants (2005) This site consists of one artefact.

WCP536 – open artefact site This site was assessed by South East Archaeology (2014).

WCP537 - open artefact site. This site was assessed by South East Archaeology (2014).

One previously lodged site recording occurs adjacent to Area 7. It is:

WCP224 - open artefact site. This site was assessed by Navin Officer Heritage Consultants (2005). This site consists of ten artefacts.

WE6, WE8, WE9 and WE10 were revisited as part of this assessment (Figure 32). No rock shelters were detected. The current recorded locations of rock shelters WE6, WE8, WE9 and WE10 are therefore concluded to be incorrect.

A previously unrecorded rock shelter location (GPS reference GDA 769414.6416787) was identified near to the WE10 location data (AMG 769305.6416622) and is outside of Area 7 (Figure 32). Based on the site card for this site it is likely that this is site WE10 (Figure 10).

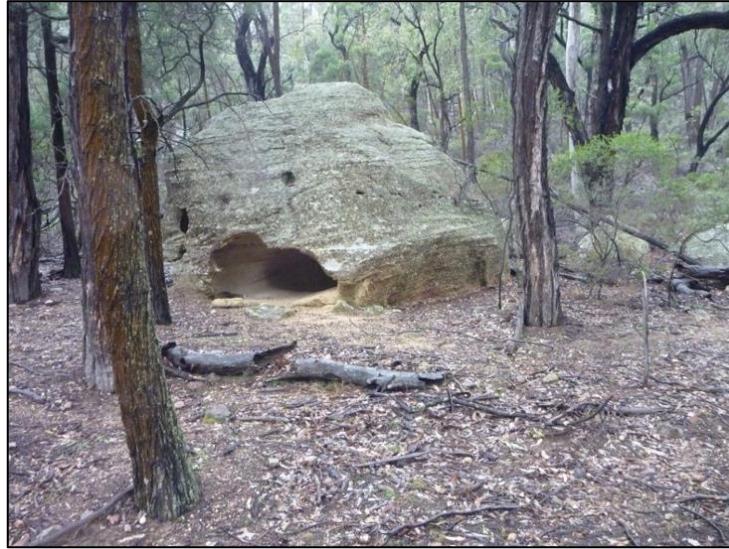
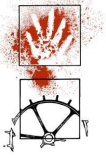


Figure 10 WE10 located outside Area 7 (6 July 2016).

WCP536 was re-found during this assessment (Figure11 and 32).

The site was located along areas of erosional scald on a valley floor adjacent to current mining operations. One confirmed artefact was collected from the recorded location of site WCP536 (see Table 4).



Figure 11 WCP536 view west

WCP537 was re-found during this assessment (Figure12 and 32).

The site was located along areas of erosional scald on a valley floor adjacent to current mining operations and highly disturbed from dam construction and contour banking activities. Seventeen lithic items including fourteen confirmed artefacts were collected from the recorded location of site WCP537 (see Table 4).

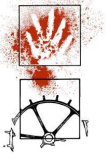


Figure 12 WCP537 view northwest

WCP224 was re-found during this assessment (Figure 13, 14, 15 and 32).

The site was located along areas of erosional scald, mechanical disturbance and vehicle track. The surface scatter at this site extends from crests and saddle of two closely located minor spur lines to lower slopes adjacent to current mining operations.

It is highly probable post depositional movement of surface artefacts from erosional activities has occurred at this site over a period of time. The limit of visible artefacts located at site WCP224 extended approximately 100 x 200 metres.

Subsurface disturbance on the spur crests of site WCP224 is limited to vegetation clearance, rural fencing and animal treadage. The archaeological potential of the spur crest is assessed to be low to moderate and the likelihood of intact deposits is low to moderate. The lower slope of this site is highly disturbed by mechanical excavations, vegetation clearance and sheet erosion and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits in these lower slope areas is extremely low.

Sixty two lithic items including thirty eight confirmed artefacts were collected from site WCP224 (see Table 4).



Figure 13 WCP224 spur crest located top right



Figure 14 WCP224 view east across saddle



Figure 15 WCP224 view northwest

Sites Recorded in the Current Investigation

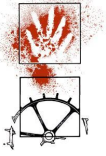
Twenty seven lithic items including sixteen artefacts were collected from fourteen previously unrecorded site locations. Of these ten locations contained confirmed artefacts and constitute new recordings WCP634 through to WCP643.

Collection Location 1 (CL1)

GDA 769909.6417079

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 16 and 32). The area is located on an erosional scald. The site was located on a mid-slope adjacent to current mining operations.

Ground surface disturbance consisted of rural fencing, stock grazing and sheet erosion. The disturbance incidence was 40% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.



One lithic item was collected from this site (see Table 4). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 16 CL1 looking north across site

Collection Location 2 (CL2)

GDA 769845.6416791

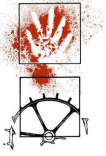
This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 17 and 32). The area is located on an animal track. The site was located on a lower slope adjacent to current mining operations.

Ground surface disturbance consisted of forest clearing, animal treadage and sheet erosion. The disturbance incidence was 80% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

One lithic item was collected from this site (see Table 4). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 17 CL2 looking southwest



Collection Location 3 (CL3)

GDA 769691.6416886

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 18 and 32). The area is located on an erosional scald. The site was located on lower slopes adjacent to current mining operations.

Ground surface disturbance consisted of forest clearing and sheet erosion. The disturbance incidence was 20% with 80% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

One lithic item was collected from this site (see Table 4). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 18 CL3 general location

Collection Location 4 (CL4)

GDA 769621.6417150 (centre point)

This site consists of two lithic items situated within an area of approximately 20 x 1 m. (Figure 19 and 32). The area is located on an erosional scald. The site was located on mid slope adjacent to current mining operations.

Ground surface disturbance consisted of forest clearing, animal tracks and sheet erosion. The disturbance incidence was 20% with 80% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Two lithic items were collected from this site (see Table 4). Analysis determined that both these items were not artefactual and as a consequence no site name has been allocated.

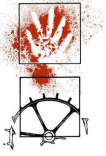


Figure 19 CL4 general location

WCP635

GDA 769359.6417343 ARTS 1-3

This site consists of three confirmed artefacts (Figure 20 and 32). The site was located along area of scald on a valley floor adjacent to current mining operations. The limit of visible artefacts located at site WCP635 extended approximately 20 x 2 metres.

Ground surface disturbance consisted of construction of an olive tree plantation and drainage/contour lines. The disturbance incidence was 90% with 60% visibility within exposures. Visibility in adjacent areas was 10% due to thick grass cover. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Three complete quartz flakes were collected from this site (see Table 4).

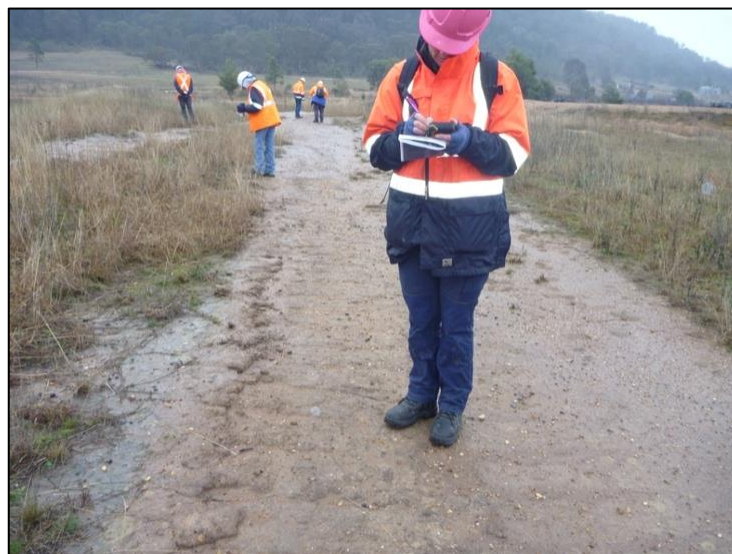
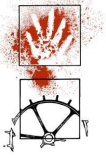


Figure 20 WCP635 view northwest



WCP636

GDA 769172.6418047

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 21 and 32). The area is located on an animal track. The site was located on a steep gradient mid slope adjacent to a valley floor current mining operations.

Ground surface disturbance consisted of sheet erosion and grazing animals. The disturbance incidence was 40% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz flaked piece was collected from this site (see Table 4).



Figure 21 WCP636 view north

WCP637

GDA 769984.6417302

This site consists of seven lithic items including three confirmed artefacts situated within an area of approximately 5 x 5 m. (Figure 22 and 32). The area is located on an erosional scald with an easterly aspect. The site was located on a basal slope of spur line adjacent to a valley floor current mining operations.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 100% with 20% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Seven lithic items including three quartz artefacts were collected from this site (see Table 4).

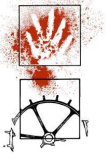


Figure 22 WCP637 looking northwest

WCP638

GDA 769865.6416934

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 23 and 32). The area is located on an erosional scald. The site was located on basal slopes and on an edge of a gully adjacent to current mining operations.

Ground surface disturbance consisted of cedar forest clearing, stock grazing and sheet erosion. The disturbance incidence was 90% with 80% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz flake was collected from this site (see Table 4).



Figure 23 WCP638 general view of site



WCP639

GDA 769525.6417319

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 24 and 32). The area is located on an erosional scald on top of contour bank. The site was located on the valley floor adjacent to current mining operations.

Ground surface disturbance consisted of mechanical excavation and sheet erosion. The disturbance incidence was 60% with 80% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz flake was collected from this site (see Table 4).



Figure 24 WCP639 general view of site

WCP640

GDA 769680.6416791

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 25 and 32). The area is located on an erosional scald. The site was located on lower slopes approximately 20 metres from an ephemeral drainage line adjacent to current mining operations.

Ground surface disturbance consisted of forest clearing, animal treadage and sheet erosion. The disturbance incidence was 50% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz flake was collected from this site (see Table 4).

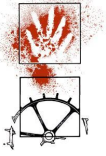


Figure 25 WCP640 view south

WCP641

GDA 769560.6417010

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 26 and 32). The area is located on an erosional scald. The site was located on a rocky upper slope of minor spur line adjacent to current mining operations.

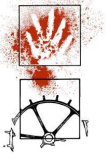
Ground surface disturbance consisted of animal treadage and sheet erosion. The disturbance incidence was 60% with 80% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz flake was collected from this site (see Table 4).



Figure 26 WCP641 general location



WCP642

GDA 769568.6417108

This site consists of three confirmed artefacts situated within an area of approximately 1 x 1 m. (Figure 27 and 32). The area is located on an erosional scald atop a contour bank. The site was located on basal slopes adjacent to current mining operations.

Ground surface disturbance consisted of mechanical excavations, animal treadage and sheet erosion. The disturbance incidence was 100% with 70% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Three quartz flakes were collected from this site (see Table 4).



Figure 27 WCP642 view southwest

WCP643

GDA 769600.6417152

This site consists of three lithic items including one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 28 and 32). The area is located on an erosional scald. The site was located on basal slopes adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance, animal treadage and sheet erosion. The disturbance incidence was 80% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Three lithic items including one complete flake made from a fine grained siliceous material were collected from this site (see Table 4).

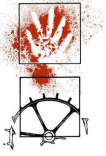


Figure 28 WCP643 view southwest

WCP644

GDA 769590.6417218

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 29 and 32). The area is located on an erosional scald adjacent to olive grove. The site was located on the valley floor adjacent to current mining operations.

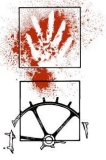
Ground surface disturbance consisted of rural fencing, intensive agricultural activities, animal treadage and sheet erosion. The disturbance incidence was 100% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz flake (proximal fragment) was collected from this site (see Table 4).



Figure 29 WCP644 view north



Scarred Tree – non Aboriginal origin

GDA 769030.6416901

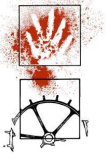
This tree is located on a basal slope adjacent to current mining operations (Figure 30 and 32).

Following on site assessment by Aboriginal representatives and field archaeologist, the scar on lower end of prostrate tree trunk is of non- Aboriginal origin. The scar is asymmetrical, narrow at bottom extending to top of root ball and most likely caused by a limb tear.

Coral Williams expressed her desire to have this tree noted.



Figure 30 Non Aboriginal scarred tree



Historic Item- Sandstone Rock Trough

GDA 769176.6417864

This item is a man-made trough carved from local sandstone rock (Figure 31 and 32). The trough is located adjacent to mine operations and is within the proposed impact area.

As a possible preservation measure, Wilpinjong Coal Mine may perhaps salvage the rock trough prior to impacts and donate to the local historical society to promote positive community sentiments and goodwill.



Figure 31 Historic man-made rock trough

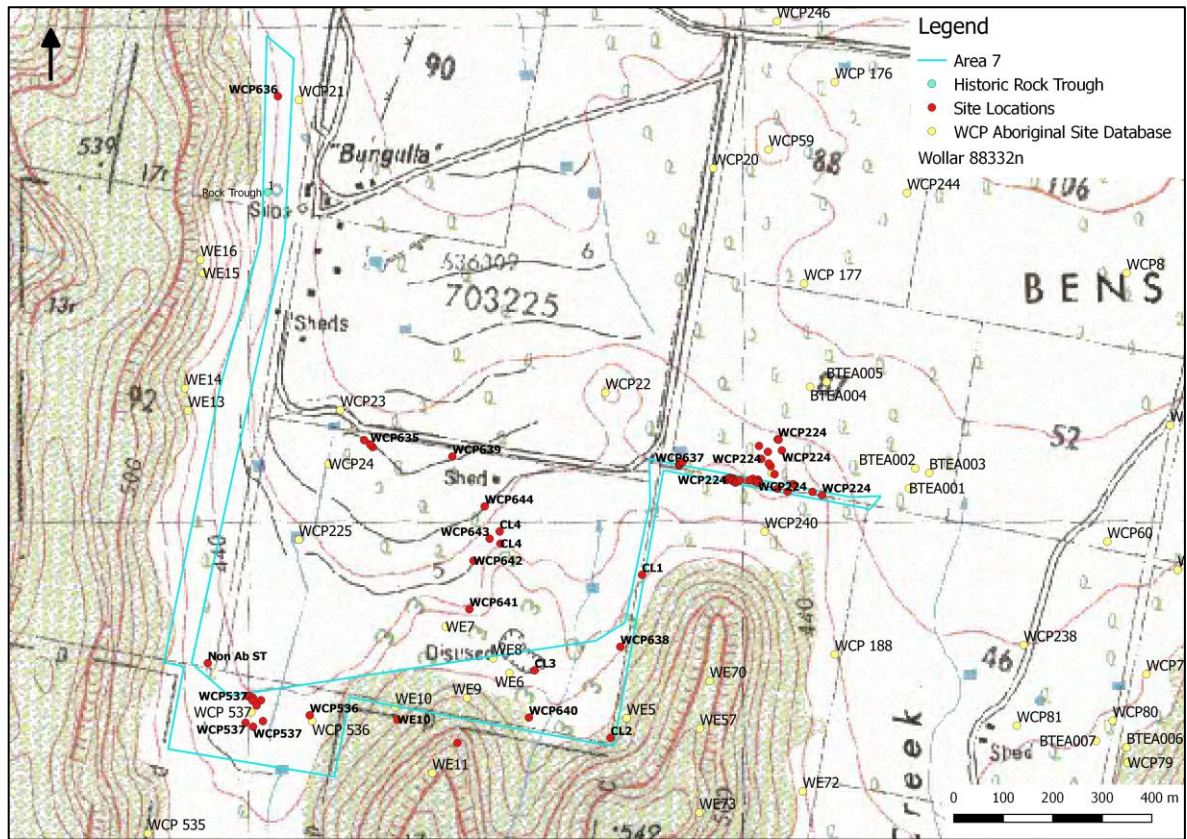


Figure 32a Locations of newly recorded sites, historic site and WCP Aboriginal Site Database previously recorded sites – Area 7 (Base map Wollar 1:25 000 8833-2-N)

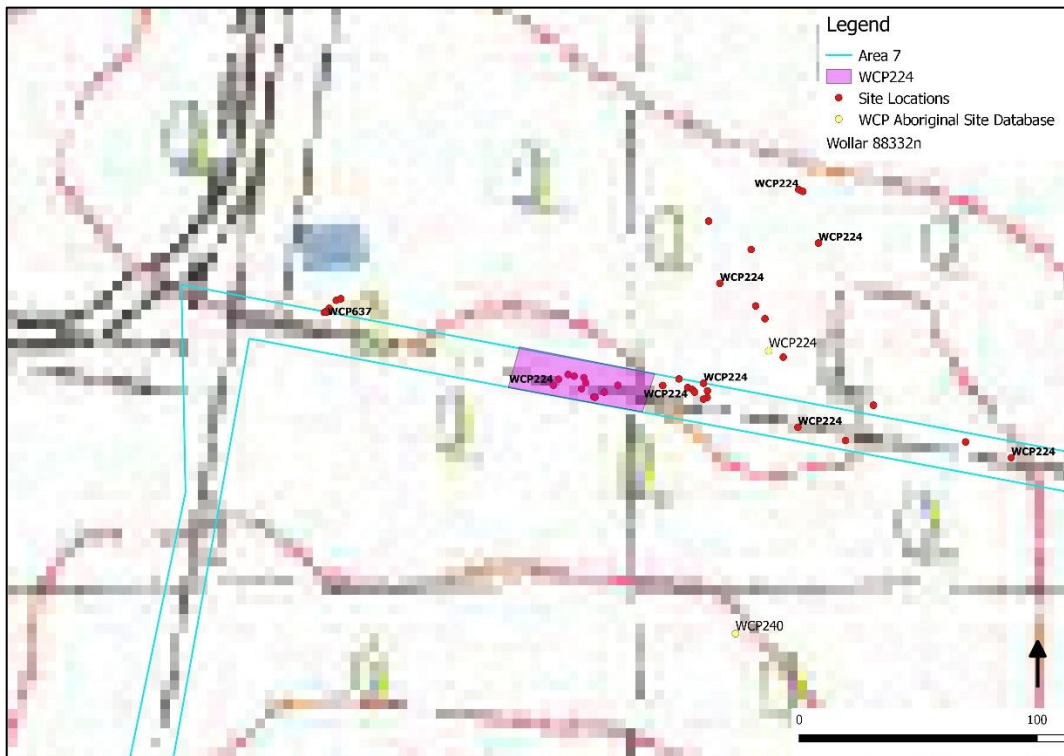
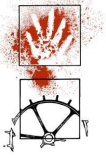


Figure 32b Locations of newly recorded sites – Area 7 including WCP224 test excavation area (Base map Wollar 1:25 000 8833-2-N)



AREA 19 (PART)

Area 19 (part) is shown outlined in blue in Figure 33 and was surveyed as part of this clearance work program on 7 July 2016. Part of Area 19 shaded in blue has been allocated for future archaeological investigation.

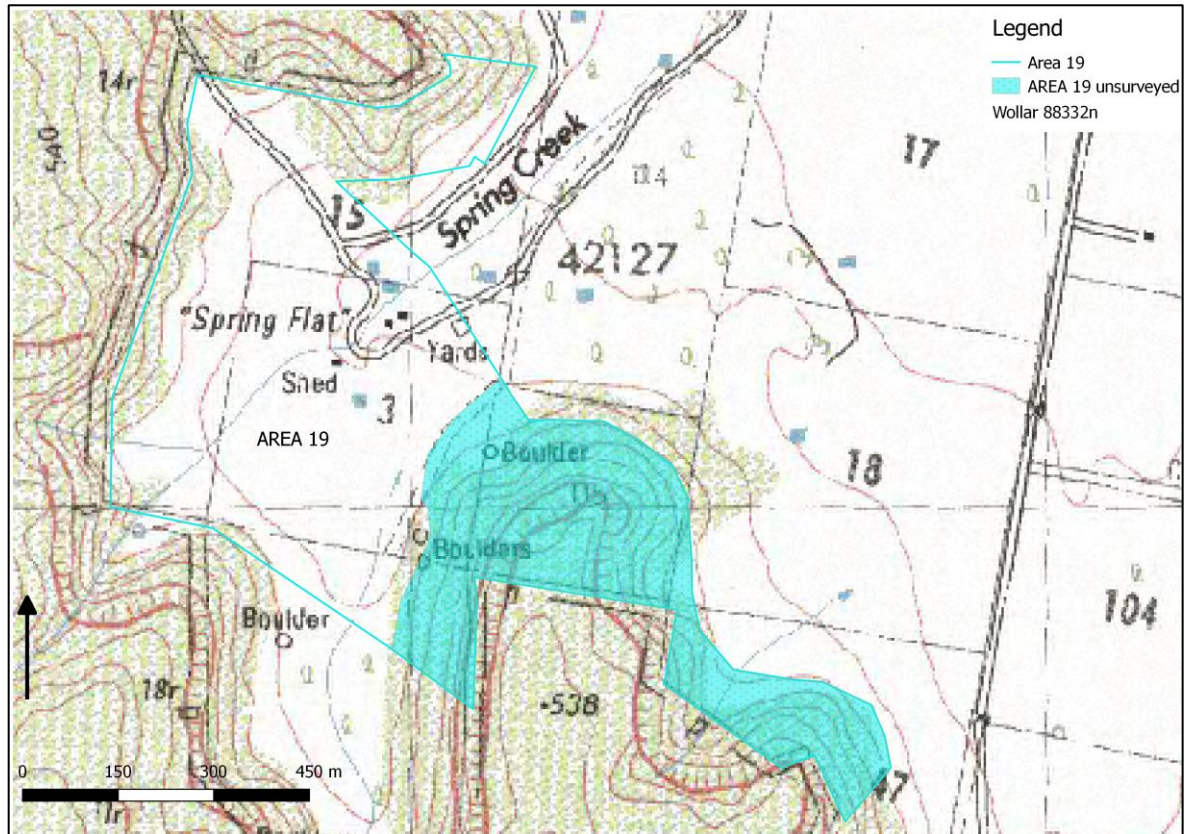


Figure 33 Area 19 (Base map Wollar 1:25 000 8833-2-N)

Clearance Survey Results

Summary

Figure 54 details the results of the current assessment. A clearance boundary is indicated on this plan which excludes rock shelter sites within the study area.

Thirty three previously recorded sites are located within or near Area 19.

Six of these sites are located within part of Area 19 yet to be assessed (WCP115, WCP116, WCP117, WCP500, WE50 and WE55).

Twenty seven previously recorded sites were re-visited as part of this assessment (Table 1).

Table 1 Previously Recorded sites visited in Area 19

Site Name	Site Type	Re-visited as part of this assessment
WCP482	rock shelter with PAD	yes
WCP483	rock shelter with PAD	yes



Site Name	Site Type	Re-visited as part of this assessment
WCP486	open artefact site	yes
WCP484	open artefact site	yes
WCP485	open artefact site	yes
WCP211	open artefact site of 5 artefacts	yes
WCP487	open artefact site	yes
WCP489	rock shelter with PAD	yes
WCP215	open artefact site of 1 artefact	yes
WCP216	open artefact site of 10 artefacts	yes
WCP490	open artefact site	yes
WE38	open artefact site	yes
WCP491	open artefact site	yes
WCP492	open artefact site	yes
WCP493	open artefact site	yes
WCP209	open artefact site of 5 artefacts	yes
WCP494	open artefact site	yes
WCP495	open artefact site	yes
WE39	rock shelter with PAD	yes
WE40	rock shelter with PAD	yes
WE41	rock shelter with PAD	yes
WCP115	rock shelter with 2 artefacts closed site.	no
WCP116	rock shelter with 2 artefacts; closed site.	no
WE50	rock shelter with PAD	no
WCP117	rock shelter with PAD; closed site	no
WCP118	rock shelter with 11 artefacts and PAD	yes



Site Name	Site Type	Re-visited as part of this assessment
WCP119	rock shelter with 11 artefacts and PAD; closed site	yes
WCP120	rock shelter with 1 artefact and PAD; closed site	yes
WCP210	open artefact site of 1 artefact	yes
WE42	rock shelter with PAD	yes
WE55	rock shelter with PAD	no
WCP497	open artefact site	yes
WCP500	rock shelter with PAD; closed site	no

Fifty lithic items were collected including thirty five confirmed artefacts from eleven of the twenty seven previously recorded sites located within or near Area 19 (Table 2).

Table 2 Previously recorded sites in Area 19 where lithic items were collected

Site Name	Site Type	No. of Lithic Items	No. of Artefacts
WCP483	rock shelter with PAD	14	8
WCP486	open artefact site	1	1
WCP484	open artefact site	3	3
WCP485	open artefact site	4	3
WCP211	open artefact site of 5 artefacts	1	1
WCP487	open artefact site	12	8
WCP492	open artefact site	4	2
WCP493	open artefact site	3	2
WCP494	open artefact site	2	2
WCP118/119	rock shelter with 11 artefacts and PAD	6	5
	TOTALS	50	35

Twelve lithic items including six artefacts were collected from four previously unrecorded site locations. Of these four locations contained confirmed artefacts and constitute new recordings WCP645 through to WCP648 (Table 3). Each of the remaining four site locations consisted of non-artefactual material and are identified as collection locations (CL).

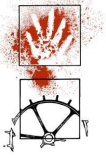


Table 3 Newly recorded sites and collection locations in Area 19 where lithic items were collected

New Site Name	Site Type	No. of Lithic Items	No. of Artefacts
WCP645	open artefact site	1	1
WCP646	open artefact site	1	1
WCP647	open artefact site	5	3
WCP648	open artefact site	1	1
CL1	NA	1	0
CL2	NA	1	0
CL3	NA	1	0
CL4	NA	1	0
	Totals	12	6

Previously Recorded Sites

Thirty three previously lodged site recordings occur in Area 19 (fifteen rock shelters and eighteen open artefact sites). These are:

WCP482 - rock shelter with PAD. This site was assessed by South East Archaeology (2014).

WCP483 - rock shelter with PAD. This site was assessed by South East Archaeology (2014).

WCP486 - open artefact site. This site was assessed by South East Archaeology (2014).

WCP484 – open artefact site. This site was assessed by South East Archaeology (2014).

WCP485 - open artefact site. This site was assessed by South East Archaeology (2014).

WCP211 – open artefact site of 5 artefacts. This site was assessed by Navin Officer Heritage Consultants (2005).

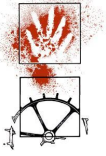
WCP487 - open artefact site. This site was assessed by South East Archaeology (2014).

WCP489 - rock shelter with PAD. This site was assessed by South East Archaeology (2014).

WCP215 – open artefact site of 1 artefact. This site was assessed by Navin Officer Heritage Consultants (2005).

WCP216 – open artefact site of 10 artefacts. This site was assessed by Navin Officer Heritage Consultants (2005).

WCP490 - open artefact site. This site was assessed by South East Archaeology (2014).



- WE38 – open artefact site. This site was assessed by Kayandel Archaeological Services (2006).
- WCP491 – open artefact site. This site was assessed by South East Archaeology (2014).
- WCP492 – open artefact site. This site was assessed by South East Archaeology (2014).
- WCP493 – open artefact site. This site was assessed by South East Archaeology (2014).
- WCP209 – open artefact site of 5 artefacts. This site was assessed by Navin Officer Heritage Consultants (2005).
- WCP494 – open artefact site. This site was assessed by South East Archaeology (2014).
- WCP495 – open artefact site. This site was assessed by South East Archaeology (2014).
- WE39 – rock shelter with PAD This site was assessed by Kayandel Archaeological Services (2006).
- WE40 – rock shelter with PAD This site was assessed by Kayandel Archaeological Services (2006).
- WE41 – rock shelter with PAD This site was assessed by Kayandel Archaeological Services (2006).
- WCP115 – rock shelter with 2 artefacts closed site. This site was assessed by Navin Officer Heritage Consultants (2005).
- WCP116 – rock shelter with 2 artefacts; closed site. This site was assessed by Navin Officer Heritage Consultants (2005).
- WE50 – rock shelter with PAD This site was assessed by Kayandel Archaeological Services (2006).
- WCP117 – rock shelter with PAD; closed site. This site was assessed by Navin Officer Heritage Consultants (2005).
- WCP118 – rock shelter with 11 artefacts and PAD. This site was assessed by Navin Officer Heritage Consultants (2005).
- WCP119 – rock shelter with 11 artefacts and PAD; closed site. This site was assessed by Navin Officer Heritage Consultants (2005).
- WCP120 – rock shelter with 1 artefact and PAD; closed site. This site was assessed by Navin Officer Heritage Consultants (2005).
- WCP210 – open artefact site of 1 artefact. This site was assessed by Navin Officer Heritage Consultants (2005).
- WE42 – rock shelter with PAD This site was assessed by Kayandel Archaeological Services (2006).
- WE55 – rock shelter with PAD This site was assessed by Kayandel Archaeological Services (2006).
- WCP497 – open artefact site. This site was assessed by South East Archaeology (2014).
- WCP500 – rock shelter with PAD; closed site. This site was assessed by South East Archaeology (2014).



WE50, WE55, WCP115, WCP116, WCP117 and WCP500 were not revisited as part of this assessment.

Rock shelter locations WE39, WE40, WE41 and WE42 were revisited as part of this assessment (Figure 54). No rock shelters were detected. The current recorded locations of rock shelters WE39, WE40, WE41 and WE42 are therefore concluded to be incorrect.

Sites WCP209, WCP210, WCP215, WCP216, WCP490, WCP491, WCP495, WCP497 and WE38 were re-found during this assessment (Figure 54). No artefacts were detected or collected at these locations.

WCP489 rock shelter with PAD was re-found during this assessment (Figure 54). This site is located outside of Area 19 and therefore not included in this assessment.

WCP120 a rock shelter with PAD was re-found during this assessment (Figure 54). The site was located on a basal slope of a spurline adjacent to current mining operations. No artefacts were detected or collected at WCP120.

WCP482 a rock shelter with PAD was re-found during this assessment (Figure 54). The site was located mid slope adjacent to current mining operations. No artefacts were detected or collected at WCP482.

WCP483 a rock shelter with PAD was re-found during this assessment (Figure 34 and 54).

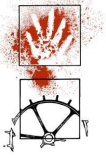
The site was located mid slope adjacent to current mining operations. The limit of visible artefacts located at site WCP483 extended approximately 50 m downslope from shelter opening.

This rock shelter possibly contains imported rocks placed at back of shelter. This has been interpreted by the Aboriginal representatives as a possible burial site within shelter (Larry Foley, pers. comm. 7 July 2016).

Fourteen lithic items including eight confirmed artefacts were collected from the recorded location of site WCP483 (see Table 4).



Figure 34 WCP483 shelter opening (left) and the location of a possible burial site at back of shelter (right)



WCP484 an open artefact site was re-found during this assessment (Figure 35 and 54).

The site was located on an upper slope of a spur adjacent to current mining operations. Three confirmed artefacts were collected from the recorded location of site WCP484 (see Table 4).



Figure 35 WCP484 view northeast

WCP493 an open artefact site was re-found during this assessment (Figure 36 and 54).

The site was located on the edge of a dam wall adjacent to current mining operations. Three lithic items including two confirmed artefacts were collected from this site (see Table 4).



Figure 36 WCP493 general location



WCP494 an open artefact site was re-found during this assessment (Figure 37 and 54).

The site was located on a valley floor adjacent to current mining operations. Two confirmed artefacts were collected from this site (see Table 4).



Figure 37 WCP494 view northwest

WCP485 an open artefact site was re-found during this assessment (Figure 38 and 54).

The site was located on a valley floor adjacent to current mining operations. Ground surface disturbance consisted of mechanical excavations. Four lithic items including three confirmed artefacts were collected from this site (see Table 4).



Figure 38 WCP485 general location



WCP486 an open artefact site was re-found during this assessment (Figure 39 and 54).

The site was located on a low rocky rise above a valley floor adjacent to current mining operations. One confirmed artefact was collected from this site (see Table 4).



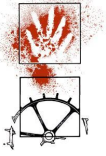
Figure 39 WCP486 general location

WCP492 an open artefact site was re-found during this assessment (Figure 40 and 54).

The site was located on a valley floor adjacent to current mining operation. Very low visibility due to grass cover. Four lithic items including two confirmed artefacts, one a hammer stone, were collected from this site (see Table 4).



Figure 40 WCP492 view northwest



WCP487 an open artefact site was re-found during this assessment (Figure 41 and 54).

The site was located within areas of scald in and around a dam on a valley floor adjacent to current mining operations. Highly disturbed area from mechanical excavations. Twelve lithic items including eight confirmed artefacts were collected from this site (see Table 4).



Figure 41 WCP487 view southwest

WCP211 an open artefact site was re-found during this assessment (Figure 42 and 54).

The site was located on the edge of a dam wall adjacent to current mining operations. One confirmed artefact was collected from this site (see Table 4).



Figure 42 WCP211 dam wall



WCP118/WCP119 a rock shelter with surface artefacts and PAD was re-found during this assessment (Figure 43, 44, 45 and 54).

The site was located on basal slope of a spurline adjacent to current mining operation. Shelter opens out towards valley floor and has an easterly aspect. Site WCP119 is located on the rear side of the same rock outcrop and has same co-ordinates as WCP118.

Six lithic items including five confirmed artefacts were collected from this site (see Table 4).

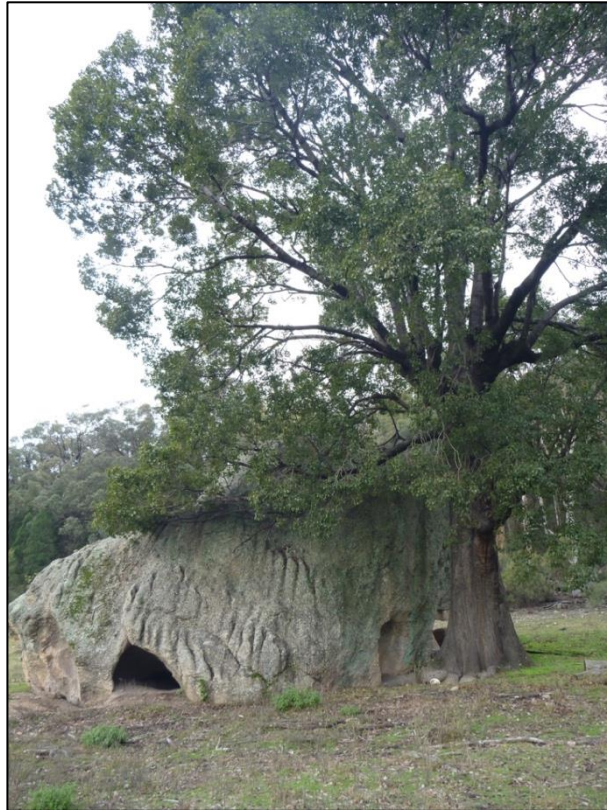


Figure 43 WCP118



Figure 44 WCP118 wombat burrow located at shelter entrance



Figure 45 WCP119 located on the rear side of WCP118

Sites Recorded in the current assessment

Twelve lithic items including six artefacts were collected from eight previously unrecorded site locations. Of these four locations contained confirmed artefacts and constitute new recordings WCP645 through to WCP648.

Collection Location 1 (CL1)

GDA 767225.6418929

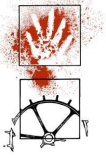
This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 46 and 54). The area is located on an animal track. The site was located on an upper-slope adjacent to current mining operations.

Ground surface disturbance consisted of animal treadage and sheet erosion. The disturbance incidence was 40% with 60% visibility within exposures.

One lithic item was collected from this site (see Table 4). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 46 CL1 looking north east across site.



Collection Location 1 (CL2)

GDA 767282.6418894

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 47 and 54). The area is located on an animal track. The site was located on a mid-slope adjacent to current mining operations.

Ground surface disturbance consisted of animal treadage and sheet erosion. The disturbance incidence was 46% with 80% visibility within exposures.

One lithic item was collected from this site (see Table 4). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 47 CL2 looking north east across site.

Collection Location 1 (CL3)

GDA 767107.6418808

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 48 and 54). The area is located on an animal track. The site was located on an upper-slope adjacent to current mining operations.

Ground surface disturbance consisted of animal treadage and sheet erosion. The disturbance incidence was 40% with 50% visibility within exposures.

One lithic item was collected from this site (see Table 4). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 48 CL3 view northeast

Collection Location 1 (CL4)

GDA 766691.6418294

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 49 and 54). The area is located on the edge of a wombat hole currently in use. The site was located on a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of animal excavations, pastoral and erosional activities. The disturbance incidence was 20% with 80% visibility within exposures.

One lithic item was collected from this site (see Table 4). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 49 CL4 looking north east across site.



WCP645

GDA 767179.6418837

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 50 and 54). The area is located on an animal track. The site was located mid slope of a spurline adjacent to current mining operations.

Ground surface disturbance consisted of animal treadage and vegetation clearing. The disturbance incidence was 30% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz core was collected from this site (see Table 4).



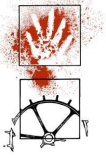
Figure 50 WCP645 general view of site

WCP646

GDA 767083.6418788

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 51 and 54). The area is located on an animal track. The site was located on an upper slope of a minor spurline adjacent to current mining operations.

Ground surface disturbance consisted of animal treadage and vegetation clearing. The disturbance incidence was 20% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.



Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One broken quartz flake (proximal fragment) was collected from this site (see Table 4).



Figure 51 WCP646 general view of site

WCP647

GDA 767025.6418751

This site consists of five lithic items including three confirmed artefacts situated within an area of approximately 1 x 1 m. (Figure 52 and 54). The area is located on erosional scalds. The site was located on lower slopes adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance, animal treadage and sheet erosion. The disturbance incidence was 80% with 20% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Five lithic items including three confirmed artefacts were collected from this site (see Table 4).

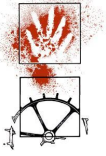


Figure 52 WCP647 general location

WCP648

GDA 767075.6418106

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 53 and 54). The area is located on an edge of a wombat burrow. The site was located on basal slopes adjacent to current mining operations.

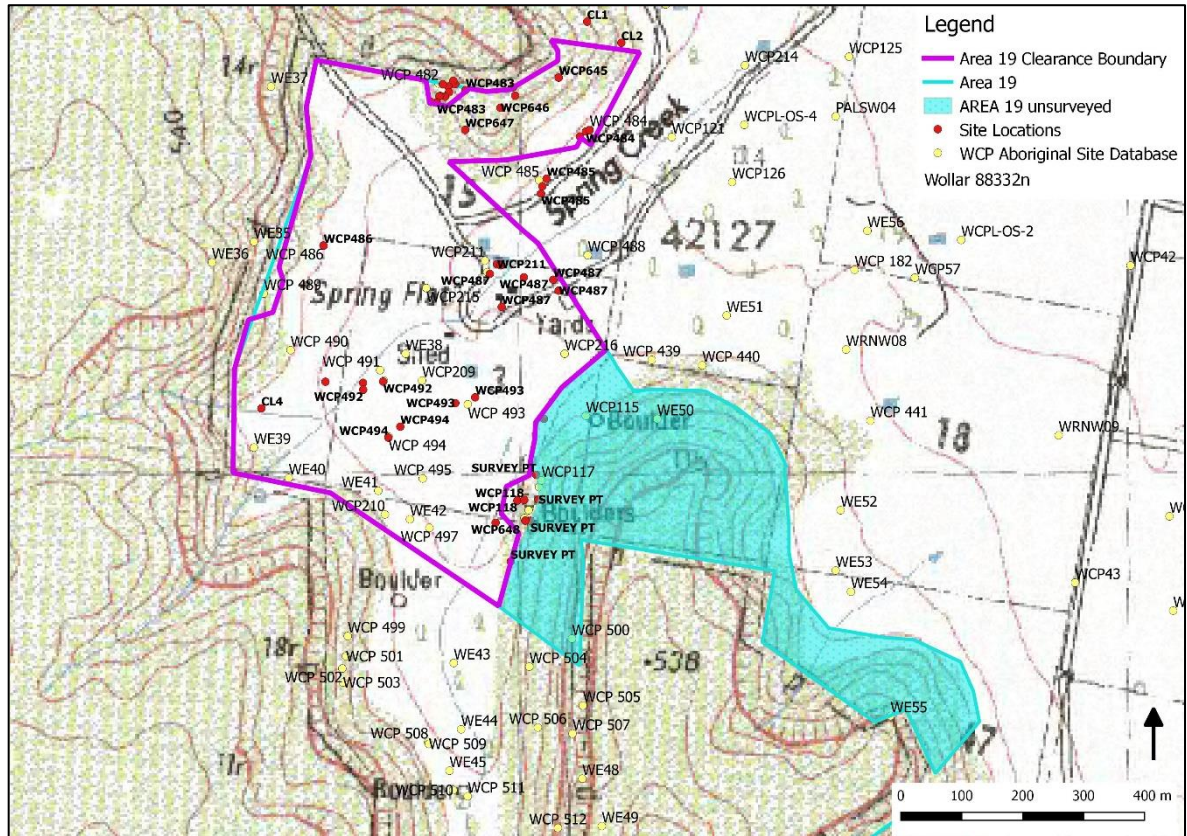
Ground surface disturbance consisted of animal excavations and pastoral clearing. The disturbance incidence was 60% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One broken quartz flake (distal end) was collected from this site (see Table 4).



Figure 53 WCP648 view south west



**Figure 54 Locations of newly recorded sites and WCP Aboriginal Site Database previously recorded sites – Area 19 (part)
Pink line Indicates the clearance boundary
(Base map Wollar 1:25 000 8833-2-N)**



WOLLAR ROAD FENCE LINE

Wollar Road fence line is shown outlined in blue in Figure 55 and was surveyed as part of this clearance work program on 5 July 2016.

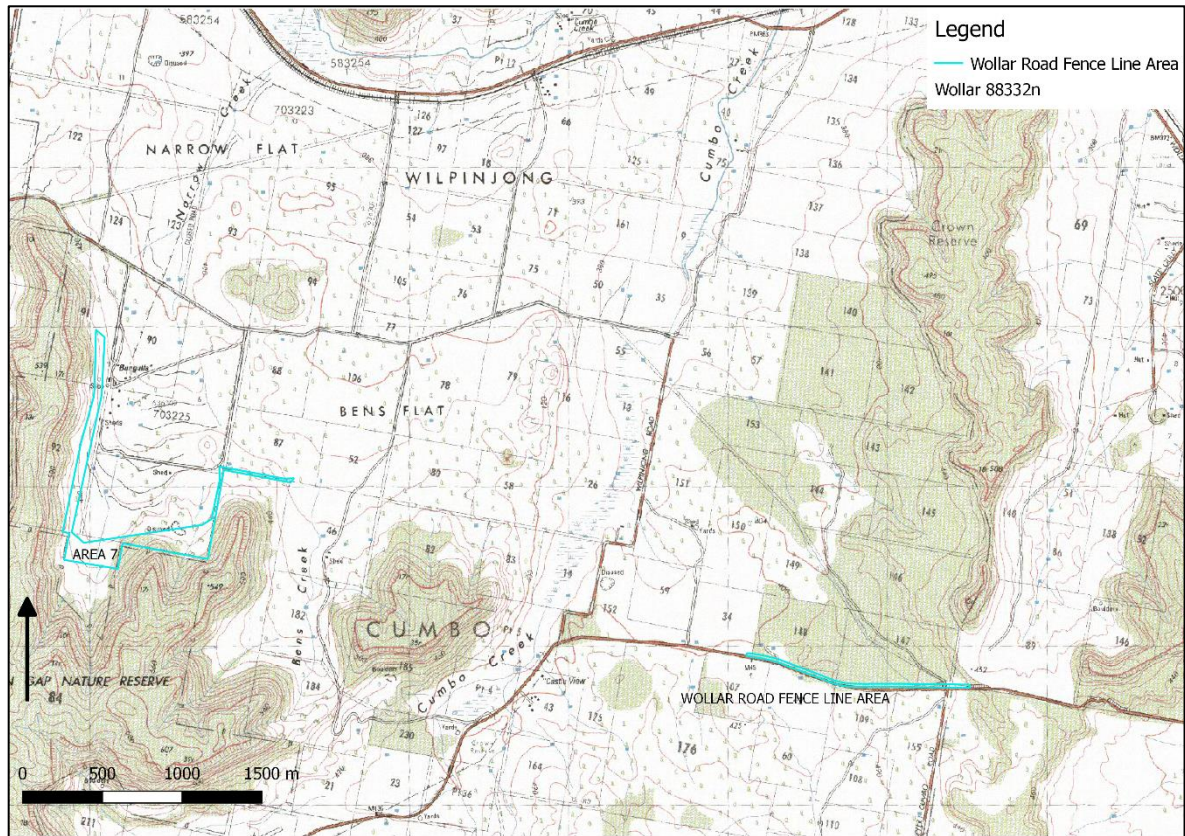


Figure 55 Wollar Road Fence Line (Base map Wollar 1:25 000 8833-2-N))

Clearance Survey Results

Summary

WCP64 AND WCP448 previously recorded sites were re-visited as part of this assessment.

Nine lithic items including one artefact were collected from four previously unrecorded site locations. Of these, one location contained a confirmed artefact and constitutes a new recording WCP649.

One confirmed artefact was collected from one new previously unrecorded site location during this assessment. The new site name is:

- WCP649

Previously Recorded Sites

Two previously lodged site recordings occur in Wollar Road fence line area. These are:

WCP64 – scarred tree; recorded as possibly Aboriginal in origin (Navin Officer Heritage Consultants 2005).

WCP448 – isolated find (South East Archaeology 2013).



The area is located adjacent to Wollar Road. Sections along proposed Wollar Road fence line impact area are highly disturbed. Ground surface disturbance consists of road construction activities, vegetation clearance and rural fencing. Visibility in this area is low to very low.

WCP64 was revisited as part of this assessment (Figure 56 and 62). This site is located outside of proposed Wollar Rd Fence Line area.

New location data was recorded for Modified Tree WCP64 during current survey from GDA 774426.6415946 to GDA 774419.6415951.



Figure 56 WCP64

WCP448 was revisited as part of this assessment (Figure 57 and 62).

Four lithic items were collected from the previously recorded location site WCP448 (see Table 4).

The site area is located on a vehicle track. Ground surface disturbance consisted of original clearing, mechanical excavation, road grading and sheet erosion. The disturbance incidence was 100% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Analysis determined these four lithic items collected during current study were not artefactual.



Figure 57 WCP448 view south across site



Sites Recorded In The Current Assessment

Nine lithic items including one artefact were collected from four previously unrecorded site locations. Of these, one location contained a confirmed artefact and constitutes a new recording WCP648.

Collection Location 1 (CL1)

GDA 773868.6415968

This site consists of three lithic items situated within an area of approximately 5 x 10 m. (Figure 58 and 62). The area is located on an erosional scald atop contour bank.

Ground surface disturbance consisted of vegetation clearance and sheet erosion. The disturbance incidence was 100% with 50% visibility within exposures. There is low to moderate potential for subsurface material and very low potential for this material to be undisturbed.

Three lithic items were collected from this site (see Table 4). Analysis determined that all three of these items were not artefactual and as a consequence no site name has been allocated.



Figure 58 CL1 view east

Collection Location 2 (CL2)

GDA 773793.646415978

This site consists of three lithic items situated within an area of approximately 10 x 10 m. (Figure 59 and 62). The site was located in areas of scald on a lower slope of a low broad spur and adjacent to Wollar Road.

Ground surface disturbance consisted of recent vegetation clearance, surface water erosion and construction of bitumen road. The disturbance incidence was 50-80% with 50% visibility within exposures. Visibility in adjacent areas was 10-20% due to fallen leaf matter and other organic debris. Possible imported material mounded nearby. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Three lithic items were collected from this site (see Table 4). Analysis determined that all three of these items were not artefactual and as a consequence no site name has been allocated.

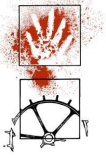


Figure 59 CL2 view east across site

Collection Location 3 (CL3)

GDA 773839.6415926

This site consists two lithic items situated within an area of approximately 1 x 1 m. (Figure 60 and 62). The site was located on an area of scald on an upper slope of a low broad spur adjacent to Wollar Road.

The area is highly disturbed, ground surface disturbance consisted of vegetation clearance and construction of bitumen road. The disturbance incidence was 80% with 60% visibility within exposures. Visibility in adjacent areas was 10% due to fallen leaf matter. There is low potential for subsurface material and very low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is very low.

Two lithic items were collected from this site (see Table 4). Analysis determined that these items were not artefactual and as a consequence no site name has been allocated.



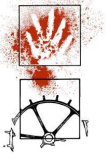


Figure 60 CL3 view east

WCP649

GDA 774095.6415928

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 61 and 62). The site was located in areas of scald on mid slope of a low broad spur and adjacent to Wollar Road.

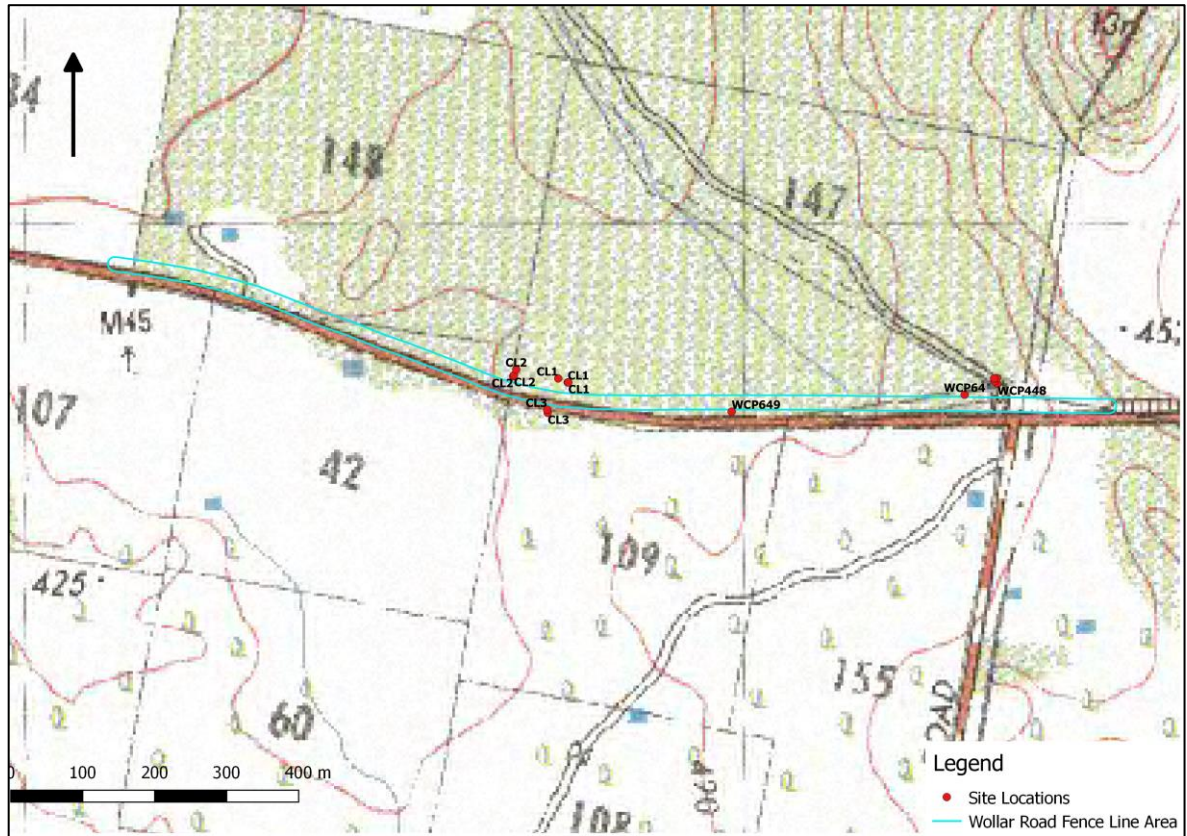
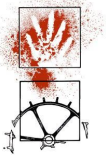
Ground surface disturbance consisted of recent vegetation clearance, surface water erosion and construction of bitumen road. The disturbance incidence was 50-80% with 50% visibility within exposures. Visibility in adjacent areas was 10-20% due to fallen leaf matter and other organic debris. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 4).



Figure 61 WCP649 view east



**Figure 62 Locations of newly recorded sites and WCP Aboriginal Site Database previously recorded sites - Wollar Road Fence Line area
(Base map Wollar 1:25 000 8833-2-N)**



Table 4 Lithic item descriptions

Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
Area 3	WCP631	Core	26.33	Quartz, vein	Complete				0			28.86	26.7
Area 3	WCP632	Unretouched flake	3.62	Quartz, vein	Margin missing	Hertzian	Single	Feather	0	Same	19.08	16.36	4.76
Area 3	WCP633	Non-artefactual	2.84	Quartz, vein									
Area 3	WCP634	Unretouched flake	16.98	FGS	Medial fragment	None	None	None	0	Same	22.16	44.62	10.87
Area 3	WCP634	Unretouched flake	9.66	Quartz, vein	LCS left	Wedging	Single	Feather	0	Same	25.47	18.38	8.41
Area 3	WCP634	Unretouched flake	1.43	Quartz, vein	Distal fragment	None	None	Feather	0	Same	14.2	13.09	3.86
Area 3	WCP634	Unretouched flake	3.67	Quartz, vein	Margin missing	Hertzian	Shattered	Feather	0	Same	30.56	15.06	6.2
Area 3	WCP631	Flaked piece	21.86	Quartz, vein	Complete							35.25	22.63
Wollar Road	WCP649	Unretouched flake	56.94	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	55	45.23	20.71
Wollar Road	CL1	Non-artefactual	1.03	Quartz, vein									
Wollar Road	CL1	Non-artefactual	6.8	Quartz, vein									
Wollar Road	CL1	Non-artefactual	1.94	Quartz, vein									
Wollar Road	CL2	Non-artefactual	44.08	Quartz, vein									
Wollar Road	CL2	Non-artefactual	27.71	Quartz, vein									
Wollar Road	CL2	Non-artefactual	27.95	Quartz, vein									
Wollar Road	CL3	Non-artefactual	14.73	Quartz, vein									
Wollar Road	CL3	Non-artefactual	15.57	Quartz, vein									
Area 7	WCP635	Unretouched flake	1.77	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	14	18.84	4.19
Area 7	WCP635	Unretouched flake	1.37	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	15.58	15.77	4.23
Area 7	WCP635	Unretouched flake	2.73	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	20.94	16.06	4.82
Area 7	WCP636	Flaked piece	5.54	Quartz, vein	Complete							21.65	16.86



Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
Area 7	WCP637	Unretouched flake	6.71	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	21.62	18.7	7.05
Area 7	WCP637	Non-artefactual	2.61	Quartz, vein									
Area 7	WCP637	Non-artefactual	1.43	Quartz, vein									
Area 7	WCP637	Unretouched flake	1.07	Quartz, vein	Distal fragment	None	None	Feather	0	Indeterminate	6.72	14.46	5.75
Area 7	WCP637	Unretouched flake	1.3	Quartz, vein	Margin missing	Hertzian	Shattered	Feather	0	Same	21.31	10.88	4.69
Area 7	WCP637	Non-artefactual	59.57	Quartz, vein									
Area 7	WCP637	Non-artefactual	36.2	Quartz, vein									
Area 7	WCP224	Non-artefactual	24.74	Quartz, vein									
Area 7	WCP224	Unretouched flake	7	Quartz, vein	Complete	Wedging	Shattered	Feather	0	Same	21.75	19.04	8.27
Area 7	WCP224	Unretouched flake	2.65	Quartz, vein	Proximal fragment	Wedging	Single	None	0	Same	21.74	17.85	3.44
Area 7	WCP224	Non-artefactual	0.92	Quartz, vein									
Area 7	WCP224	Non-artefactual	6.87	Chert									
Area 7	WCP224	Unretouched flake	0.79	Quartz, vein	Medial fragment	None	None	None	0	Same	9.09	12.55	4.34
Area 7	WCP224	Non-artefactual	2.03	Quartz, vein									
Area 7	WCP224	Non-artefactual	0.15	Quartz, vein									
Area 7	WCP224	Unretouched flake	7.85	Chert	Proximal fragment	Hertzian	Single	None	0	Same	43.29	22.25	6.95
Area 7	WCP224	Unretouched flake	4.86	Quartz, vein	Proximal fragment	Hertzian	Single	None	0	Same	19.97	20.74	6.43
Area 7	WCP224	Unretouched flake	7.11	Quartz, vein	Proximal fragment	Hertzian	Single	None	0	Same	19.4	27.37	7.7
Area 7	WCP224	Unretouched flake	0.33	Quartz, vein	Distal fragment	None	None	Feather	0	Same	12.1	8.89	2.07
Area 7	WCP224	Unretouched flake	1.04	Quartz, vein	Complete	Hertzian	Multiple	Step	0	Same	15.39	11.9	2.52
Area 7	WCP224	Unretouched flake	3.26	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	16.87	17.86	5.61
Area 7	WCP224	Unretouched flake	1.88	Quartz, vein	Complete	Wedging	Shattered	Step	0	Indeterminate	22.15	10.44	4.49
Area 7	WCP224	Unretouched flake	3.2	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	28.67	17.29	3.07
Area 7	WCP224	Unretouched flake	2.03	Quartz,	Proximal fragment	Hertzian	Single	None	0	Same	16.6	15.21	5.05



Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
				vein									
Area 7	WCP224	Non-artefactual	20.49	Quartz, vein									
Area 7	WCP224	Non-artefactual	80.86	Quartz, vein									
Area 7	WCP224	Unretouched flake	5.37	Chert	Complete	Hertzian	Multiple	Feather	0	Same	34.49	20.18	5.49
Area 7	WCP640	Unretouched flake	1.82	Quartz, vein	Complete	Hertzian	Multiple	Step	100	None	15.11	15.6	5.05
Area 7	WCP224	Non-artefactual	5.21	Quartz, vein									
Area 7	WCP224	Unretouched flake	0.68	Quartz, vein	Distal fragment	None	None	Step	0	Same	11.7	9	3.19
Area 7	WCP224	Non-artefactual	1.28	Quartz, vein									
Area 7	WCP224	Non-artefactual	35.21	Quartz, vein									
Area 7	WCP224	Non-artefactual	0.48	Quartz, vein									
Area 7	WCP224	Unretouched flake	0.29	Quartz, vein	Complete	None	None	Feather	0	Same	11.48	9.11	1.86
Area 7	WCP224	Unretouched flake	0.96	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	0	Same	14.53	12.07	3.8
Area 7	WCP224	Unretouched flake	1.4	Chert	Complete	Hertzian	Single	Feather	0	Same	12.85	12.58	6.26
Area 7	WCP224	Unretouched flake	4.56	Chert	Distal fragment	None	None	Feather	0	Same	22.83	23.54	3.92
Area 7	WCP224	Unretouched flake	10	Quartz, vein	Complete	Wedging	Single	Feather	0	Same	37.77	22.15	6.91
Area 7	WCP224	Non-artefactual	6.55	Quartz, vein									
Area 7	WCP224	Unretouched flake	1.26	Quartz, vein	Proximal fragment	Hertzian	Single	None	0	Same	11.88	11.87	3.96
Area 7	WCP224	Non-artefactual	0.46	Quartz, vein									
Area 7	WCP224	Unretouched flake	27.74	Chert	Medial fragment	None	None	None	0	Same	20.94	48.27	15.19
Area 7	WCP224	Unretouched flake	4.2	Quartz, vein	Proximal fragment	Hertzian	Single	None	0	Same	17.43	16.02	8.35
Area 7	WCP224	Non-artefactual	1.78	Chert									
Area 7	WCP224	Unretouched flake	0.81	Quartz, vein	Distal fragment	None	None	Step	0	Same	8.71	20.14	3.12
Area 7	WCP224	Non-artefactual	15.68	Quartz, vein									
Area 7	WCP224	Non-artefactual	0.48	Chert									
Area 7	WCP537	Non-artefactual	0.16	Quartz, vein									



Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
Area 7	WCP224	Non-artefactual	84.47	Quartz, vein									
Area 7	WCP224	Unretouched flake	6.35	Quartz, vein	Distal fragment	None	None	Outrepassé	0	Same	16.99	17.5	5.32
Area 7	WCP224	Unretouched flake	1.12	Quartz, vein	Distal fragment	None	None	Feather	0	Same	9.48	14.5	4.9
Area 7	WCP224	Non-artefactual	0.77	Quartz, vein									
Area 7	WCP224	Non-artefactual	2.42	Quartz, vein									
Area 7	WCP224	Non-artefactual	0.33	Quartz, vein									
Area 7	WCP224	Non-artefactual	0.5	Quartz, vein									
Area 7	WCP224	Non-artefactual	0.37	Quartz, vein									
Area 7	WCP224	Non-artefactual	0.35	Quartz, vein									
Area 7	WCP224	Unretouched flake	1.68	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	17.75	14.67	6.3
Area 7	WCP638	Unretouched flake	11.48	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	37.4	22.11	10.96
Area 7	CL2	Non-artefactual	57.97	Quartz, vein									
Area 7	CL1	Non-artefactual	2.04	Quartz, vein									
Area 7	WCP537	Non-artefactual	84.96	Quartz, vein									
Area 7	WCP537	Unretouched flake	15.22	Quartz, vein	Margin missing	Hertzian	Shattered	Feather	100	None	39.87	21.87	17.43
Area 7	WCP537	Unretouched flake	11.57	Chert	Complete	Hertzian	Single	Feather	70	Indeterminate	24.28	22.45	14.69
Area 7	WCP537	Unretouched flake	8.9	Chert	Complete	Hertzian	Multiple	Feather	0	Same and oblique	28.69	28.01	7.89
Area 7	WCP537	Unretouched flake	20.26	Quartz, vein	Distal fragment	None	None	Feather	90	Indeterminate	33.07	40.47	8.74
Area 7	WCP537	Unretouched flake	7.63	Chert	LCS right	Hertzian	Single	Hinge	0	Indeterminate	27.07	14.26	13.84
Area 7	WCP537	Unretouched flake	1.71	Quartz, vein	Distal fragment	None	None	Feather	0	Same	14.56	18.85	3.34
Area 7	WCP536	Unretouched flake	17.45	Quartz, vein	Complete	Hertzian	Shattered	Feather	40	Same	35.8	25.86	16.52
Area 7	WCP536	Unretouched flake	5.54	Quartz, vein	Distal fragment	None	None	Feather	0	Indeterminate	19.3	19.56	8.2
Area 7	WCP536	Unretouched flake	3.12	Quartz, vein	LCS left	Hertzian	Single	Feather	0	Same	26.49	16.96	6.6
Area 7	WCP224	Unretouched flake	1.82	FGS	Medial fragment	None	None	None	0	Same	17.16	17.53	3.65



Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
Area 7	WCP224	Unretouched flake	3.71	FGS	Complete	Hertzian	Single	Hinge	0	Same and oblique	24.49	15.21	5.8
Area 7	WCP224	Unretouched flake	0.65	Quartz, vein	Complete	Hertzian	Multiple	Step	0	Same	14.59	10.31	2.29
Area 7	WCP224	Unretouched flake	5.98	Quartzite	Marginal fragment	None	None	None	0	Same	22.15	16.33	5.24
Area 7	WCP224	Unretouched flake	2.17	Quartz, vein	Distal fragment	None	None	Feather	0	Same	15.4	11.36	5.26
Area 7	WCP224	Non-artefactual	1.51	Quartz, vein									
Area 7	WCP224	Unretouched flake	14.54	Quartz, vein	Medial fragment	None	None	None	0	Same	27.88	22.11	13.16
Area 7	WCP224	Unretouched flake	1.98	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	0	Same	20.13	11.5	5.38
Area 7	WCP224	Unretouched flake	5.83	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	33.74	19.38	4.78
Area 7	WCP224	Unretouched flake	1.27	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	17.9	15.1	3.53
Area 7	WCP224	Unretouched flake	14.22	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	0	Same	30.39	29.83	14.26
Area 7	WCP224	Unretouched flake	3.05	Quartz, vein	Distal fragment	None	None	Feather	0	Same			
Area 7	WCP537	Unretouched flake	2.65	Quartz, vein	LCS left	Hertzian	Single	Feather	0	Same	24.25	6.56	8.24
Area 7	WCP537	Unretouched flake	4.6	Quartz, vein	Proximal fragment	Hertzian	Single	None	0	Same	16.93	19.93	7.26
Area 7	WCP537	Unretouched flake	2.86	Quartz, vein	Complete	Hertzian	Single	Step	0	Same	17.24	20.66	4.16
Area 7	WCP537	Unretouched flake	7.97	Quartz, vein	Proximal fragment	Hertzian	Multiple	None	0	Oblique	16.26	25.08	11.85
Area 7	WCP537	Unretouched flake	4.16	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	26.68	19.45	5.95
Area 7	WCP537	Unretouched flake	2.18	FGS	Medial fragment	None	None	None	50	Indeterminate	19.01	14.08	5.82
Area 7	WCP537	Unretouched flake	6.88	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	22.91	21.67	11
Area 7	CL4	Non-artefactual	165.44	Quartz, vein									
Area 7	WCP644	Unretouched flake	1.91	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	0	Same	15.35	15.21	5.6
Area 7	WCP224	Unretouched flake	2.13	Quartz, vein	Distal fragment	None	None	Feather	0	Same	17.43	20.99	4.17
Area 7	WCP537	Unretouched flake	3.18	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	21.14	18.46	6.97
Area 7	WCP639	Unretouched flake	1.05	Quartz,	Complete	Hertzian	Single	Feather	0	Same	14.16	8.98	4.98



Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
				vein									
Area 7	WCP537	Non-artefactual	4.99	FGS									
Area 7	WCP643	Non-artefactual	1.32	Quartz, vein									
Area 7	WCP643	Unretouched flake	4.5	FGS	Complete	Hertzian	Single	Hinge	0	Same	22.8	26.08	5.55
Area 7	WCP643	Non-artefactual	4.65	Quartz, vein									
Area 7	WCP642	Unretouched flake	5.43	Quartz, vein	Complete	Hertzian	Multiple	Feather	0	Same	28.59	17.36	6.49
Area 7	WCP642	Unretouched flake	2.73	Quartz, vein	Complete	Hertzian	Shattered	Feather	100	None	25.2	13.44	7.46
Area 7	WCP642	Unretouched flake	1.72	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	15.75	12.99	6.54
Area 7	WCP641	Unretouched flake	3.5	Quartz, vein	Complete	Wedging	Shattered	Feather	0	Same and oblique	18.19	16.94	7.78
Area 7	CL4	Non-artefactual	0.87	Quartz, vein									
Area 7	CL3	Non-artefactual	610.13	Quartzite									
Area 19	WCP492	Non-artefactual	543.14	Quartz, vein									
Area 19	WCP118/119	Retouched flake	433.51	Hornfels	Complete	Hertzian	Single	None	90	Same	76.31	104.55	32
Area 19	WCP492	Non-artefactual	162.62	Quartz, vein									
Area 19	WCP492	Hammer	523.68	Quartz, vein	Broken						80.5	65.41	59.4
Area 19	WCP485	Unretouched flake	4.54	Quartz, vein	Medial fragment	Hertzian	None	None	0	Indeterminate	18.74	17.14	7.7
Area 19	WCP485	Unretouched flake	1.31	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Indeterminate	12.65	8.34	6.13
Area 19	WCP485	Unretouched flake	3.33	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	23.68	15.59	5.51
Area 19	WCP492	Unretouched flake	4.81	Quartz, vein	Distal fragment	None	None	Feather	0	Same	14.71	19.71	9.62
Area 19	WCP211	Unretouched flake	4.64	Quartz, vein	Distal fragment	None	None	Feather	0	Same	26.82	14.52	7.99
Area 19	WCP487	Non-artefactual	2.04	Quartz, vein									
Area 19	WCP487	Unretouched flake	1.39	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	0	Same	14.77	14.08	3.17
Area 19	WCP487	Unretouched flake	4.68	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	16.19	24.54	7.63
Area 19	WCP483	Non-artefactual	13.55	FGS									



Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
Area 19	WCP483	Non-artefactual	2.72	Quartz, vein									
Area 19	WCP483	Unretouched flake	5.32	Quartz, vein	Distal fragment	None	None	Feather	0	Same	14.26	23.37	7.5
Area 19	WCP483	Non-artefactual	3.88	Quartz, vein									
Area 19	WCP647	Non-artefactual	9.75	Quartz, vein									
Area 19	WCP647	Non-artefactual	11.91	Quartz, vein									
Area 19	WCP647	Unretouched flake	0.53	Quartz, vein	Distal fragment	None	None	Feather	0	Same	16.68	8.32	2.55
Area 19	WCP647	Unretouched flake	2.21	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	16.37	10.59	6.9
Area 19	WCP647	Unretouched flake	9.88	Quartz, vein	Distal fragment	None	None	Feather	0	Same	20.8	24.7	7.83
Area 19	WCP486	Unretouched flake	4.52	Quartz, vein	Distal fragment	None	None	Feather	0	Same and opposite	24.64	17.54	6.71
Area 19	CL4	Non-artefactual	1.76	Quartz, vein									
Area 19	WCP485	Non-artefactual	0.98	Quartz, vein	Medial fragment	None	None	None	0	Same	14.31	8.83	3.79
Area 19	CL2	Non-artefactual	301.14	Quartz, vein									
Area 19	WCP492	Non-artefactual	9.95	Quartz, vein									
Area 19	WCP494	Unretouched flake	0.61	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	12.06	10.13	3.47
Area 19	WCP494	Unretouched flake	0.21	Quartz, vein	Distal fragment	None	None	Feather	0	Same	6.73	11.93	1.66
Area 19	WCP648	Unretouched flake	1.55	Quartz, vein	Distal fragment	None	None	Feather	0	Same	27.79	17.75	3.03
Area 19	WCP118/119	Unretouched flake	2.36	Quartz, vein	Complete	Hertzian	Multiple	Feather	0	Indeterminate	13.62	20.33	7.42
Area 19	WCP118/119	Unretouched flake	4.38	Quartz, vein	Medial fragment	None	None	None	0	Same	18.79	11.51	6.75
Area 19	WCP118/119	Non-artefactual	2.61	Quartz, vein									
Area 19	WCP118/119	Unretouched flake	1.25	Quartz, vein	Distal fragment	None	None	Step	0	Same	17.14	9.79	5.19
Area 19	WCP118/119	Unretouched flake	1.94	FGS	Complete	Hertzian	Single	Feather	40	Same and oblique	27.04	15.02	4.11
Area 19	WCP484	Unretouched flake	1.93	FGS	Proximal fragment	Hertzian	Multiple	None	0	Same	16.65	17.24	5.09
Area 19	WCP484	Unretouched flake	2.49	Quartz, vein	Distal fragment	None	None	Feather	0	Same	14.63	16.65	5.82
Area 19	CL1	Non-artefactual	19.49	Quartz, vein									



Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
Area 19	WCP493	Unretouched flake	4.78	Quartz, vein	Distal fragment	None	None	Step	0	Same	25.28	21.96	6.44
Area 19	WCP493	Non-artefactual	32.24	Quartz, vein									
Area 19	WCP493	Unretouched flake	1.11	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	0	Same	13.99	12.47	4.17
Area 19	WCP487	Unretouched flake	1.65	Quartz, vein	Proximal fragment	Wedging	Shattered	None	0	Same	20.25	13.96	3.29
Area 19	WCP487	Unretouched flake	0.35	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	14.39	10.01	1.29
Area 19	WCP487	Unretouched flake	1.01	Quartz, vein	LCS left	Hertzian	Single	Feather	0	Same	14.26	8.71	4.05
Area 19	WCP487	Unretouched flake	0.87	Quartz, vein	Complete	Bending	Multiple	Feather	0	Same	7.43	9.38	5.41
Area 19	WCP487	Non-artefactual	1.28	Quartz, vein									
Area 19	WCP487	Unretouched flake	4.08	Quartz, vein	Margin missing	Hertzian	Single	Feather	0	Same	18.64	12.82	9.54
Area 19	WCP487	Non-artefactual	1.52	Quartz, vein									
Area 19	WCP487	Non-artefactual	0.51	Quartz, vein									
Area 19	WCP487	Unretouched flake	0.99	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	11.9	12.58	4.81
Area 19	WCP484	Unretouched flake	0.32	Quartz, vein	Distal fragment	None	None	Feather	0	Same	10.48	6.71	2.28
Area 19	WCP483	Unretouched flake	28.76	Quartz, vein	LCS left	Hertzian	Single	Step	0	Same	36.88	21.37	16.88
Area 19	WCP483	Non-artefactual	3.58	Quartz, vein									
Area 19	WCP483	Unretouched flake	1.26	Quartz, vein	Complete	Hertzian	Multiple	Step	100	None	13.11	13.08	3.41
Area 19	WCP483	Unretouched flake	6.63	Quartz, vein	Distal fragment	None	None	Outrepassé	0	Same	13.36	17.96	5.53
Area 19	WCP483	Unretouched flake	4.15	Quartz, vein	Medial fragment	None	None	None	0	Same	27.53	15.55	6.67
Area 19	WCP483	Unretouched flake	0.26	Quartz, vein	Proximal fragment	Hertzian	Multiple	None	0	Same	9.44	9.74	2
Area 19	WCP483	Non-artefactual	9.11	Quartz, vein									
Area 19	WCP483	Unretouched flake	2.85	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	14.12	10.18	7.45
Area 19	CL3	Non-artefactual	3.3	Quartz, vein									
Area 19	WCP646	Unretouched flake	2.28	Quartz, vein	Proximal fragment	Wedging	Shattered	None	0	Same	14.04	15.04	7.93



Survey Area	Site Name	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
Area 19	WCP483	Non-artefactual	1.57	Quartz, vein									
Area 19	WCP483	Unretouched flake	10.82	Quartz, vein	Complete	Hertzian	Cortical	Feather	100	None	38.69	23.95	9.86
Area 19	WCP645	Core	13.3	Quartz, vein	Complete				40			24.51	23.99

Continued over.



Survey Area	Site Name	Platform width	Platform thickness	Comments
Area 3	WCP631			Heavily flaked double-ended core, with platforms at both proximal and distal end showing signs of repeated rotation (i.e. sequential flaking onto and from the platform).
Area 3	WCP632			
Area 3	WCP633			
Area 3	WCP634	20.05	12.15	
Area 3	WCP634			
Area 3	WCP634			
Area 3	WCP634			Angular piece of quartz, with two negative flake scars and one truncated ambiguous surface that could be ventral.
Wollar Road	WCP649	17.57	7.11	
Wollar Road	CL1			
Wollar Road	CL1			
Wollar Road	CL1			
Wollar Road	CL2			
Wollar Road	CL2			
Wollar Road	CL2			
Wollar Road	CL3			
Wollar Road	CL3			
Area 7	WCP635	14.66	4.77	
Area 7	WCP635	14.12	2.55	
Area 7	WCP635	14.7	5.67	
Area 7	WCP636			
Area 7	WCP637			
Area 7	WCP637			
Area 7	WCP637			



Survey Area	Site Name	Platform width	Platform thickness	Comments
Area 7	WCP637			
Area 7	WCP637			
Area 7	WCP637			
Area 7	WCP637			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224	10.46	3.59	
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224	12.47	3.44	
Area 7	WCP224	19.11	5.5	
Area 7	WCP224	29.02	6.18	
Area 7	WCP224			
Area 7	WCP224	12.99	3.75	
Area 7	WCP224	11.54	4.56	
Area 7	WCP224			
Area 7	WCP224	12.05	4.32	
Area 7	WCP224	15.39	5.1	
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224	11.13	4.9	
Area 7	WCP640	14.28	6.33	
Area 7	WCP224			



Survey Area	Site Name	Platform width	Platform thickness	Comments
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224	6.04	2.7	
Area 7	WCP224			
Area 7	WCP224	13.93	4.05	
Area 7	WCP224			
Area 7	WCP224	13.63	4.25	
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224	14.04	8.58	
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP537			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			



Survey Area	Site Name	Platform width	Platform thickness	Comments
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP638			
Area 7	CL2			
Area 7	CL1			
Area 7	WCP537			
Area 7	WCP537			
Area 7	WCP537	25.44	13.5	
Area 7	WCP537	22.83	6.86	
Area 7	WCP537			
Area 7	WCP537	23.71	17.66	
Area 7	WCP537			
Area 7	WCP536			
Area 7	WCP536			
Area 7	WCP536	17.56	9.24	
Area 7	WCP224			
Area 7	WCP224	10.05	3.53	
Area 7	WCP224	9.36	2.24	
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224	6.96	2.25	
Area 7	WCP224			
Area 7	WCP224			
Area 7	WCP224			



Survey Area	Site Name	Platform width	Platform thickness	Comments
Area 7	WCP224			
Area 7	WCP537	8.29	6.33	
Area 7	WCP537	14.7	4.62	
Area 7	WCP537	11.18	3.56	
Area 7	WCP537	25.93	12.78	
Area 7	WCP537	15.63	6.3	
Area 7	WCP537			
Area 7	WCP537			
Area 7	CL4			
Area 7	WCP644			
Area 7	WCP537			
Area 7	WCP639			
Area 7	WCP537	7.59	3.8	
Area 7	WCP643			
Area 7	WCP643			
Area 7	WCP643	13.7	4.48	
Area 7	WCP642	13.81	5.19	
Area 7	WCP642			
Area 7	WCP642			
Area 7	WCP641			
Area 7	CL4			
Area 7	CL3			
Area 19	WCP492			
Area 19	WCP118/119	68.01	25.54	Large scraper, with unifacial dorsal retouch on both margins and distal end. Pitting and abrasion on dorsal and ventral surfaces is recent (not of Aboriginal origin).
Area 19	WCP492			
Area 19	WCP492			Rounded cobble with intensive hammer damage on radiused corners.



Survey Area	Site Name	Platform width	Platform thickness	Comments
Area 19	WCP485			
Area 19	WCP485			
Area 19	WCP485			
Area 19	WCP492			
Area 19	WCP211			
Area 19	WCP487			
Area 19	WCP487			
Area 19	WCP487			
Area 19	WCP483			
Area 19	WCP483			
Area 19	WCP483			
Area 19	WCP483			
Area 19	WCP647			
Area 19	WCP647			
Area 19	WCP647			
Area 19	WCP647	9.34	3.22	
Area 19	WCP647			
Area 19	WCP486			
Area 19	CL4			
Area 19	WCP485			
Area 19	CL2			
Area 19	WCP492			
Area 19	WCP494	10.33	3.13	
Area 19	WCP494			
Area 19	WCP648			
Area 19	WCP118/119	14.57	2.65	
Area 19	WCP118/119			



Survey Area	Site Name	Platform width	Platform thickness	Comments
Area 19	WCP118/119			
Area 19	WCP118/119			
Area 19	WCP118/119	11.51	5.24	
Area 19	WCP484	13.26	5.67	
Area 19	WCP484			
Area 19	CL1			
Area 19	WCP493			
Area 19	WCP493			
Area 19	WCP493			
Area 19	WCP487			
Area 19	WCP487			
Area 19	WCP487	8.33	4.07	
Area 19	WCP487	11.03	6.59	
Area 19	WCP487			
Area 19	WCP487			
Area 19	WCP487			
Area 19	WCP487	8.63	3.9	
Area 19	WCP484			
Area 19	WCP483	10.49	7.62	
Area 19	WCP483			
Area 19	WCP483	10.9	2.77	
Area 19	WCP483			
Area 19	WCP483			
Area 19	WCP483	5.69	1.37	
Area 19	WCP483			
Area 19	WCP483	6.87	2.69	



Survey Area	Site Name	Platform width	Platform thickness	Comments
Area 19	CL3			
Area 19	WCP646	8.32	3.94	
Area 19	WCP483			
Area 19	WCP483	5.38	4.44	
Area 19	WCP645			Single-platform core, with evidence of repeated rotations, with flaking alternating between the platform surface and the major flaked surface.



ABORIGINAL CONSULTATION

Wilpinjong Coal Mine (WCM) and Peabody Energy conduct an ongoing consultation program with Aboriginal stakeholders with regard to cultural heritage management within the Wilpinjong mining lease (ML 1573). There are currently eight organisations or individuals registered as Aboriginal stakeholders (also known as 'registered Aboriginal parties' or RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH). Navin Officer Heritage Consultants contacted each stakeholder to invite a representative of each group to be involved in the site visits for this assessment. This was done via email on 18 March 2016. Four stakeholders responded to the invitation and their representatives attended the fieldwork. The

Field Participation

The following representatives from four registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over three days, 5, 6 and 7 July 2016:

- Coral Williams Warrabinga Native Title Claimants Aboriginal Group;
- Eric Hill North East Wiradjuri Company Ltd;
- Debie Foley and Larry Foley Mudgee Local Aboriginal Land Council; and
- Larry Foley and Shannon Foley Murrong Gillinga.

NOHC FIELDWORK PERSONNEL

Archaeologists Jo Dibden and Lucy Blackham undertook the survey and artefact collection.

Dr Oliver Macgregor undertook the artefact description.

CONCLUSIONS AND RECOMMENDATIONS

Twenty new Aboriginal sites, WCP630 to WCP649, have been recorded within the Wilpinjong project boundary as a result of this assessment. AHIMS site cards are attached for these sites.

Area 3

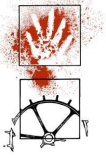
Area 3 will be cleared for impact following the salvage of WCP630 (modified tree).

Area 7

Area 7 is cleared for impact excluding the area shown in Figure 32b as site WCP224.

RAP field representatives from a cultural point of view suggest WCP224 undergo additional salvage works prior to impacts. A reasonable sample of surface artefacts were collected from the lower slopes of site WCP224 following two systematic archaeological salvage programs (WCPL ACHMP and current). The sample size of collected artefacts from WCP224 is of sufficient size to enable the identification of spatial distribution within a valley floor context.

A limited program of two archaeological test excavation 0.5 x 1.0 metre pits placed on WCP224 spur crest located within Area 7 would enable the identification of the extent of archaeological



deposit and subsurface artefact potential. This investigation is covered by the provision of the WCPL ACHMP.

The proposed archaeological test excavation program offers to provide a more robust assessment of the nature of the assemblage on the crest at site WCP224.

Following the WCP224 proposed archaeological test excavation program an infield assessment will be undertaken to identify if further salvage works are required on the spur crest within Area 7.

The scarred tree located in Area 7 was dismissed as unlikely to be culturally modified tree. The salvage of the historical trough should be considered prior to any impacts.

Area 19

Area 19 requires the remaining unsurveyed area to be investigated prior to any impacts in that area.

Consistent with the WCPL ACHMP rock shelters WCP118/119 and WCP120 should be avoided by the project. Sites WCP482, 483 and 489 are not included in the WCPL ACHMP however consistent with the WCPL ACHMP these sites should be avoided by the project.

A program of archaeological salvage excavation within rock shelters WCP118/119 should be undertaken prior to impact. This recommendation is consistent with the recommendations made by NOHC 2005 and South East Archaeology 2013.

Rock shelter WCP483 possibly contains imported rocks placed at back of shelter. This has been interpreted by the Aboriginal representatives as a possible burial site within shelter. This rock shelter should be avoided by the project and fenced during any mining activity occurring near the site.

If avoidance is not feasible at rock shelters WCP120, 482 and 489. These sites should be recorded in detail either by using 3D scanning or detailed archaeological recording and dependent upon the results of the excavation of WCP118/119 may also require salvage excavation.

It is unclear if impacts to the rock shelters or the recommended salvage excavation is covered under the current WCPL ACHMP. If impacts are anticipated to the rock shelters, then WCPL may require additional approvals from the Department of Planning.

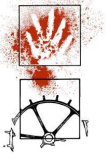
Area 19 is cleared for impact in the area shown in Figure 54, this area avoids rock shelters WCP118/119, WCP120, WCP482, 483 and 489. Rock shelter sites WCP118/119, WCP120, WCP482, 483 and 489 should be fenced during the life of operations in Area 19 when mining operations come within 20 metres of these sites. Impacting these sites must be avoided until their significance is re-assessed by a qualified Archaeologist.

Wollar Road Fence Line

Wollar Road Fence Line will be cleared for impact following the installation of suitable protection fencing for WCP64 (Aboriginal scarred tree).

Recommendations:

1. Newly recorded Aboriginal sites WCP630 to WCP649 should be entered on the Wilpinjong sites database.



2. Modified tree WCP630 located in Area 3 be included in a scarred tree salvage program (see Appendix 1) based upon an assessment of its Aboriginal cultural heritage value and origin.
3. Area 7 is cleared for impact excluding the area shown in Figure 32b as site WCP224.
4. Site WCP224 undergo a limited Archaeological test program on the spur crest located within Area 7 to identify the extent of the archaeological deposit and as a means to provide an infield assessment of the potential for subsurface salvage within this area.
5. Site WE10 is located outside Area 7, this site should be fenced for protection when mining operations come within 20 metres of the site.
6. Area 19 is cleared for impact in the area shown in Figure 54. This area avoids rock shelters WCP118/119, WCP120, WCP482, 483 and 489. Rock shelters WCP118/119, WCP120, WCP482, 483 and 489 should be fenced during the life of operations in Area 19 when mining operations come within 20 metres. Impacting these sites must be avoided until their significance is re-assessed by a qualified Archaeologist.
7. Modified tree WCP64 be protected with a suitable visual fence prior to impacts in Wollar Road Fence Line area.
8. The current recorded locations for Rock Shelters WE10, WCP482, WCP483, WCP118/119 and WCP120 and Modified Tree WCP64 should be updated on relevant databases. New GDA recordings for these sites are:

WE10 - 769414.6416787

WCP482 – 766989.6418826

WCP483 – 766997.6418822

WCP118/119 – 767122.6418143

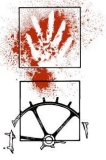
WCP120 – 767124.6418109

WCP64 – 774419.6415951



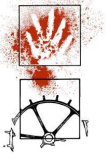
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- South East Archaeology 2015 Wilpinjong Coal Mine, Central Tablelands Of New South Wales – Extension Project: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- Wilpinjong Coal Pty Ltd (WCPL) 2015 Wilpinjong Coal Project Aboriginal Site Database revised 5 March 2015.
- Wilpinjong Coal Pty Ltd (WCPL) 2006, Wilpinjong Coal Project Environmental Impact Statement.



ATTACHMENT 1

SCARRED TREE SALVAGE METHODOLOGY



When salvage of probable Aboriginal scar trees is undertaken in accordance with the Aboriginal Cultural Heritage Management Plan, the following methodology would be implemented. In addition to the below, Wilpinjong Coal Pty Limited would provide the Native Title Party with the opportunity to conduct a smoking ceremony for any live probable or possible Aboriginal scar trees salvaged in accordance with the below methodology.

Note that actions in *italics* in the following tables may require a person with specialist experience, such as in dendrochronology, or the archaeological interpretation of scarred trees.

Actions **bolded** are additional actions arising from discussions on 28 May 2015

Salvage Methodology - Probable Scar Trees

(If salvage is adopted as a management option, this methodology could also be implemented for possible Aboriginal scar trees that are in good condition).

- A1. Conduct an assessment of the condition and fragility of the tree. If it is unlikely that the scarred section of trunk can be recovered/salvaged without significant break-up, then consult with Aboriginal stakeholder group(s) as to whether an attempt to salvage the scarred trunk should be continued and whether the recovery and storage of fragments is required.
- A2. In the event that a successful salvage of the scarred section of tree is not considered possible, then conduct salvage step A10 prior to destruction of the tree.
- A3. If it is considered possible to salvage the scarred section of tree without significant break-up, then: Identify section of trunk containing both the remaining exposed scar surface and the healed-over regrowth (refer to the site card for an estimate of the original length of the scar or scars)

Additional Step 1 A 3D scan will be completed of each scar, to record the scar prior to the removal of the tree. This information will be provided to the Aboriginal groups and documented in an archival report

- A5. **Remove crown, conserving as much of the trunk above the top of the scar as is feasible (and making sure that at least 200 mm of trunk remains between the cut and the upper most point of the original scar, ie including the regrowth)**

Additional Step 2 Excavation will occur around the base of the tree, this is to loosen any roots to allow step A4 to be undertaken with less chance of damaging the tree. Excavation will occur preferably on the downslope face of the tree

- A4. Push tree over, taking all reasonable steps to protect the side of the tree with the scar from unnecessarily impact. **The tree around the scar will be braced using appropriate methods such as wooden braces and strapping. Additionally it is preferable to push the tree up-slope and onto a constructed batter/mound to reduce the distance the tree falls to the ground.** If it is unsafe, or for some other reason, it is not feasible to push the tree over, the tree could be felled using a chain saw. Where feasible and safe to do so, the trunk should be cut so that the original scarred section of the trunk remains in one piece (including regrowth).
- A6. Ensure regrowth around scar is retained (regrowth can often be identified by its raised character, hollow sound when tapped, and different surface pattern on bark)
- A7. Remove roots and stump/lower trunk portion, making sure that at least 200 mm of trunk remains between the cut and the lower most point of the original scar (ie including regrowth)



- A8. Relocate to storage area, providing surface protection to scar area (such as by wrapping a geotextile or other such covering around trunk) where there is an assessed risk of accidental scraping, percussion or gauging impact to the scar area
- A9. Store under cover, and off the ground, with site number clearly and permanently identified on trunk (do not place identification on scar or regrowth areas)
- A10. *If agreed by Aboriginal stakeholder group(s), collect two 5mm diameter core samples (providing record of tree rings), one through regrowth into heartwood (if still extant), and one through full trunk radius outside of the scar area. This type of sample is removed using an 'increment borer' and the samples will allow an approximate date to be calculated for the scar*
- A11. *In consultation with the Aboriginal stakeholder group(s), consideration to be given to partially or fully removing the regrowth on selected scarred tree examples to determine the shape of the original scar, the original method of bark removal, and to record the pattern of original axe/hatchet marks.*
- A12. Curate or replace back onto rehabilitated mine landscape, according to the requirements of the Aboriginal stakeholder group(s). The results of the analysis of the age, pattern of axe marks and original shape of the scars should be considered by Aboriginal stakeholders when deciding if the scars are of Aboriginal origin and require any further



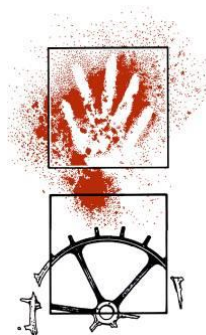
Wilpinjong Coal Mine

Aboriginal Cultural Heritage Clearance Works

Areas 19(part), 15 and Contour Bank

Archaeological Subsurface testing of site
WCP224.

March 2017



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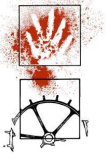
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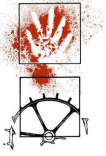
Client: *Wilpinjong Coal Pty Ltd*



Report Register

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

Issue No.	Notes/Description	Issue Date
v1	Draft for proponent comment	
v5	For proponent comment	31/01/2017
v6	Mapping updates	14/02/2017
v7	Update after proponent comments	15/02/2017
v8	Update after proponent comments	16/02/2017
v9	Update after proponent comments	15/03/2017



EXECUTIVE SUMMARY

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.

The following report explains the results of pre-clearance archaeological survey and surface salvage of Areas 19 (part), 15 and the subsurface testing of site WCP224.

Area 19 (part)

Six previously lodged site recordings occur in Area 19 (part):

WCP115 – rock shelter with artefacts (NOHC 2005). This site is listed in the ACHMP.

WCP116 - rock shelter with artefacts (NOHC 2005). This site is listed in the ACHMP.

WCP117 - rock shelter with PAD (NOHC 2005). This site is listed in the ACHMP.

WCP500 - rock shelter with PAD (South East Archaeology 2015). This site is listed in the ACHMP

WE50 - rock shelter with PAD (Kyandel 2006). This site is listed in the ACHMP.

WE55 - rock shelter with PAD (Kyandel 2006). This site is listed in the ACHMP.

No rock shelter with PAD was detected at locations WE50 and WE55. All of Area 19 (part) was surveyed with the view to identifying another location for WE50 and WE55, areas outside Area 19 (part) were also surveyed. The current recorded locations of sites WE50 and WE55 are therefore concluded to be incorrect.

Three confirmed artefacts were collected from three previously unrecorded locations and constitute three new recordings WCP650, WCP651 and WCP652.

Area 15

Nine previously lodged site recordings occur in Area 15 They are:

265 – Open artefact site (NOHC 2005). This site is listed in the ACHMP.

266 – Open artefact site (NOHC 2005). This site is listed in the ACHMP.

WCP235 - Open artefact site (NOHC 2005). This site is listed in the ACHMP.

WCP236 – Scarred Tree (NOHC 2005). This site is listed in the ACHMP.

WCP562 - rock shelter with PAD (South East Archaeology 2015). This site is listed in the ACHMP

WCP566 - rock shelter with PAD (South East Archaeology 2015). This site is listed in the ACHMP

WCP568 - rock shelter with PAD (South East Archaeology 2015). This site is listed in the ACHMP



WE1 – Scarred tree (Kyandel 2006). This site is listed in the ACHMP.

WE4 - Open artefact site (Kyandel 2006). This site is listed in the ACHMP.

WE1 and WE4 were revisited as part of this assessment. No artefacts or scarred trees were detected. The current recorded locations of sites WE1 and WE4 are therefore concluded to be incorrect.

Forty-six lithic items were collected from combined sites 264-266. Of these, twenty-seven are confirmed artefacts.

One confirmed artefact was collected from site WCP235 at GPS location 774008.6418916.

The scarred tree at site WCP236 was re-found during the clearance survey.

Rock shelters WCP562, WCP566 and WCP568 were re-found during the clearance survey.

Fifty one lithic items including thirty confirmed artefacts were collected from seventeen previously unrecorded site locations. Of these ten locations contained confirmed artefacts and constitute new recordings WCP653 through to WCP662.

Three previously unrecorded scarred trees were located in Area 15, these constitute new site recordings WCP663, WCP664 and WCP665.

Contour Bank

There are no previously recorded sites located in the contour bank survey area.

Three lithic items including one confirmed artefact were collected and constitute new recording WCP666.

Site WCP224

Six artefacts and seven non-artefacts were recovered from site WCP224.

Recommendations

Recommendations:

1. Newly recorded Aboriginal sites WCP650 to WCP666 should be entered on the Wilpinjong sites database.
2. Area 19 as shown in Figure 2 is cleared for disturbance:
 - i. to the extent shown in Figure 7; and
 - ii. in line with the recommendations contained within this report.

Note: The area shown in Figure 7 excludes the rock shelters comprising: WCP115, 116, 117 and 500. Refer to the Conclusions and Recommendations section of this report for further details.
3. Area 15 as shown in Figure 8 is cleared for disturbance:
 - i. to the extent shown in Figure 34; and



- ii. in line with the recommendations contained within this report.

Note: The area shown in Figure 34 excludes the rock shelters, scarred trees and artefacts comprising: WCP562, 566, 568, 236, 663, 664, 665, 654 and 264-266. Refer to the Conclusions and Recommendations section of this report for further details.

4. Modified trees WCP236, WCP663 and WCP664 located in Area 15 be included in a scarred tree salvage program based upon an assessment of its Aboriginal cultural heritage value and origin.
5. Site WCP654 and combined site 264-266 located in Area 15 should undergo a limited Archaeological salvage program as a means to collect a larger sample of artefactual material from these locations.
6. The contour bank is cleared for impact.
7. Site WCP224 is cleared for impact.
8. The current recorded locations for Rock Shelters WCP115, WCP116/117 and WCP500 should be updated on relevant databases. New GDA recordings for these sites are:

WCP115 – 767230.6418277

WCP116/117 – 767144.6418161

WCP500 – 767197.6417916



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BACKGROUND

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 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).

The ACHMP includes an Ancillary Disturbance Area Protocol which includes:

1. Pre-clearance archaeological survey (conducted with the assistance of Aboriginal representatives). This survey would include consideration of the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage.
2. Avoidance of the identified Aboriginal object/sites by realigning or adjusting infrastructure/disturbance area if practicable.

If the object/site cannot be avoided:

1. Consider surface salvage (advice from Aboriginal representatives and/or an archaeologist will be sought).
2. If relevant, consider the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage (subject to review of the ACHMP and consultation with Aboriginal representatives and/or an archaeologist).
3. Conduct surface salvage (and subsurface salvage if necessary) with the assistance of Aboriginal representatives and an archaeologist.
4. Store salvaged artefacts in the "Keeping Place".
5. Post-rehabilitation, replace artefacts onto the rehabilitated landform.

Surface Salvage

The ACHMP specifies that surface salvage will involve the systematic recovery of all evident surface artefacts from a representative sample of open artefact scatters and from selected isolated finds at known sites within the project disturbance area. Surface collections will occur on a progressive basis prior to the commencement of ground surface disturbance works within an area.

A basic level of recording will be conducted on all recovered artefactual surface material including location, technological traits, and stone type. This analysis has been conducted by a qualified lithic specialist, Dr Oliver Macgregor.

Subsurface Archaeological Test Excavation

The subsurface testing of site WCP224 was undertaken following the ACHMP specifically Appendix 6. Two archaeological test excavation pits of 0.5 x 1.0 metres were placed on the WCP224 spur crest.



All excavated archaeological deposit was sieved with the aid of pressurised water from a water truck. All material was sieved through 2–3 mm mesh. All identified or suspected cultural material recovered from sieving was retained, bagged and labelled.

This Report

This report presents the results of a pre-clearance archaeological survey and surface salvage of Areas 19(part), 15, the remediation of a contour bank and the subsurface test excavation of site WCP224 (Figure 1). All areas are situated within the boundaries of the approved project area (05-0021) and are thus subject to the ACHMP.



Figure 1 Location of Areas 19 (part), 15, Contour Bank and WCP224



AREA 19 (PART)

Area 19 (part) is shown in yellow in Figure 2 and was surveyed as part of this clearance work program on 10-13 October 2016.

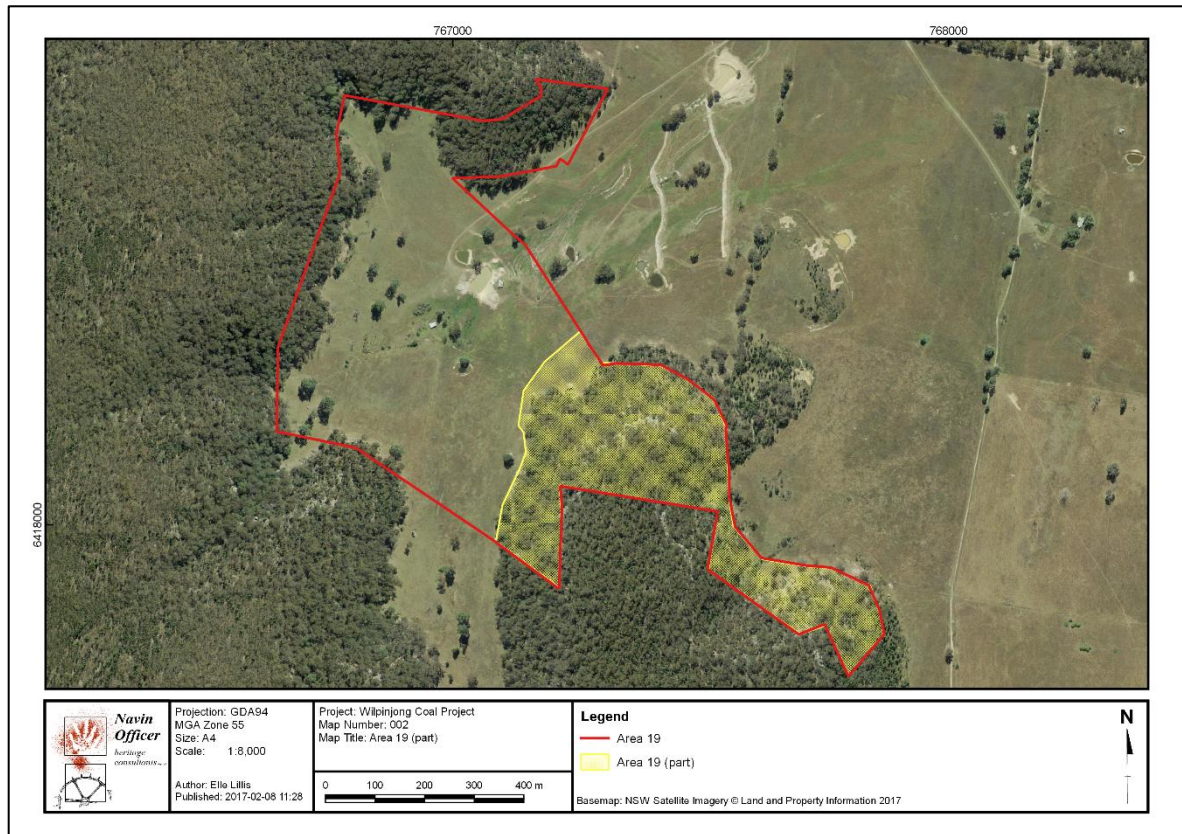


Figure 2 Area 19 (part)

Clearance Survey Results

Previously Recorded Sites

Six previously lodged site recordings occur in Area 19 (part):

WCP115 – rock shelter with artefacts (NOHC 2005). This site is listed in the ACHMP.

WCP116 - rock shelter with artefacts (NOHC 2005). This site is listed in the ACHMP.

WCP117 - rock shelter with PAD (NOHC 2005). This site is listed in the ACHMP.

WCP500 - rock shelter with PAD (South East Archaeology 2015). This site is listed in the ACHMP

WE50 - rock shelter with PAD (Kyandel 2006). This site is listed in the ACHMP.

WE55 - rock shelter with PAD (Kyandel 2006). This site is listed in the ACHMP.

No rock shelter with PAD was detected at locations WE50 and WE55. The current recorded locations of sites WE50 and WE55 are therefore concluded to be incorrect. All of Area 19 (part) was surveyed with the view to identifying another location for WE50 and WE55, areas outside Area 19 (part) were also surveyed. No rock shelter with PAD matching the previously recorded data for WE50 and WE55 were identified during this survey.



Rock shelter sites WCP115, WCP116/117 and WCP500 were all re-located in the current survey. The GPS location for sites WCP115, WCP116/117 and WCP500 were re-taken, the following are the GPS locations recorded during the current assessment:

WCP115 – 767230.6418277

WCP116/117 – 767144.6418161

WCP500 – 767197.6417916

Sites Recorded in the current assessment

Three confirmed artefacts were collected from three previously unrecorded locations and constitute three new recordings WCP650, WCP651 and WCP652 (see Table 6 and Figure 7).

WCP650

GDA (Zone 55) 767184.6417924

This site is a single artefact situated within an area of approximately 1 x 1 m. The site is located mid-slope on a steep gradient.

Ground surface disturbance consisted of animal treadage. The disturbance incidence was 40% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz unretouched flake was collected from this site (see Table 6).

WCP651

GDA (Zone 55) 767338.6418277

This site is a single artefact situated within an area of approximately 1 x 1 m on animal tracks. The site is located mid-slope on a steep rocky gradient.

Ground surface disturbance consisted of animal treadage. The disturbance incidence was 60% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz unretouched flake was collected from this site (see Table 6).

WCP652

GDA (Zone 55) 767555.6417981

This site is a single artefact situated within an area of approximately 1 x 1 m on animal tracks (Figure 3). The site is located mid-slope on a steep rocky gradient.



Ground surface disturbance consisted of animal treadage. The disturbance incidence was 80% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz unretouched flake was collected from this site (see Table 6).



Figure 3 WCP652 looking south west

Rock shelter Locations

The following three shelters were recorded at the request of the RAPs as possible locations that may have been used by Aboriginal people at some point in the past. Rock shelters are assessed as Aboriginal sites if they contain artefacts and/or Aboriginal art and/or meet the following criteria:

- Shelter should contain a sediment floor at least around one square metre in area;
- Deposit must be at least 15 cm deep (determined by inserting tent pegs);
- Deposit should be relatively compact and show evidence for a significant period of accumulation (deposit should not be spongy and contain only clean sand derived from recent stone weathering);
- The shelter space should be at least one metre high and one metre deep (but exceptions may occur, such as where the deposit is deep); and
- The shelter should be relatively dry.



The shelters below are all located in escarpment country. The escarpment has many rock shelters and not all have been recorded as Aboriginal sites. None of these shelters had any archaeological evidence of past human occupation or use including artefacts, potential archaeological deposit or art.

Rock Shelter Location 1 (RSL1)

GDA (Zone 55) 767206.6417974

This location is a rock shelter consisting of a rock overhang located mid-slope on a rocky escarpment. The shelter extends approximately 15m under two boulders (Figure 4). The shelter has a rocky floor.

There is low to nil potential for subsurface archaeological deposits within and outside of the shelter and no artefacts were located. There is no direct evidence of human occupation of this shelter.

The archaeological field assessment determined no archaeological evidence present nor areas of archaeological potential associated with this rock shelter and as a consequence no statutory constraints nor site name has been allocated to RSL1.



Figure 4 RSL1 entrance

Rock Shelter Location 2 (RSL2)

GDA (Zone 55) 767318.6418181

This location is a rock shelter consisting of a rock overhang located mid-slope on a rocky escarpment (Figure 5).



The shelter was recorded as there is orange staining on the walls which were originally thought to perhaps be the remains of pigment, it is now clear that this is natural staining of the rock through the weathering.

The shelter has a sandy base, the sand was a recent accumulation derived from recent stone weathering. There is low to nil potential for subsurface archaeological deposits within and outside of the shelter and no artefacts were located. There is no direct evidence of human occupation of this shelter.

The archaeological field assessment determined no archaeological evidence present nor areas of archaeological potential associated with this rock shelter and as a consequence no statutory constraints nor site name has been allocated to RSL2.



Figure 5 RSL2 orange staining

Rock Shelter Location 3 (RSL3)

GDA (Zone 55) 767421.6418220

This location is a rock shelter located mid-slope on a rocky escarpment (Figure 6). The shelter is 3-5m high and 10-12 m wide. The shelter has a sloping floor with minimal recent sand buildup. There is a large paper wasp nest on the roof of the shelter. The shelter has a northerly aspect.

There is low potential for subsurface archaeological deposits within and outside of the shelter and no artefacts were located. There is no direct evidence of human occupation of this shelter.

The archaeological field assessment determined no archaeological evidence present nor areas of archaeological potential associated with this rock shelter and as a consequence no statutory constraints nor site name has been allocated to RSL3.



Figure 6 RSL3 looking south

Artefact Analysis

Three artefacts were recovered from Area 19 (part), all of which are unretouched flakes made from vein quartz.

Table 1 Area 19 (part) all lithics by type and material

Type	Quartz, vein	Row Total
Unretouched flake	3	3
Column Total	3	3

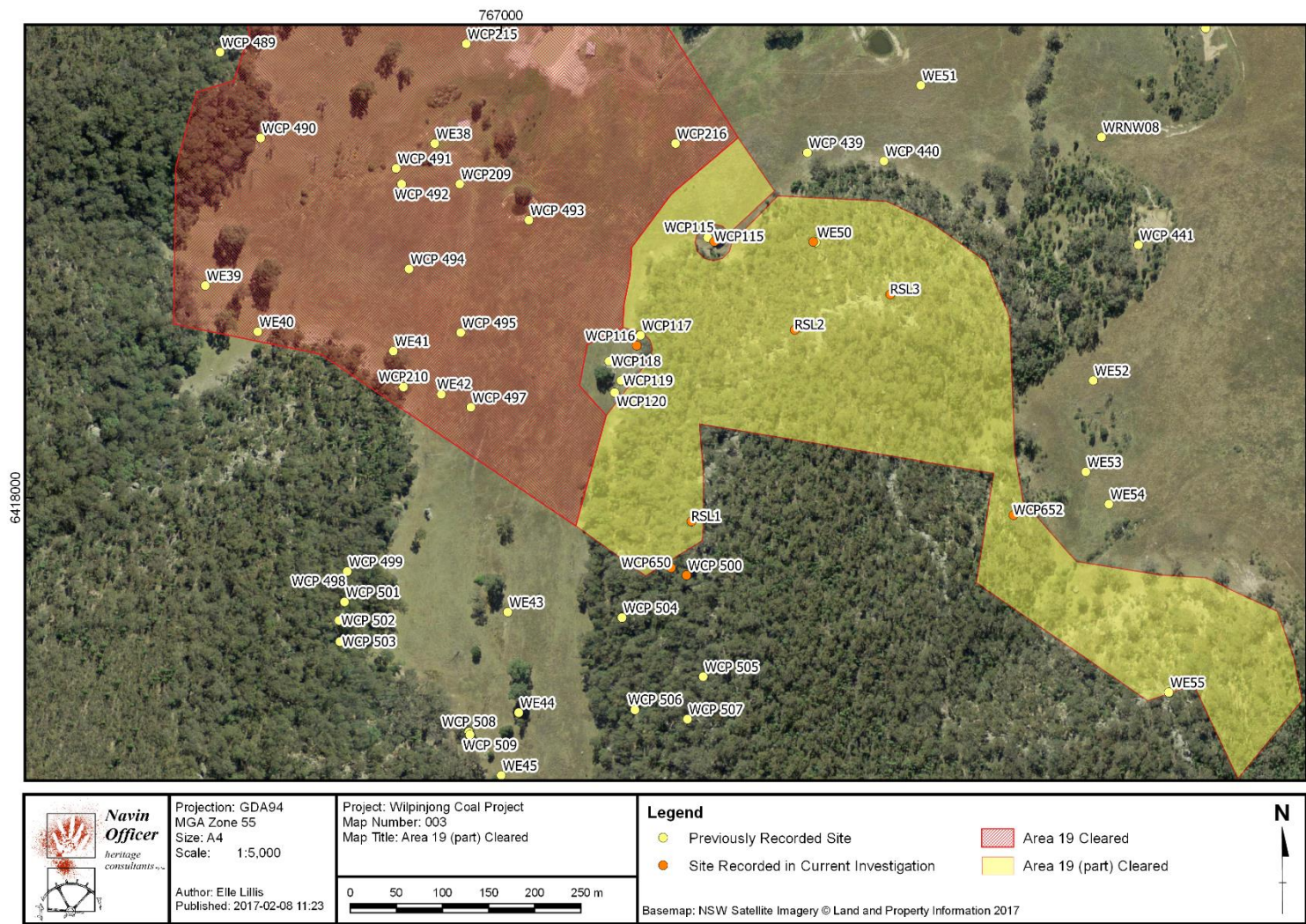


Figure 7 Locations of newly recorded sites and WCP Aboriginal Site Database previously recorded sites – Area 19 (part)



AREA 15

Area 15 is shown in yellow in Figure 8 and was surveyed as part of this clearance work program on 10-13 October 2016.

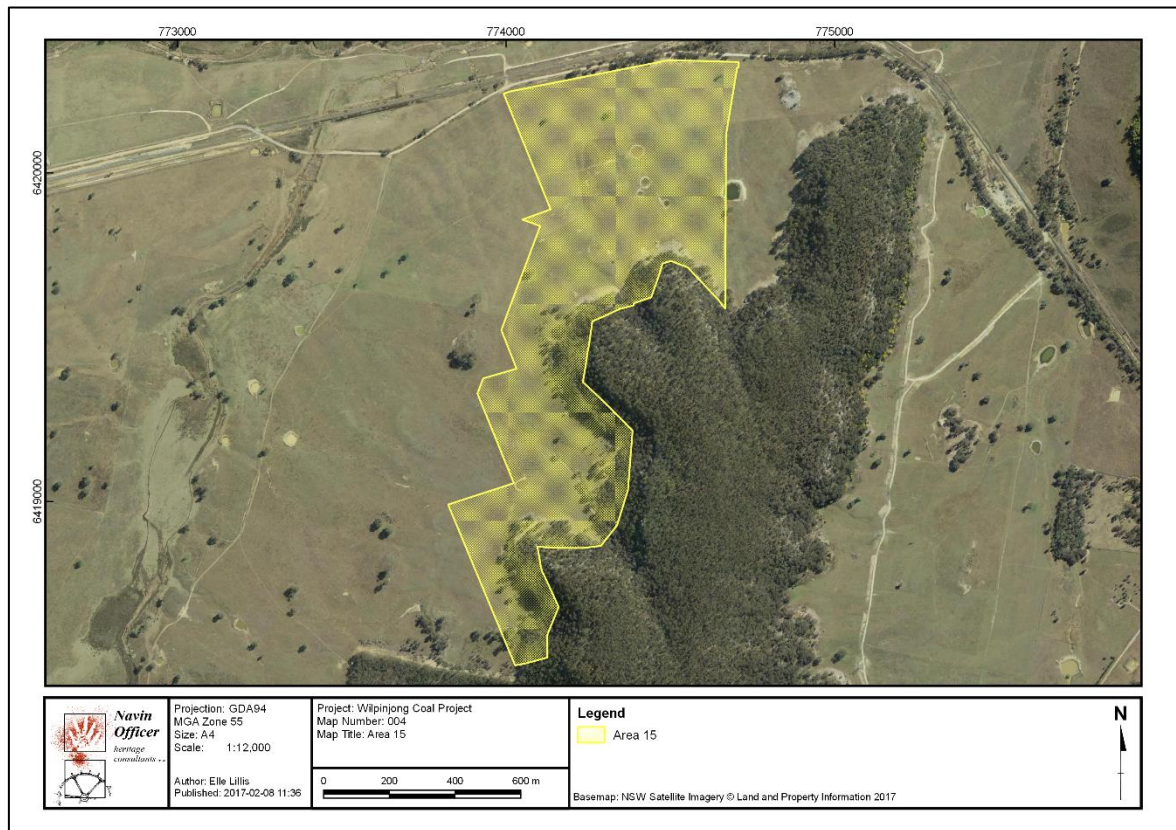


Figure 8 Area 15

Clearance Survey Results

Previously Recorded Sites

Nine previously lodged site recordings occur in Area 15 They are:

265 – Open artefact site (NOHC 2005). This site is listed in the ACHMP.

266 – Open artefact site (NOHC 2005). This site is listed in the ACHMP.

WCP235 - Open artefact site (NOHC 2005). This site is listed in the ACHMP.

WCP236 – Scarred Tree (NOHC 2005). This site is listed in the ACHMP.

WCP562 - rock shelter with PAD (South East Archaeology 2015). This site is listed in the ACHMP

WCP566 - rock shelter with PAD (South East Archaeology 2015). This site is listed in the ACHMP

WCP568 - rock shelter with PAD (South East Archaeology 2015). This site is listed in the ACHMP

WE1 – Scarred tree (Kyandel 2006). This site is listed in the ACHMP.



WE4 - Open artefact site (Kyandel 2006). This site is listed in the ACHMP.

WE1 and WE4 were revisited as part of this assessment no artefacts or scarred trees were detected. The current recorded locations of sites WE1 and WE4 are therefore concluded to be incorrect.

Combined site 264-266

Site 264: GDA (Zone 55) 774388.6420339

Site 265: GDA (Zone 55) 774404.6420305

Site 266: GDA (Zone 55) 774408. 6420251

Forty-six lithic items were collected from previously recorded sites 264 (located outside Area 15), 265 and 266 (Figure 9). Of these twenty-seven are confirmed artefacts. It is assessed that these locations are part of one large artefact scatter. These sites are located on a spur crest in the valley floor. The artefacts were located within erosion scalds on the crest.

The archaeological potential is assessed to be moderate to high and the likelihood of intact deposits is moderate. Pre-construction management of this site is recommended; this should take the form of a grader scrape along the crest of the spur in the vicinity of the recorded artefacts.



Figure 9 264-265 looking south

WCP235

GDA (Zone 55) 774008.6418916

One confirmed artefact was collected from site WCP235.

The site is located at the base of a steep slope just on the edge of the valley floor (Figure 10). Ground surface disturbance consisted of animal tracks and sheet erosion. The disturbance incidence was <10% with 20% visibility within exposures.



Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.



Figure 10 WCP235 looking west

WCP236 – Scarred Tree

GDA (Zone 55) 774283.6419184

This site was re-found during the clearance survey. WCP236 was identified by RAP field representatives as a culturally significant modified tree.

Further mitigation actions required prior to impacts based upon an assessment of its Aboriginal cultural heritage value and origin.



Figure 11 WCP236

Rock shelter WCP562

GDA (Zone 55) 774160.6419488

This site was re-found during the current survey. Two artefacts were recorded in the shelter, two unretouched flakes. These artefacts were left in place.

Rock shelter WCP566

GDA (Zone 55) 774361.6419092

This site was re-found during the current survey.

Rock shelter WCP568

GDA (Zone 55) 774087.6418662

This site was re-found during the current survey.

Sites Recorded in the Current Investigation

Fifty-one lithic items including thirty confirmed artefacts were collected from seventeen previously unrecorded site locations. Of these ten locations contained confirmed artefacts and constitute new recordings WCP653 through to WCP662 (Figure 34).

Three previously unrecorded scarred trees were located in Area 15, these constitute new site recordings WCP663, WCP664 and WCP665 (Figure 34).



Collection Location 1 (CL1)

GDA (Zone 55) 774440.6420102

This location consists of one lithic item located on an animal track (Figure 12). The item was located on the mid slope of a spur in the valley floor between a dam and a farm fence.

One item was collected from this area (see Table 6). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 12 CL1 looking north

Collection Location 2 (CL2)

GDA (Zone 55) 774427.6420337

This location consists of one lithic item located on an erosion scald (Figure 13). The item was located in the saddle/gully between two spur crests.

One item was collected from this site (see Table 6). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 13 CL2 looking west

Collection Location 3 (CL3)

GDA (Zone 55) 774652.6419939

This location consists of one lithic item located on the edge of a dam (Figure 14). The item was located on the valley floor.

One item was collected from this site (see Table 6). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 14 CL3 looking north



Collection Location 4 (CL4)

GDA (Zone 55) 774467.6419750

This location consists of one lithic item located on an erosion scald below a fallen boulder (Figure 15). The item was located on the mid slope on a steep spur.

One item was collected from this site (see Table 6). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 15 CL4

Collection Location 5 (CL5)

GDA (Zone 55) 774175.6419385

This location consists of one lithic item located on an erosion on rocky ground (Figure 16). The item was located on the mid slope on a steep spur.

One item was collected from this site (see Table 6). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 16 CL5 looking south

Collection Location 6 (CL6)

GDA (Zone 55) 77396.6419178

This location consists of one lithic item located on an erosion scald (Figure 17). The item was located on the crest of a spur.

One item was collected from this site (see Table 6). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 17 CL6 looking south



Collection Location 7 (CL7)

GDA (Zone 55) 77396.6419178

This location consists of one lithic items located on an erosion scald (Figure 18). The item was located on the mid slope of a spur crest.

One item was collected from this site (see Table 6). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 18 CL7 looking west

WCP653

GDA (Zone 55) 774100.6420270

This site is a single artefact situated within an area of approximately 1 x 1 m on an erosional scald (Figure 19). The site is located on a low rise on the valley floor.

Ground surface disturbance consisted of erosion and animal treadage. The disturbance incidence was 100% with 30% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz unretouched flake was collected from this site (see Table 6).



Figure 19 WCP653 looking north

WCP654

GDA (Zone 55) 774202.6420293

This site consists of twenty three lithic items including sixteen confirmed artefacts located in an erosion scald (Figure 20). The site is located on a low spur crest within the valley floor.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 60% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

The archaeological potential is assessed to be moderate to high and the likelihood of intact deposits is moderate. Pre-construction management of this site is recommended, this should take the form of a grader scrape along the crest of the spur in the vicinity of the recorded artefacts.

Sixteen confirmed artefacts were collected from this site (see Table 6).





Figure 20 WCP654 looking north

WCP655

GDA (Zone 55) 774276.6420308

This site consists of two lithic items including one confirmed artefact located in an erosion scald and ants nest (Figure 21). The site is located on a spur crest within the valley floor.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 40% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact an unretouched flake was collected from this site (see Table 6).



Figure 21 WCP655 looking west

WCP656

GDA (Zone 55) 774459.6420327

This site consists of two lithic items including one confirmed artefact located in an erosion scald (Figure 22). The site is located mid slope on a moderate to steep slope on a broad spur.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 80% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact an unretouched flake was collected from this site (see Table 6).



Figure 22 WCP656 looking east

WCP657

GDA (Zone 55) 774502.6420345

This site consists of six lithic items including two confirmed artefacts located in an erosion scald (Figure 23). The site is located on a low spur crest within the valley floor.

Ground surface disturbance consisted of sheet erosion and animal tracks. The disturbance incidence was 40% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Two confirmed artefacts, unretouched flakes were collected from this site (see Table 6).



Figure 23 WCP657 looking west

WCP658

GDA (Zone 55) 774413.6419722

This site consists of one confirmed artefact located on an animal track (Figure 24). The site is located mid slope on a moderate to steep slope on a broad spur.

Ground surface disturbance consisted of animal tracks and sheet erosion. The disturbance incidence was 50% with 30% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact an unretouched flake was collected from this site (see Table 6).



Figure 24 WCP658

WCP659

GDA (Zone 55) 774063.6419088

This site consists of one confirmed artefact located on an erosion scald (Figure 25). The site is located in a saddle adjacent to a dam.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 80% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact an unretouched flake was collected from this site (see Table 6).



Figure 25 WCP659 looking north

WCP660

GDA (Zone 55) 774085.6418974

This site consists of one confirmed artefact in thick grass (Figure 26). The site is located at the base of a steep slope on the edge of the valley floor.

The disturbance incidence was <5% with <5% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact a ground edge axe was collected from this site (see Table 6).



Figure 26 WCP660 looking north

WCP661

GDA (Zone 55) 774200.6419468

This site consists of one confirmed artefact located rocky ground (Figure 27). The site is located mid slope on a moderate to steep slope.

Ground surface disturbance consisted of sheet erosion and animal tracks. The disturbance incidence was 40% with 30% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact an unretouched flake was collected from this site (see Table 6).



Figure 27 WCP661 looking west

WCP662

GDA (Zone 55) 774154.6419460

This site consists of six lithic items including five confirmed artefacts located in an erosion scald (Figure 28). The site is located on a low spur crest within the valley floor. The artefacts were located near rock shelter WCP562.

Ground surface disturbance consisted of sheet erosion and animal tracks. The disturbance incidence was 40% with 30% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Six confirmed artefacts including four unretouched flakes and a broken ground edged axe were collected from this site (see Table 6).



Figure 28 WCP662 looking north

WCP663

GDA (Zone 55) 774198.6419573

This site consists of one probable Aboriginal scarred tree (Figure 29). The site was located mid slope adjacent to current mining operations.

Tree condition: alive, some limb loss; height 25 metres.

Tree species: unverified, likely a Box.

Original scar length: 146cm; with regrowth: 110cm

Original scar width: 65cm; with regrowth: 51cm

Depth of regrowth: 10cm.

Height above ground: 80cm

Tree diameter: 136.5cm (two limbs)

WCP666 was identified by RAP field representatives as a culturally significant modified tree.

Further mitigation actions required prior to impacts based upon an assessment of its Aboriginal cultural heritage value and origin.



Figure 29 WCP663

WCP664

GDA (Zone 55) 774165.6419475

This site consists of one probable Aboriginal scarred tree (Figure 30). The site was located mid slope adjacent to current mining operations.

Tree condition: alive, some limb loss, hollow; height 15 metres.

Tree species: unverified, likely a Box.

Original scar length: 200+20-40cm; with regrowth: 200cm

Original scar width: 90cm; with regrowth: 25cm

Depth of regrowth: 27cm.

Height above ground: 36cm

Tree diameter: 295cm

WCP667 was identified by RAP field representatives as a culturally significant modified tree.

Further mitigation actions required prior to impacts based upon an assessment of its Aboriginal cultural heritage value and origin.



Figure 30 WCP664

WCP665

GDA (Zone 55) 774043.6419034

This site consists of one probable Aboriginal scarred tree (Figure 31). The site was located in the valley floor within a dam wall.

The tree consists only of a stump with two possible scars evident. The tree is in very poor condition.

WCP665 was identified by RAP field representatives as a culturally significant modified tree.

Mitigative measures are not recommended as the tree will most likely fall apart if any removal is attempted.



Figure 31 WCP 665

Artefact Analysis

Ninety eight lithics were recovered from Area 15 (Table 2). The majority (50) were unretouched flakes, with two cores, three flaked pieces and two ground edge axes also recovered. The two ground edge axes (find number 94 and 99) are discussed in further detail below. Both of the cores are lightly flaked, each possessing only three flake scars.

The majority of artefacts were made from vein quartz, with chert being the next most common material. Both of the ground edge axes were made from fine grained material (FGS) which cannot be identified more precisely without destructive analysis.

Table 2 Area 15 All lithics by type and material

Type	Chert	FGS	Glass	Igneous	Quartz, crystal	Quartz, vein	Quartzite	Row Total
Core	0	0	0	0	0	2	0	2
European	0	0	1	0	0	0	0	1
Flaked piece	0	0	0	0	0	3	0	3
Ground edge axe	0	2	0	0	0	0	0	2
Non-artefactual	1	0	0	2	1	33	2	39
Unretouched flake	11	0	0	0	0	39	1	51
Column Total	12	2	1	2	1	77	3	98



Both of the ground-edge axes recovered from Area 15 are incomplete artefacts, with breakage surfaces that have removed the butt end of the axe. Artefact 94 is made from a fine-grained pale grey material, which could be a hornfels or a fine-grained igneous rock (Figure 32). This artefact has a very finely polished edge, with visible striations on both faces that run perpendicular to the ground edge. A transverse fracture has truncated the artefact. One of the artefact's faces (second from left in image) retains hammer-dressing marks, which are overlain by grinding.



Figure 32 Artefact 94 WCP662 Broken section of the functional edge of a ground-edge axe

Artefact 99 is an elongate ground-edge axe made from a fine-grained material that has developed a slightly crumbly pale yellow weathering rind (Figure 33).

Identifying the material the artefact is made from would require stripping away some of this rind to expose the fresh material underneath, and as this would be a destructive analysis it was not carried out as part of this project.

The ground edge (or bitt) of the artefact is ground on both faces, and the artefact has extensive hammer-dressing on its mid-section. The butt of the artefact has been removed by a transverse break. It is likely that the hammer-dressing was carried out to create a narrow mid-section to assist in hafting the artefact by creating a 'waisted' section for the haft to be attached to. If this is the case, then it is likely that the artefact was hafted with its working edge perpendicular to the handle, as the waisted surfaces lie at the two ends of the ground edge (seen in the second image from the left). If the artefact was hafted in this way, then it would have been used as an adze rather than as an axe.



Figure 33 Artefact 99 WCP660 Broken ground-edge axe

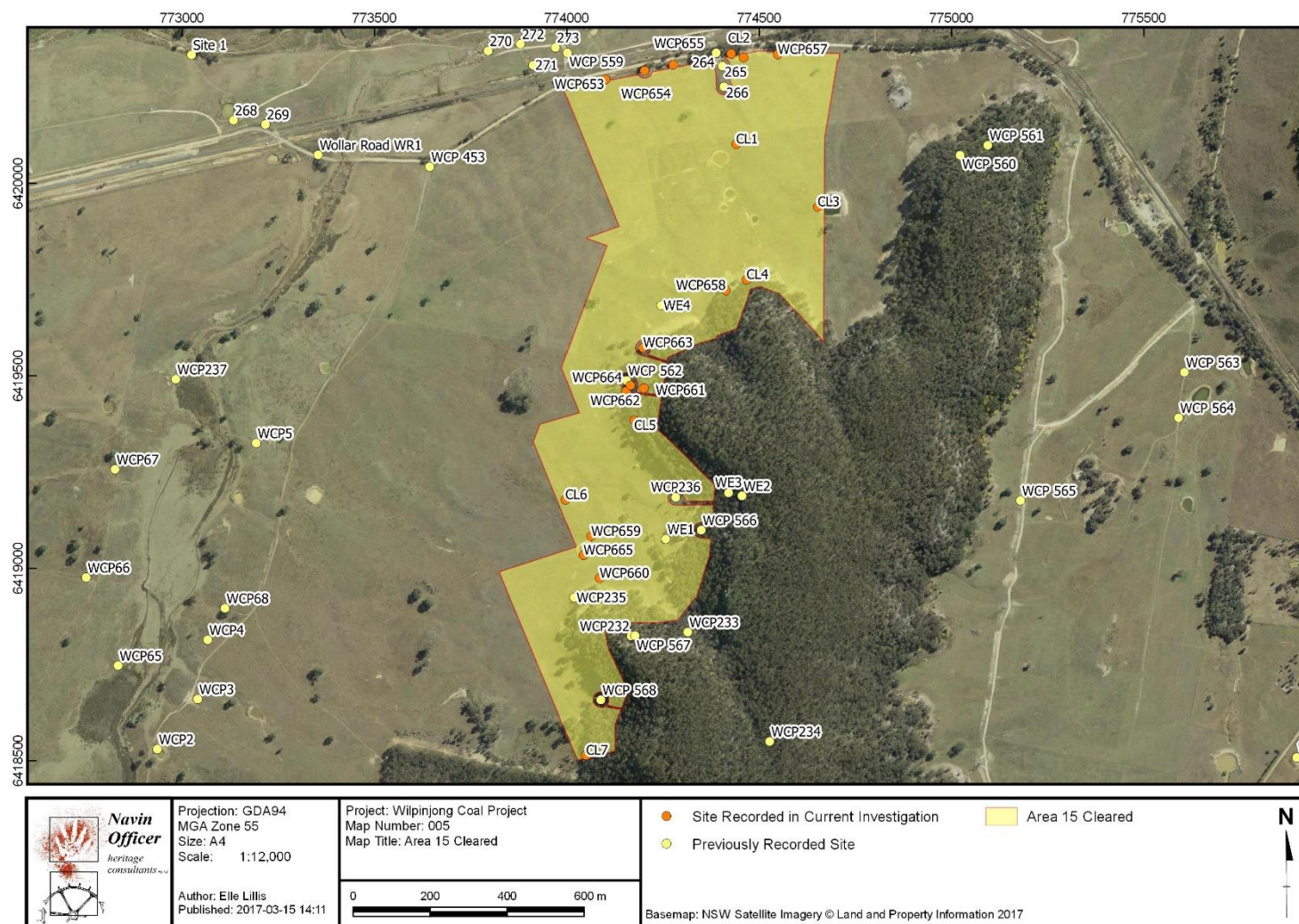


Figure 34 Locations of newly recorded sites and WCP Aboriginal Site Database previously recorded sites – Area 15



CONTOUR BANK

The location of the remediation of a contour bank area is shown in yellow in Figure 35 and was surveyed as part of this clearance work program on 10-13 October 2016.

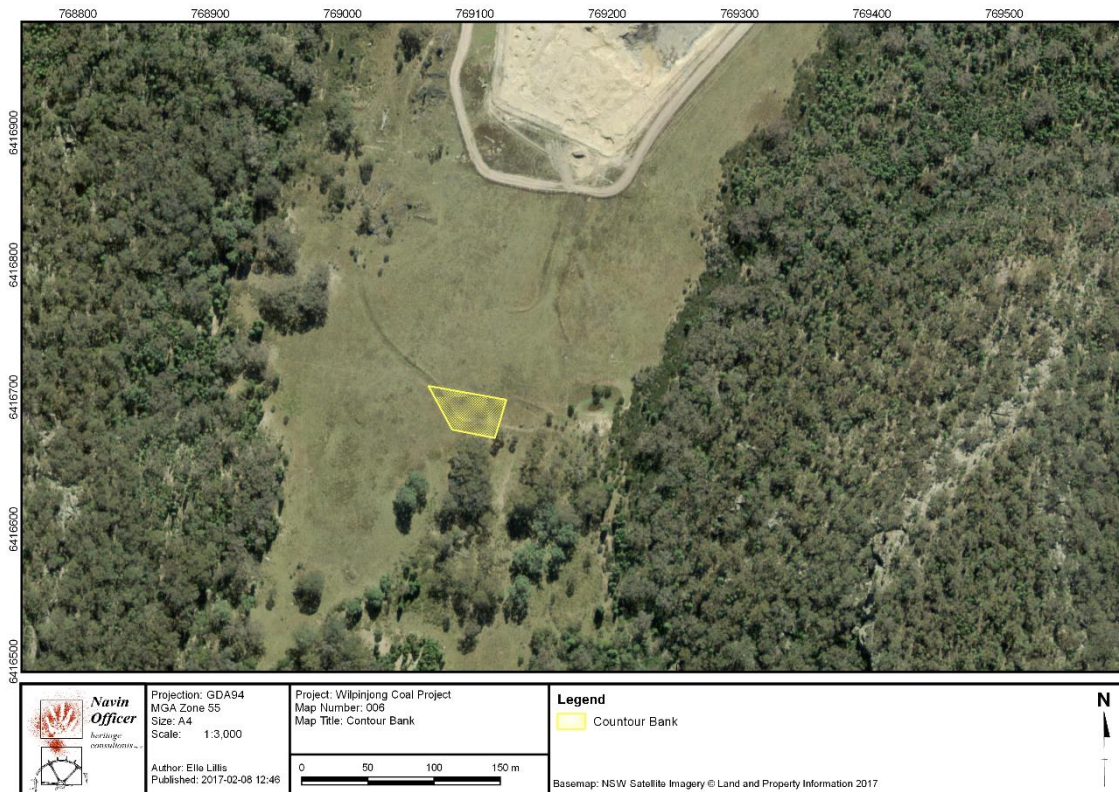


Figure 35 Contour Bank

Clearance Survey Results

Previously Recorded Sites

There are no previously recorded sites located in the contour bank survey area.

Sites Recorded in the Current Investigation

Three lithic items including one confirmed artefact was collected and constitutes new recording WCP666.

WCP666

GDA (Zone 55) 769109.6416672

This site consists of three lithic items including one confirmed artefact located on a contour bank (Figure 36 and 37). The site is located gully on basal slopes.

Ground surface disturbance consisted of sheet erosion and animal tracks. The disturbance incidence was <10% with 20% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.



Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 6).



Figure 36 WCP666 looking west

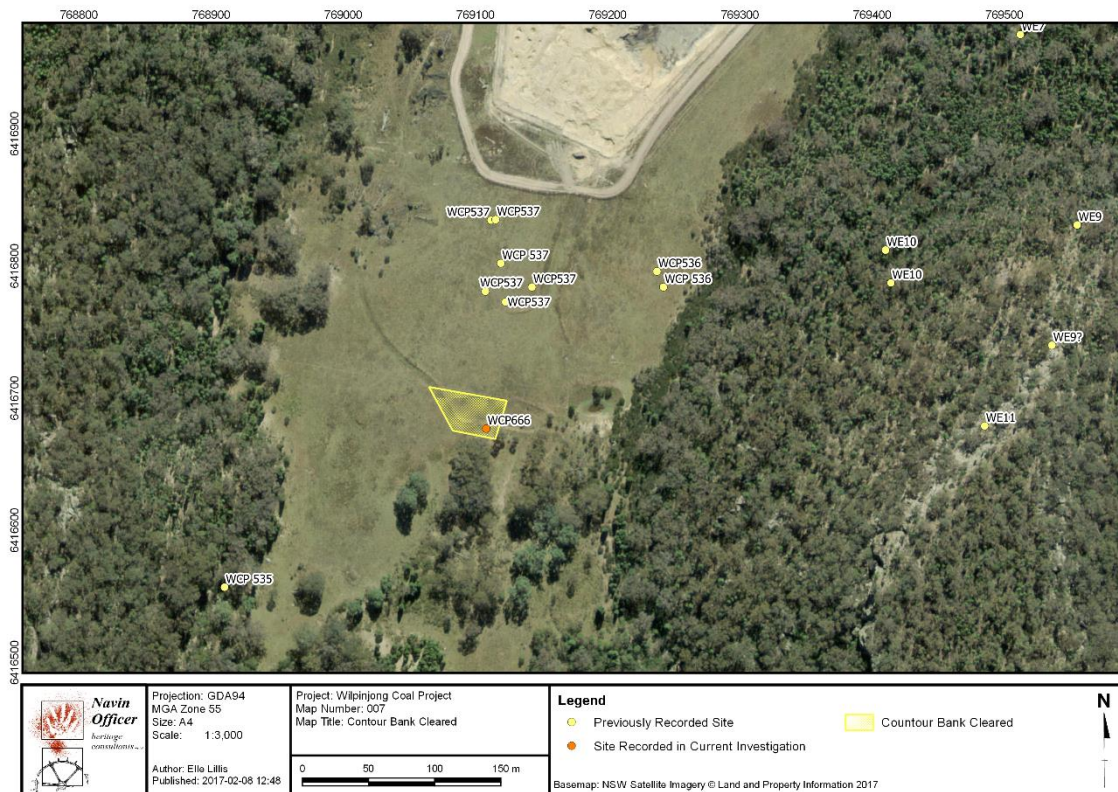


Figure 37 Location of newly recorded site WCP666 – Contour Bank



WCP224 – SUBSURFACE ARCHAEOLOGICAL TEST EXCAVATION

The aim of the excavation was to determine if the artefacts located downslope from the spur were coming from the rest of the spur in the approval area.

All material excavated was wet sieved using 4mm metal sieves and pressurized water.

Results

Test Excavation

Two archaeological test pits were located on the crest of the spur at site WCP224 (Figure 38 and 39).

Pit 1

Three 10cm spits were excavated at pit 1. The soil profile consisted of (Figure 40):

Spit 1: sparse grass, weed cover and leaf litter onto thin brown dry loam. Quickly onto orange brown gravelly sand. Very dry slate gravel, clayey and silty. Sand with large angular gravels.

Spit 2: as above, clay increases with depth, salty saprolitic gravel.

Spit 3: As above grades to sandy clay and large in-situ slate bedrock

Two confirmed artefacts were recovered from spit 1 and nil artefacts from spits 2 and 3.

Pit 2

One 10cm spit was excavated at pit 2. The soil profile consisted of (Figure 41):

Spit 1: Very sparse grass and weed and very rocky slatey ground. Light brown clayey silty sandy gravel quickly onto saprolitic in-situ degrading slate bedrock.

Four confirmed artefacts were recovered from spit 1.

An additional two lithic items were collected from the surface of the site, these artefacts have been confirmed as non-artefactual.

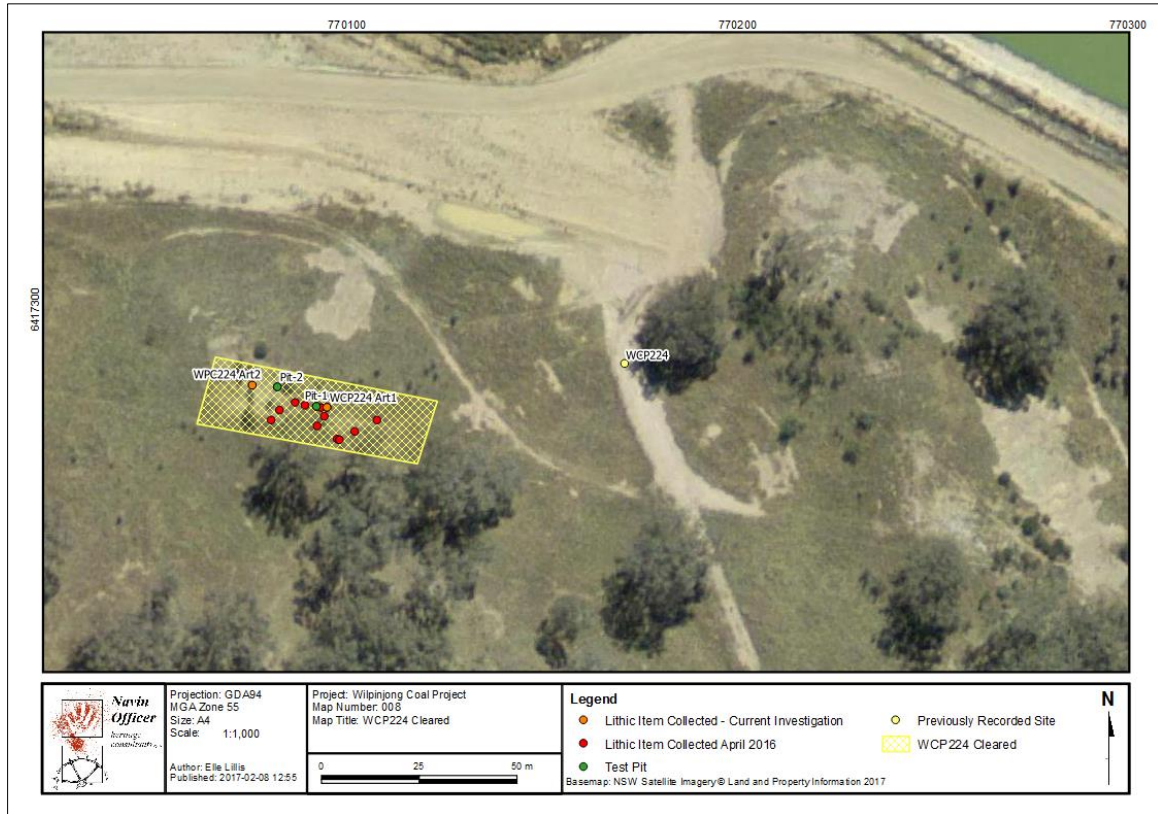


Figure 38 WCP224 location of pits and surface items collected during the current investigations (orange) and lithic items collected in April 2016 (red)



Figure 39 WCP224 excavation of test pits



Figure 40 WCP224 Pit 1



Figure 41 WCP224 Pit 2



Artefact Analysis

Six artefacts and seven non-artefacts were recovered from WCP224 (Table 3). One artefact was a retouched flake, with a small region of dorsal retouch along the distal portion of the flake's right margin. This artefact doesn't fall within any established implement class.

Table 3 WCP224 All lithics by type and material

Type	Chert	FGS	Quartz, vein	Row Total
Non-artefactual	0	2	5	7
Retouched flake	1	0	0	1
Unretouched flake	0	0	5	5
Column Total	1	2	10	13

Of the artefacts recovered from WCP224, two were recovered from Pit 1, and four were recovered from Pit 2. All lithics were recovered from spit 1.

Table 4 WCP224 All lithics by type, pit and spit Pit 1

Type	Spit 1	Row Total
Non-artefactual	3	3
Unretouched flake	2	2
Column Total	5	5

Table 5 WCP224 All lithics by type, pit and spit Pit 2

Type	Spit 1	Row Total
Non-artefactual	2	2
Retouched flake	1	1
Unretouched flake	3	3
Column Total	6	6

Conclusions

The subsurface test excavation at WCP224 found a total of six confirmed artefacts across two pits. This equates to a density of six artefacts per square metre across the site. Thirty eight confirmed artefacts across an area of 69 x 13 meters were collected from the crest and slope of site WCP224 in April 2016.

The soil on the spur crest is extremely shallow and not conducive to retaining an archaeological deposit.

It is apparent that the artefacts collected from site WCP224 are not eroding from an archaeological deposit located on the spur crest. It can be concluded that the surface artefact distribution recorded at WCP224 is a reflection of the size and distribution of artefacts across this site.

No further action is required at this site.



Table 6 Lithic item descriptions

ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
13979	7	WCP224		2	Spit 1	Retouched flake	0.93	Chert	Medial fragment	None	None	None	0
13980	7	WCP224		2	Spit 1	Unretouched flake	0.2	Quartz, vein	Complete	Hertzian	Single	Feather	0
13981	7	WCP224		2	Spit 1	Unretouched flake	2.21	Quartz, vein	Distal fragment	None	None	Feather	100
13982	7	WCP224		2	Spit 1	Unretouched flake	0.62	Quartz, vein	Distal fragment	None	None	Feather	0
13983	7	WCP224		2	Spit 1	Non-artefactual	0.24	Quartz, vein					
13984	7	WCP224		2	Spit 1	Non-artefactual	0.13	Quartz, vein					
13985	7	WCP224		1	Spit 1	Unretouched flake	0.24	Quartz, vein	Distal fragment	None	None	Feather	0
13986	7	WCP224		1	Spit 1	Non-artefactual	8.39	FGS					
13987	7	WCP224		1	Spit 1	Unretouched flake	1.22	Quartz, vein	Proximal fragment	Hertzian	Single	None	0
13988	7	WCP224		1	Spit 1	Non-artefactual	0.55	Quartz, vein					
13989	7	WCP224		1	Spit 1	Non-artefactual	0.16	FGS					
13990	7	WCP224	2		Surface	Non-artefactual	5.75	Quartz, vein					
13991	7	WCP224	1		Surface	Non-artefactual	1.87	Quartz, vein					
13992	19	WCP650	1		Surface	Unretouched flake	5.71	Quartz, vein	Complete	Hertzian	Single	Feather	100



ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
13993	19	WCP651	2		Surface	Unretouched flake	1.9	Quartz, vein	Complete	Wedging	Single	Feather	0
13994	19	WCP652	3		Surface	Unretouched flake	0.74	Quartz, vein	Distal fragment	None	None	Feather	0
13995	contour bank	WCP666	3	1		Unretouched flake	0.38	Quartz, vein	Medial fragment	None	None	None	0
13996	contour bank	WCP666	1	1		Non-artefactual	47.32	Quartz, vein					
13997	contour bank	WCP666	2	1		Non-artefactual	0.24	Quartz, vein					
13998	15	WCP661	87		Surface	Unretouched flake	0.77	Quartz, vein	Proximal fragment	Hertzian	Single	None	10
13999	15	CL5	88		Surface	Non-artefactual	9.12	Quartz, vein					
14000	15	CL6	95		Surface	Non-artefactual	133.12	Quartz, vein					
14001	15	WCP659	96		Surface	Unretouched flake	1.21	Quartz, vein	Complete	Hertzian	Single	Feather	0
14002	15	CL7	97		Surface	Non-artefactual	11.92	Quartz, vein					
14003	15	WCP235	98		Surface	Unretouched flake	0.24	Chert	Distal fragment	None	None	Hinge	0
14004	15	WCP660	99		Surface	Ground edge axe	685.9	FGS	Broken				
14005	15	WCP662	89		Surface	Non-artefactual	170.09	Quartzite					
14006	15	WCP662	91		Surface	Unretouched flake	2.49	Chert	Distal fragment	None	None	None	0



ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
14007	15	WCP662	90		Surface	Unretouched flake	1.93	Quartz, vein	Distal fragment	None	None	Feather	0
14008	15	WCP662	93		Surface	Unretouched flake	2.46	Quartz, vein	LCS left	Hertzian	Single	Step	0
14009	15	WCP662	92		Surface	Unretouched flake	7.01	Quartz, vein	Distal fragment	None	None	Feather	0
14010	15	WCP662	94		Surface	Ground edge axe	49.29	FGS	Broken				
14011	15	264-266	31		Surface	Non-artefactual	450.5	Quartz, vein					
14012	15	264-266	32		Surface	Non-artefactual	235.46	Quartzite					
14013	15	CL4	29		Surface	Non-artefactual	823.4	Quartz, vein					
14014	15	264-266	33		Surface	Unretouched flake	5.58	Quartz, vein	Margin missing	Hertzian	Shattered	Feather	0
14015	15	264-266	34		Surface	Unretouched flake	3.32	Chert	Complete	Hertzian	Single	Feather	0
14016	15	264-266	35		Surface	Non-artefactual	17.01	Quartz, vein					
14017	15	WCP655	25		Surface	Unretouched flake	28.57	Quartz, vein	Complete	Hertzian	Shattered	Feather	0
14018	15	WCP655	26		Surface	Non-artefactual	12.97	Quartz, vein					
14019	15	CL3	30		Surface	Non-artefactual	1.43	Quartz, vein					
14020	15	264-266	85		Surface	Flaked piece	1.96	Quartz, vein	Complete				
14021	15	WCP653	1		Surface	Unretouched flake	1.83	Quartz, vein	Proximal fragment	Hertzian	Multiple	None	0



ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
14022	15	CL1	27		Surface	Non-artefactual	20.28	Quartz, vein					
14023	15	WCP667	75		Surface	Non-artefactual	0.79	Quartz, vein					
14024	15	WCP656	72		Surface	Non-artefactual	3.21	Quartz, vein					
14025	15	WCP656	73		Surface	Unretouched flake	0.29	Quartz, vein	Complete	Hertzian	Single	Feather	0
14026	15	CL2	71		Surface	Non-artefactual	1.86	Quartz, vein					
14027	15	WCP657	74		Surface	European	0.42	Glass					
14028	15	WCP657	76		Surface	Unretouched flake	1.11	Quartz, vein	Medial fragment	None	None	None	0
14029	15	WCP657	77		Surface	Non-artefactual	0.47	Quartz, crystal					
14030	15	WCP658	28		Surface	Unretouched flake	0.25	Quartz, vein	Medial fragment	None	None	None	0
14031	15	WCP657	78		Surface	Unretouched flake	8.27	Quartz, vein	Medial fragment	None	None	None	0
14032	15	WCP657	79		Surface	Non-artefactual	0.7	Quartz, vein					
14033	15	264-266	80		Surface	Unretouched flake	1.04	Quartz, vein	Distal fragment	None	None	Feather	0
14034	15	264-266	70		Surface	Non-artefactual	24.16	Quartz, vein					
14035	15	264-266	64		Surface	Unretouched flake	0.84	Quartz, vein	Margin missing	Hertzian	Shattered	Step	0



ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
14036	15	264-266	65		Surface	Unretouched flake	1.05	Quartz, vein	Distal fragment	None	None	Feather	20
14037	15	264-266	66		Surface	Unretouched flake	2.21	Quartz, vein	Medial fragment	None	None	None	0
14038	15	264-266	84		Surface	Unretouched flake	0.54	Quartz, vein	Distal fragment	None	None	Feather	50
14039	15	264-266	81		Surface	Non-artefactual	0.46	Quartz, vein					
14040	15	264-266	82		Surface	Unretouched flake	1.01	Quartz, vein	Distal fragment	None	None	Feather	0
14041	15	264-266	83		Surface	Non-artefactual	3.29	Quartz, vein					
14042	15	264-266	38		Surface	Unretouched flake	1.31	Chert	Complete	Hertzian	Multiple	Feather	0
14043	15	264-266	39		Surface	Non-artefactual	0.09	Quartz, vein					
14044	15	264-266	45		Surface	Non-artefactual	0.55	Chert					
14045	15	264-266	60		Surface	Non-artefactual	1.26	Quartz, vein					
14046	15	264-266	61		Surface	Non-artefactual	0.73	Quartz, vein					
14047	15	264-266	62		Surface	Unretouched flake	0.19	Quartz, vein	Complete	Hertzian	Single	Feather	0
14048	15	264-266	63		Surface	Non-artefactual	0.12	Quartz, vein					
14049	15	264-266	55		Surface	Non-artefactual	36.08	Quartz, vein					
14050	15	264-266	56		Surface	Non-artefactual	19.33	Quartz, vein					



ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
14051	15	264-266	57		Surface	Non-artefactual	5.89	Quartz, vein					
14052	15	264-266	58		Surface	Unretouched flake	3.08	Quartz, vein	Complete	Hertzian	Single	Feather	0
14053	15	264-266	59		Surface	Unretouched flake	0.75	Quartz, vein	Distal fragment	None	None	Feather	0
14054	15	264-266	49		Surface	Core	7.05	Quartz, vein	Complete				
14055	15	264-266	50		Surface	Unretouched flake	2.58	Quartz, vein	LCS left	Hertzian	Single	Feather	0
14056	15	264-266	40		Surface	Non-artefactual	36.86	Quartz, vein					
14057	15	264-266	48		Surface	Unretouched flake	1.93	Quartz, vein	Proximal fragment	Hertzian	Single	None	0
14058	15	264-266	44		Surface	Unretouched flake	10.62	Chert	Complete	Hertzian	Single	Feather	0
14059	15	264-266	37		Surface	Unretouched flake	1.27	Chert	Complete	Hertzian	Single	Feather	0
14060	15	264-266	41		Surface	Non-artefactual	18.41	Quartz, vein					
14061	15	264-266	46		Surface	Unretouched flake	2.54	Quartz, vein	Proximal fragment	Hertzian	Single	None	0
14062	15	264-266	47		Surface	Core	21.38	Quartz, vein	Complete				40
14063	15	264-266	51		Surface	Flaked piece	10.26	Quartz, vein	Complete				
14064	15	264-266	52		Surface	Unretouched flake	2.14	Chert	Complete	Hertzian	Shattered	Feather	0
14065	15	264-266	53		Surface	Unretouched flake	2.3	Quartz, vein	Medial	None	None	None	0



ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
									fragment				
14066	15	264-266	54		Surface	Non-artefactual	0.26	Quartz, vein					
14067	15	264-266	36		Surface	Non-artefactual	1.62	Quartz, vein					
14068	15	264-266	42		Surface	Unretouched flake	3.19	Chert	Complete	Hertzian	Single	Feather	0
14069	15	264-266	67		Surface	Unretouched flake	2.04	Quartz, vein	Complete	Wedging	Shattered	Feather	0
14070	15	264-266	69		Surface	Unretouched flake	2.95	Chert	Complete	Hertzian	Single	Feather	0
14071	15	264-266	68		Surface	Non-artefactual	1.3	Quartz, vein					
14072	15	264-266	43		Surface	Unretouched flake	0.24	Quartz, vein	Complete	Hertzian	Shattered	Feather	0
14073	15	WCP654	5		Surface	Non-artefactual	146.49	Igneous					
14074	15	WCP654	23		Surface	Non-artefactual	351.55	Igneous					
14075	15	WCP654	7		Surface	Flaked piece	8.27	Quartz, vein	Complete				
14076	15	WCP654	24		Surface	Unretouched flake	0.15	Quartz, vein	Complete	Hertzian	Single	Step	0
14077	15	WCP654	86		Surface	Unretouched flake	6.18	Quartz, vein	Proximal fragment	Hertzian	Single	None	0
14078	15	WCP654	20		Surface	Unretouched flake	1.81	Quartz, vein	Proximal fragment	Hertzian	Multiple	None	0
14079	15	WCP654	16		Surface	Non-artefactual	0.07	Quartz, vein					



ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
14080	15	WCP654	19		Surface	Non-artefactual	0.7	Quartz, vein					
14081	15	WCP654	21		Surface	Non-artefactual	1.91	Quartz, vein					
14082	15	WCP654	22		Surface	Unretouched flake	0.55	Quartzite	Complete	Hertzian	Single	Hinge	0
14083	15	WCP654	18		Surface	Unretouched flake	0.25	Quartz, vein	Marginal fragment	None	None	None	0
14084	15	WCP654	17		Surface	Unretouched flake	1.41	Quartz, vein	Distal fragment	None	None	Feather	0
14085	15	WCP654	14		Surface	Non-artefactual	4.55	Quartz, vein					
14086	15	WCP654	15		Surface	Unretouched flake	1.49	Quartz, vein	Distal fragment	None	None	Feather	0
14087	15	WCP654	11		Surface	Unretouched flake	2.12	Quartz, vein	Margin missing	Hertzian	Single	Feather	0
14088	15	WCP654	12		Surface	Unretouched flake	0.85	Quartz, vein	Distal fragment	None	None	Feather	0
14089	15	WCP654	13		Surface	Unretouched flake	1.88	Quartz, vein	Margin missing	Hertzian	Shattered	Feather	0
14090	15	WCP654	10		Surface	Unretouched flake	2.46	Quartz, vein	Margin missing	Hertzian	Single	Feather	0
14091	15	WCP654	3		Surface	Unretouched flake	3.74	Chert	Complete	Hertzian	Shattered	Feather	20
14092	15	WCP654	4		Surface	Unretouched flake	2.74	Chert	Complete	Hertzian	Shattered	Feather	10
14093	15	WCP654	6		Surface	Unretouched flake	10.97	Quartz, vein	Distal fragment	None	None	Feather	0
14094	15	WCP654	9		Surface	Non-artefactual	13.86	Quartz, vein					



ID	Area name	Site	Find number	Pit	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion
14095	15	WCP654	8		Surface	Unretouched flake	0.82	Quartz, vein	Proximal fragment	Hertzian	Single	None	0



ID	Dorsal scar direction	Length	Width	Thickness	Platform width	Platform thickness	Crazing	Crenated fracture	Potlidding	Exfoliation	Comments
13979	Same	18.14	8.06	4.28			0	0	0	0	
13980	Same	9.02	6.83	1.84	6.83	1.57	0	0	0	0	
13981	None	17.2	11.55	5.54			0	0	0	0	
13982	Same	9.79	8.19	3.58			0	0	0	0	
13983							0	0	0	0	
13984							0	0	0	0	
13985	Same	11.25	7.87	1.66			0	0	0	0	
13986							0	0	0	0	
13987	Same	17.12	10.72	4.65			0	0	0	0	
13988							0	0	0	0	
13989							0	0	0	0	
13990							0	0	0	0	7m west of pit 2
13991							0	0	0	0	2.5m east of pit 2
13992	None	20.14	18.17	9.48	11.46	3.63	0	0	0	0	
13993	Same	16.05	10.36	8.62	9.39	4.48	0	0	0	0	
13994	Same	15.97	9.78	3.1			0	0	0	0	



13995	Same	12.19	7.73	3.38			0	0	0	0	South contour bank clearance.
13996							0	0	0	0	South contour bank clearance.
13997							0	0	0	0	South contour bank clearance.
13998	Same	14.35	14.1	1.95			0	0	0	0	
13999							0	0	0	0	
14000							0	0	0	0	
14001	Same	14.55	11.91	3.62	11.43	3.51	0	0	0	0	
14002							0	0	0	0	
14003	Oblique	5.84	11.5	1.99			0	0	0	0	
14004		180	57.98	46.78			0	0	0	0	Elongate ground axe made from cylindrical nodule of fine-grained sedimentary rock. ground bitt intact, opposite end removed by transverse break. lateral edges hammer-dressed to thin the piece, presumably to create concave edge for hafting
14005							0	0	0	0	
14006	None	9.88	21.32	6.39			0	0	0	0	
14007	Same	17.49	16.6	4.29			0	0	0	0	
14008	Indeterminate	20.26	13.68	4.09	7.93	4.49	0	0	0	0	
14009	Indeterminate	12.69	21.59	13.56			0	0	0	0	



14010		45.98	52.6	20.56			0	0	0	0	Very finely ground bitt. hammerdressing and grinding across top surface, underside surface is entirely ground. Ventral fracture surface truncates piece, originating from underside surface. Grinding striations perpendicular to bitt on both surfaces.
14011							0	0	0	0	
14012							0	0	0	1	
14013							0	0	0	1	
14014	Indeterminate	18.05	15.66	10.21			0	0	0	0	
14015	Same	23.96	18.22	3.93			0	0	0	0	
14016							0	0	0	0	
14017	Same and oblique	21.93	25.06	20.6			0	0	0	0	
14018							0	0	0	0	
14019							0	0	0	0	
14020		18.95	15.4	6.45			0	0	0	0	
14021	Same	11.29	15.65	5.09	16.13	5.37	0	0	0	0	
14022							0	0	0	0	
14023							0	0	0	0	



14024							0	0	0	0	
14025	Same	10.98	6.28	2.19	7.12	1.91	0	0	0	0	
14026							0	0	0	0	
14027							0	0	0	0	
14028	Same	13.69	10.09	4.44			0	0	0	0	
14029							0	0	0	0	
14030	Same	7.96	8.03	2.1			0	0	0	0	
14031	Same	21.4	24.94	8.58			0	0	0	0	
14032							0	0	0	0	
14033	Same	10.02	9.85	5.14			0	0	0	0	
14034							0	0	0	0	
14035	Same	9.78	12.54	3.32			0	0	0	0	
14036	Same	12.7	12.99	4.84			0	0	0	0	
14037	Indeterminate	8.44	19.43	7.71			0	0	0	0	
14038	Indeterminate	14.76	5.83	4.18			0	0	0	0	
14039							0	0	0	0	
14040	Same	14.59	10.07	3.86			0	0	0	0	



14041							0	0	0	0	
14042	Same	20.12	14.53	3.31	8.18	1.4	0	0	0	0	
14043							0	0	0	0	
14044							0	1	1	0	
14045							0	0	0	0	
14046							0	0	0	0	
14047	Same	7.46	7.31	2.68			0	0	0	0	
14048							0	0	0	0	
14049							0	0	0	0	
14050							0	0	0	0	
14051							0	0	0	0	
14052	Same	13.73	20.6	7.2	20.17	7.65	0	0	0	0	
14053	Same	13.52	10.17	3.13			0	0	0	0	
14054		24.02	14.07	12.73			0	0	0	0	Single platform core, with three remaining flake scars.
14055	Same	16.51	14.03	6.87	9.73	5.39	0	0	0	0	
14056							0	0	0	0	
14057	Same	13.56	15.24	6.82	7.33	3.35	0	0	0	0	



14058	Same	41.17	25.43	8.67	5.19	1.57	0	0	0	0	
14059	Same	10.4	13.35	5.98	16.44	5.57	0	0	0	0	
14060							0	0	0	0	
14061	Same	8.2	19.8	7.27	13.59	4.6	0	0	0	0	
14062		23.8	24.63	30.01			0	0	0	0	Single platform core, with three flake scars only.
14063		30.88	20.42	15.61			0	0	0	0	
14064	Same	12.15	12.64	6.25			0	0	0	0	
14065	Indeterminate	15.66	13.43	9.74			0	0	0	0	
14066							0	0	0	0	
14067							0	0	0	0	
14068	Same	21.51	16.28	6.15	14.57	6.41	0	0	0	0	
14069	Indeterminate	12.89	17.88	7.95			0	0	0	0	
14070	Same	18.15	17.16	4.99	8.03	2.48	0	0	0	0	
14071							0	0	0	0	
14072	Same	11.08	6.87	2.17			0	0	0	0	
14073							0	0	0	0	
14074							0	1	0	0	



14075		25.68	16.78	14.66			0	0	0	0	
14076	Same	10.1	5.55	1.3	4.78	1.82	0	0	0	0	
14077	Same	13.8	19.2	11.08	11.81	7.92	0	0	0	0	
14078	Same	15.57	13.92	4.37	11.18	3.98	0	0	0	0	
14079							0	0	0	0	
14080							0	0	0	0	
14081							0	0	0	0	
14082	Same	10.34	14.88	2.51	7.93	2.45	0	0	0	0	
14083	Same	10.33	4.88	1.85			0	0	0	0	
14084	Same	9.17	12.43	3.84			0	0	0	0	
14085							0	0	0	0	
14086	Same	12.38	8.28	6.28			0	0	0	0	
14087	Same	12.54	10.19	6.26			0	0	0	0	
14088	Same	16.37	12.12	2.39			0	0	0	0	
14089	Same	21.76	15.06	4.52			0	0	0	0	
14090	Same	12.15	11.97	6.29			0	0	0	0	
14091	Same	19.92	18.25	4.97			0	0	0	0	



14092	Same	19.63	20.04	5.71			0	0	0	0	
14093	Indeterminate	22.95	25.19	12.44			0	0	0	0	
14094							0	0	0	0	
14095	Indeterminate	9.21	8.1	5.53	5.34	1.75	0	0	0	0	



ABORIGINAL CONSULTATION

Wilpinjong Coal Mine (WCM) and Peabody Energy conduct an ongoing consultation program with Aboriginal stakeholders with regard to cultural heritage management within the Wilpinjong mining lease (ML 1573). There are currently eight organisations or individuals registered as Aboriginal stakeholders (also known as 'registered Aboriginal parties' or RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH). Navin Officer Heritage Consultants contacted each stakeholder to invite a representative of each group to be involved in the site visits for this assessment. This was done via email on 20 September 2016. Four stakeholders responded to the invitation and their representatives attended the fieldwork.

Field Participation

The following representatives from four registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over three days, 10-13 October 2016:

- Coral Williams Warrabinga Native Title Claimants Aboriginal Group;
- Shaen Morgan North East Wiradjuri Company Ltd;
- Debbie Foley and Larry Foley Mudgee Local Aboriginal Land Council; and
- Larry Foley and Debbie Foley Murrong Gillinga.

NOHC FIELDWORK PERSONNEL

Archaeologists Nicola Hayes, Jo Dibden and Lucy Blackam undertook the survey and artefact collection.

Dr Oliver Macgregor undertook the artefact description.

CONCLUSIONS AND RECOMMENDATIONS

Seventeen new Aboriginal sites, WCP650 to WCP666, have been recorded within the Wilpinjong project boundary as a result of this assessment. AHIMS site cards are attached for these sites.

Area 19 (part)

Consistent with the WCPL ACHMP rock shelters WCP115, WCP116, WCP117 and WCP500 should be avoided by the project.

If avoidance is not feasible at rock shelters WCP115, WCP116, WCP117 and WCP500 then the extent and type of further work for rock shelter sites within the WCPL ACHMP needs to be resolved prior to their impact.

It is unclear if impacts to the rock shelters or the recommended salvage excavation is covered under the current WCPL ACHMP. If impacts are anticipated to the rock shelters, then WCPL may require additional approvals from the Department of Planning.

Rock shelter locations 1 to 3 are not assessed as Aboriginal sites and pose no constraints to the project.



Area 19 is cleared for impact in the area shown in Figure 7, this area avoids rock shelters WCP115, WCP116, WCP117 and WCP500. Rock shelter sites WCP115, WCP116, WCP117 and WCP500 should be fenced during the life of operations in Area 19 when mining operations come within 20 metres of these sites. Impacting these sites must be avoided.

Area 15

Area 7 is cleared for impact excluding the area shown in Figure 34 as sites WCP654 and combined site 264-266, scarred trees WCP236, WCP663 and WCP664 and rock shelters WCP562, WCP566 and WCP568.

RAP field representatives from a cultural point of view suggest sites WCP654 and combined site 264-266 undergo additional salvage works prior to impacts. A limited program of grader scrapes would enable the collection of a larger sample of artefactual material at the sites. This investigation is covered by the provision of the WCPL ACHMP.

The proposed archaeological salvage program offers to provide a more robust assessment of the nature of the assemblage on the crests at sites WCP654 and combined site 264-266.

The scarred tree removal protocol outlined in the ACHMP should be followed for locations WCP236, WCP663 and WCP664.

Consistent with the WCPL ACHMP rock shelters WCP562, WCP566 and WCP568 should be avoided by the project. If avoidance is not feasible at rock shelters WCP115, WCP116, WCP117 and WCP500 then the extent and type of further work for rock shelter sites within the WCPL ACHMP needs to be resolved prior to their impact.

It is unclear if impacts to the rock shelters or the recommended salvage excavation is covered under the current WCPL ACHMP. If impacts are anticipated to the rock shelters, then WCPL may require additional approvals from the Department of Planning.

Rock shelter sites WCP562, WCP566 and WCP568 should be fenced during the life of operations in Area 15 when mining operations come within 20 metres of these sites. Impacting these sites must be avoided until their significance is re-assessed by a qualified Archaeologist.

Contour Bank

The contour bank is cleared for impact.

WCP224

Site WCP224 is cleared for impact.



References

- Kayandel Archaeological Services 2006, Wilpinjong Coal Project Aboriginal Cultural Heritage Survey: Supplemental Survey of Escarpment Areas and Report of Findings. Report prepared for Wilpinjong Coal Pty Ltd.
- Navin Officer Heritage Consultants 2005, Wilpinjong Coal Project Appendix F: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- South East Archaeology 2013, Wilpinjong Coal Mine, Central Tablelands of New South Wales - Modification: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- South East Archaeology 2015 Wilpinjong Coal Mine, Central Tablelands Of New South Wales – Extension Project: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- Wilpinjong Coal Pty Ltd (WCPL) 2015 Wilpinjong Coal Project Aboriginal Site Database revised 5 March 2015.
- Wilpinjong Coal Pty Ltd (WCPL) 2006, Wilpinjong Coal Project Environmental Impact Statement.



ATTACHMENT 1

SCARRED TREE SALVAGE METHODOLOGY



When salvage of probable Aboriginal scar trees is undertaken in accordance with the Aboriginal Cultural Heritage Management Plan, the following methodology would be implemented. In addition to the below, Wilpinjong Coal Pty Limited would provide the Native Title Party with the opportunity to conduct a smoking ceremony for any live probable or possible Aboriginal scar trees salvaged in accordance with the below methodology.

Note that actions in *italics* in the following tables may require a person with specialist experience, such as in dendrochronology, or the archaeological interpretation of scarred trees.

Actions **bolded** are additional actions arising from discussions on 28 May 2015

Salvage Methodology - Probable Scar Trees

(If salvage is adopted as a management option, this methodology could also be implemented for possible Aboriginal scar trees that are in good condition).

- A1. Conduct an assessment of the condition and fragility of the tree. If it is unlikely that the scarred section of trunk can be recovered/salvaged without significant break-up, then consult with Aboriginal stakeholder group(s) as to whether an attempt to salvage the scarred trunk should be continued and whether the recovery and storage of fragments is required.
- A2. In the event that a successful salvage of the scarred section of tree is not considered possible, then conduct salvage step A10 prior to destruction of the tree.
- A3. If it is considered possible to salvage the scarred section of tree without significant break-up, then: Identify section of trunk containing both the remaining exposed scar surface and the healed-over regrowth (refer to the site card for an estimate of the original length of the scar or scars)

Additional Step 1 A 3D scan will be completed of each scar, to record the scar prior to the removal of the tree. This information will be provided to the Aboriginal groups and documented in an archival report

- A5. **Remove crown, conserving as much of the trunk above the top of the scar as is feasible (and making sure that at least 200 mm of trunk remains between the cut and the upper most point of the original scar, ie including the regrowth)**

Additional Step 2 Excavation will occur around the base of the tree, this is to loosen any roots to allow step A4 to be undertaken with less chance of damaging the tree. Excavation will occur preferably on the downslope face of the tree

- A4. Push tree over, taking all reasonable steps to protect the side of the tree with the scar from unnecessarily impact. **The tree around the scar will be braced using appropriate methods such as wooden braces and strapping. Additionally it is preferable to push the tree up-slope and onto a constructed batter/mound to reduce the distance the tree falls to the ground.** If it is unsafe, or for some other reason, it is not feasible to push the tree over, the tree could be felled using a chain saw. Where feasible and safe to do so, the trunk should be cut so that the original scarred section of the trunk remains in one piece (including regrowth).
- A6. Ensure regrowth around scar is retained (regrowth can often be identified by its raised character, hollow sound when tapped, and different surface pattern on bark)
- A7. Remove roots and stump/lower trunk portion, making sure that at least 200 mm of trunk remains between the cut and the lower most point of the original scar (ie including regrowth)



- A8. Relocate to storage area, providing surface protection to scar area (such as by wrapping a geotextile or other such covering around trunk) where there is an assessed risk of accidental scraping, percussion or gauging impact to the scar area
- A9. Store under cover, and off the ground, with site number clearly and permanently identified on trunk (do not place identification on scar or regrowth areas)
- A10. *If agreed by Aboriginal stakeholder group(s), collect two 5mm diameter core samples (providing record of tree rings), one through regrowth into heartwood (if still extant), and one through full trunk radius outside of the scar area. This type of sample is removed using an 'increment borer' and the samples will allow an approximate date to be calculated for the scar*
- A11. *In consultation with the Aboriginal stakeholder group(s), consideration to be given to partially or fully removing the regrowth on selected scarred tree examples to determine the shape of the original scar, the original method of bark removal, and to record the pattern of original axe/hatchet marks.*
- A12. Curate or replace back onto rehabilitated mine landscape, according to the requirements of the Aboriginal stakeholder group(s). The results of the analysis of the age, pattern of axe marks and original shape of the scars should be considered by Aboriginal stakeholders when deciding if the scars are of Aboriginal origin and require any further consideration



Wilpinjong Coal Mine

Aboriginal Cultural Heritage Clearance Works

Areas 2, 3 (part), 6, 14, Stem Pad, Pit 5 Monitor Station, Optic Fibre Route (part) and 17 (revised)

Navin Officer Heritage Consultants Pty Ltd

April 2016

Background

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 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).

The ACHMP includes an Ancillary Disturbance Area Protocol which includes:

1. Pre-clearance archaeological survey (conducted with the assistance of Aboriginal representatives). This survey would include consideration of the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage.
2. Avoidance of the identified Aboriginal object/sites by realigning or adjusting infrastructure/disturbance area if practicable.

If the object/site cannot be avoided:

1. Consider surface salvage (advice from Aboriginal representatives and/or an archaeologist will be sought).
2. If relevant, consider the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage (subject to review of the ACHMP and consultation with Aboriginal representatives and/or an archaeologist).
3. Conduct surface salvage (and subsurface salvage if necessary) with the assistance of Aboriginal representatives and an archaeologist.
4. Store salvaged artefacts in the "Keeping Place".
5. Post-rehabilitation, replace artefacts onto the rehabilitated landform.

Surface Salvage

The ACHMP specifies that surface salvage will involve the systematic recovery of all evident surface artefacts from a representative sample of open artefact scatters and from selected isolated finds at known sites within the project disturbance area. Surface collections will occur on a progressive basis prior to the commencement of ground surface disturbance works within an area.



A basic level of recording will be conducted on all recovered artefactual surface material including location, technological traits, and stone type. This analysis will be conducted by a qualified lithic specialist.

This Report

This report presents the results of a pre-clearance archaeological survey and surface salvage of Areas 2, 3(part), 6, 14, Stem Pad access, Pit 5 Monitor Station, Optic Fibre Route (part) and 17 (Figure 1). All areas are situated within the boundaries of the approved project area (05-0021) and are thus subject to the ACHMP.

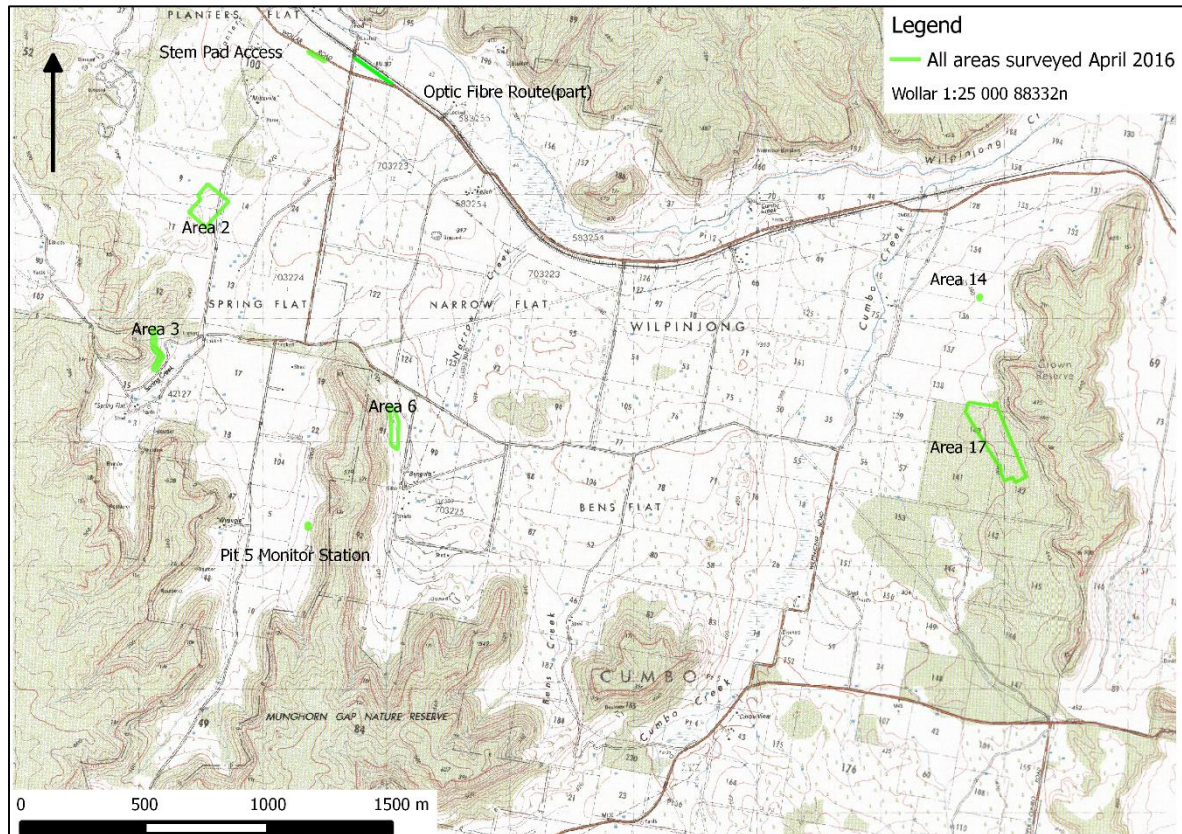


Figure 1 Location of Areas 2, 3 (part), 6, 14, Stem Pad access, Pit 5 Monitor Station, Optic Fibre Route (part) and 17 (revised)
(Base map Wollar 1:25 000 8833-2-N.)



Area 2

Area 2 is shown outlined in green in Figure 2 and was surveyed as part of this clearance work program on 5 April 2016.

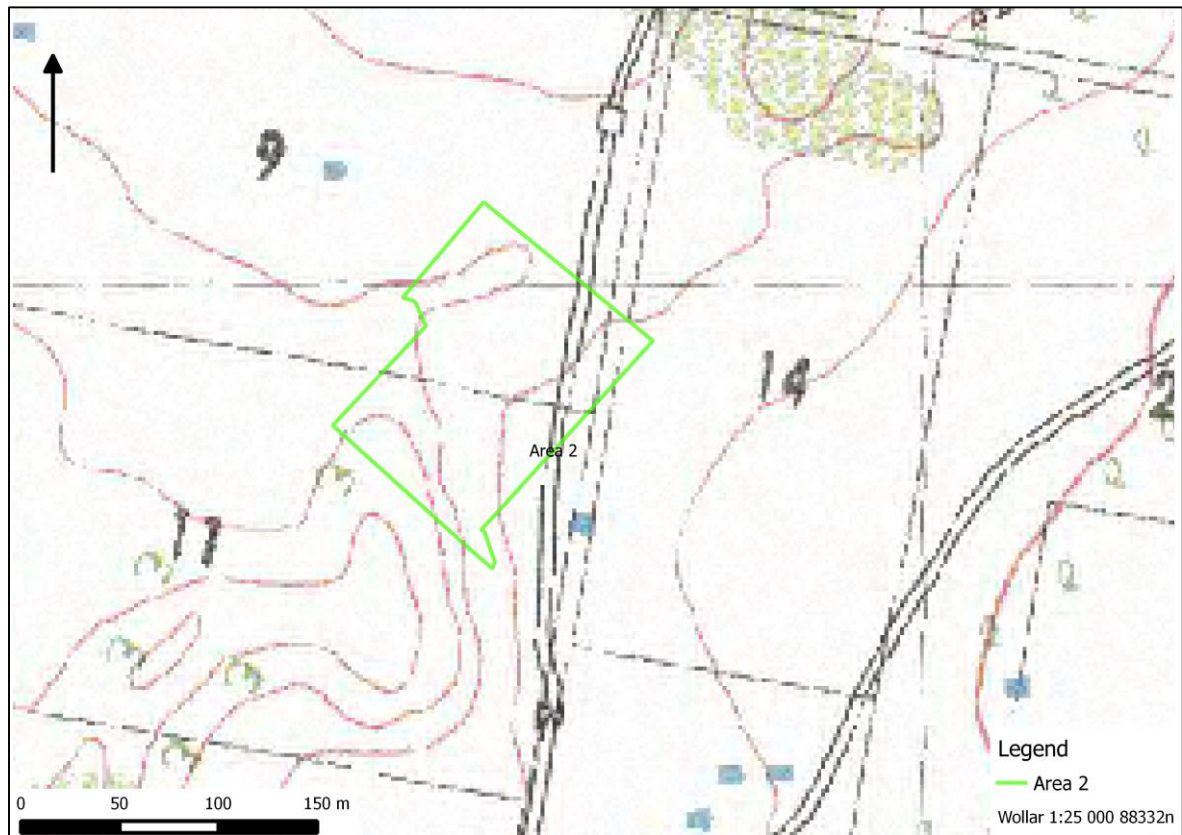


Figure 2 Area 2 (Base Map Wollar 1:25 000 8833-2-N)

Previous Recording

One previously lodged site recording occurs in Area 2. This is:

WCP451 – isolated find (Apex Archaeology 2014). This site is listed in the ACHMP.

Clearance Survey Results

No artefacts were detected or collected at location WCP451.

Five artefacts were collected from three previously unrecorded locations and constitute three new recordings WCP616, WCP617 and WCP618 (see Table 1).

WCP616

GDA 767599.6420167

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figures 3 and 6). The site was located on the crest of a small rise adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance and sheet erosion. The disturbance incidence was 60% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.



Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 1).



Figure 3 WCP616 looking south

WCP617

GDA 767757.6420042

This site consists of one artefact situated on a dirt vehicle track within an area of approximately 1 x 1 m. (Figures 4 and 6). The site was located on a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance, vehicle track and sheet erosion. The disturbance incidence was 80% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 1).



Figure 4 General site location of WCP617

WCP618

GDA 767646.6420043

This site consists of three artefacts situated within an area of approximately 3 x 40 m. (Figure 5 and 6). The area is located on a disused vehicle track. The site was located on a lower slope of a low broad spur adjacent to current mining operations.

Ground surface disturbance consisted of vehicle tracks and sheet erosion. All artefacts were located on the track. The disturbance incidence was 80% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Three confirmed artefacts were collected from this site (see Table 1).



Figure 5 WCP618 looking south east

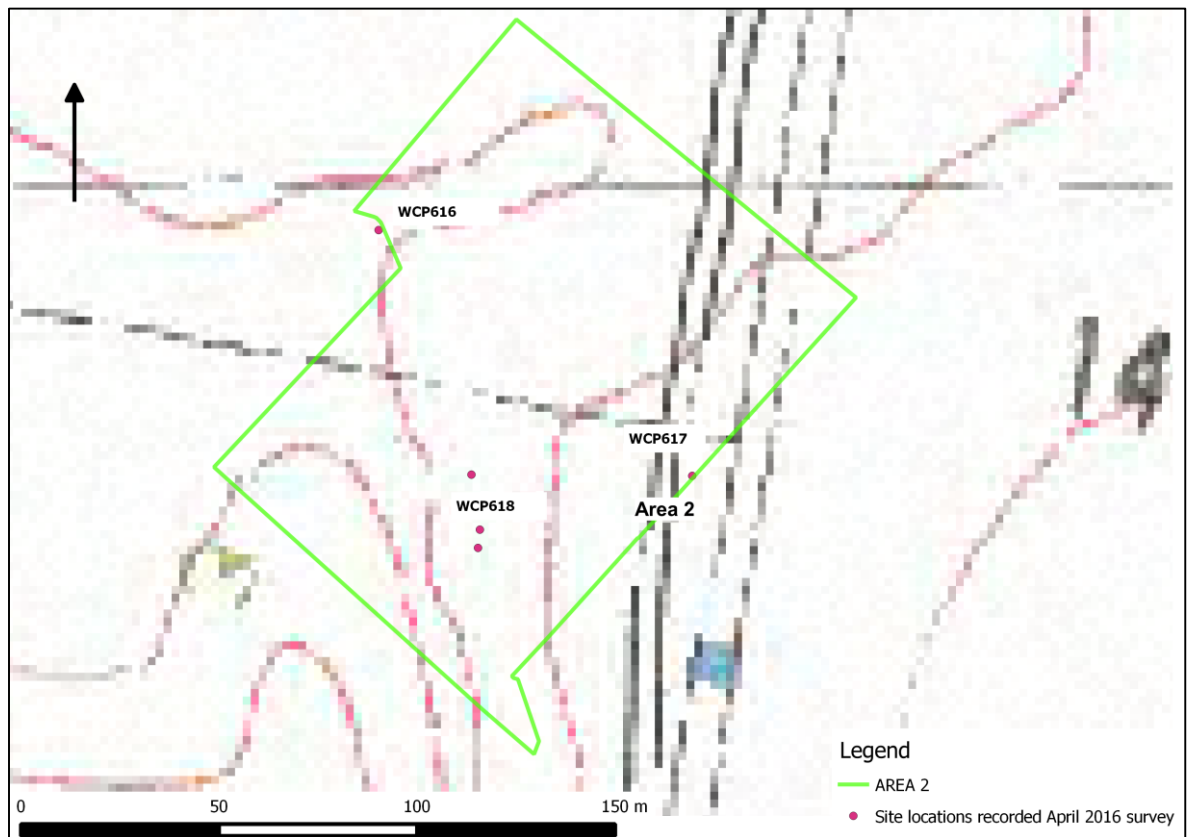


Figure 6 Locations of collected artefacts – Area 2
(Base Map Wollar 1:25 000 8833-2-N)



Area 3 (part)

Area 3 (part) is shown outlined in green in Figure 7 and was surveyed as part of this clearance work program on 5 April 2016.

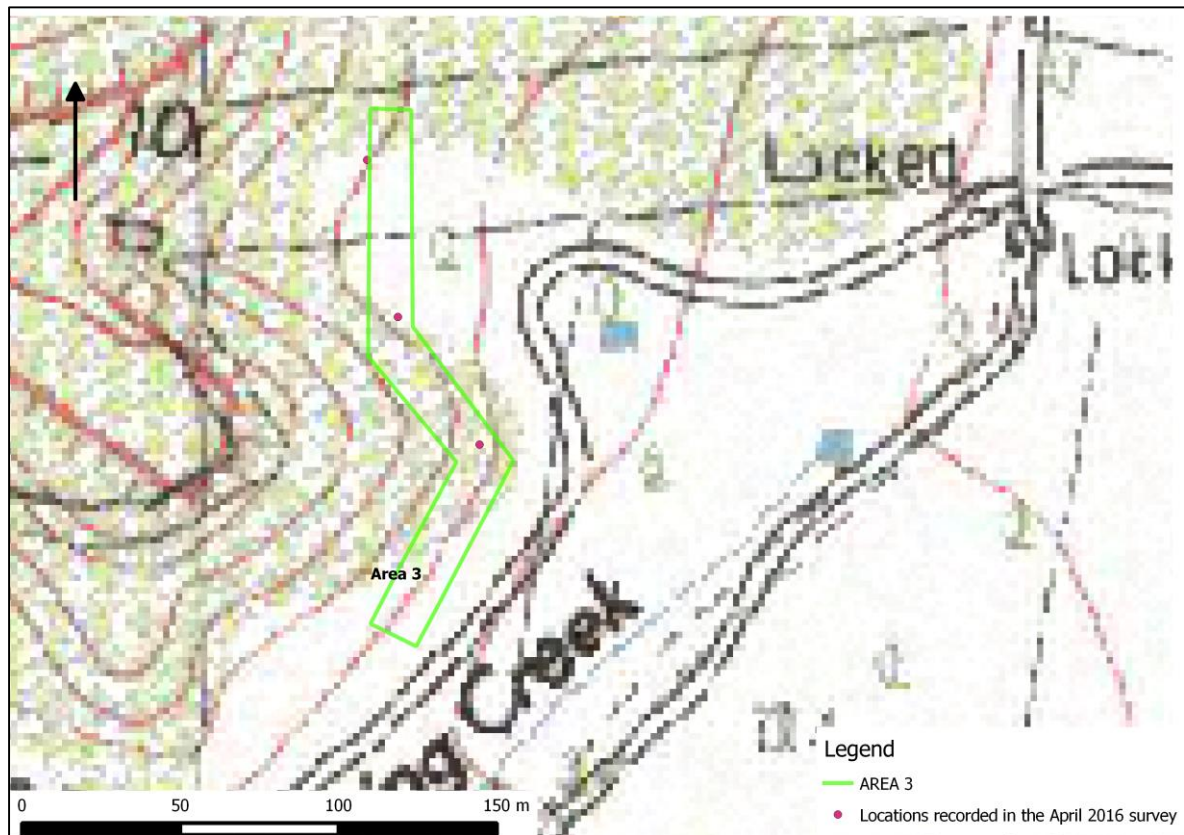


Figure 7 Area 3(part) (Base map Wollar 1:25 000 8833-2-N)

Previous Recordings

One previously lodged site recording occurs in Area 3(part): This is:

WE25 – artefact scatter. This site was assessed by Kayandel Archaeological Services (2006).

Clearance Survey Results

No artefacts were detected or collected at location WE25.

Three lithic items including two artefacts were collected from three previously unrecorded site locations. Of these two locations contained confirmed artefacts and constitute new recordings WCP619 and WCP620.

Collection Location 1 (CL1)

GDA 767290.6418889

CL1 consists of one lithic item situated within an area of approximately 1 x 1 m.

One lithic item was collected from this site (see Table 1). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 8 Collection Location 1 looking west

WCP619

GDA 767239.6418970

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 9 and 11). The site was located on the lower slope of a rocky spur adjacent to current mining operations.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 80% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One silcrete core was collected from this site (see Table 1).

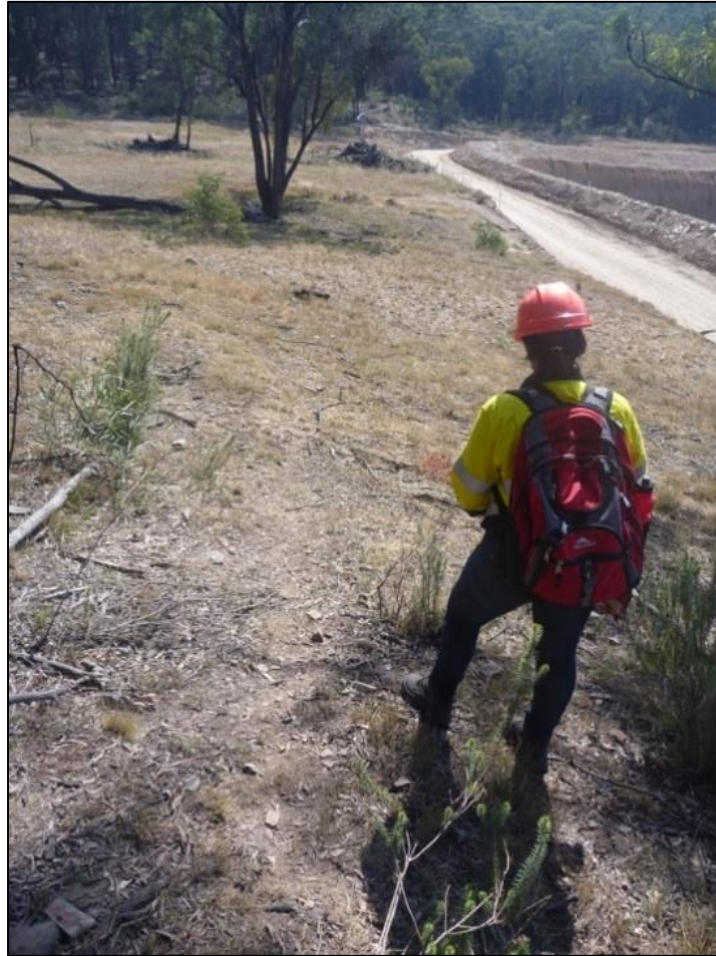


Figure 9 WCP619 looking north

WCP620

GDA 767219.6419069

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 10 and 11). The area is located on an erosion scald. The site was located on a basal slope adjacent to a valley floor current mining operations.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 90% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One broken quartz flake (distal end) artefact was collected from this site (see Table 1).



Figure 10 WCP620 looking north

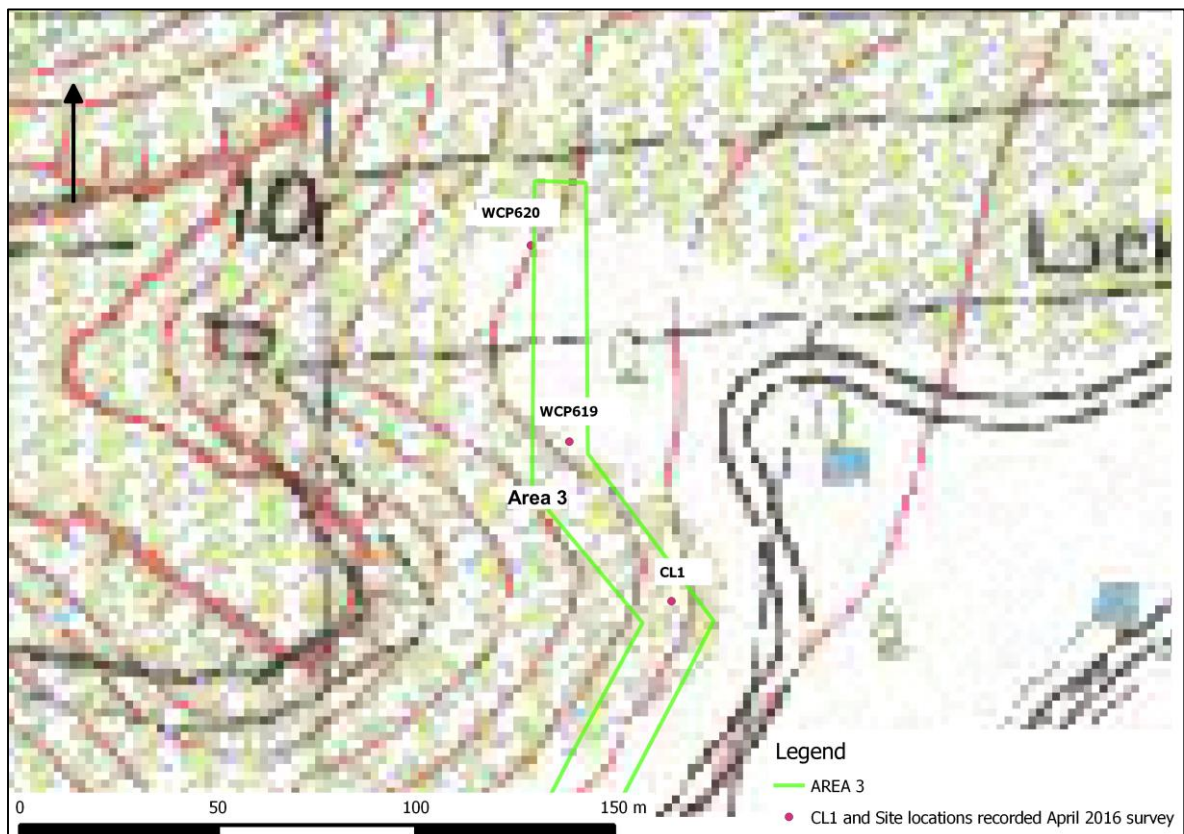


Figure 11 Locations of collected artefacts and CL1 April 2016 survey– Area 3(part)
(Base map Wollar 1:25 000 8833-2-N)



Area 6

Area 6 is shown outlined in green in Figure 12 and was surveyed as part of this clearance work program on 5 April 2016.

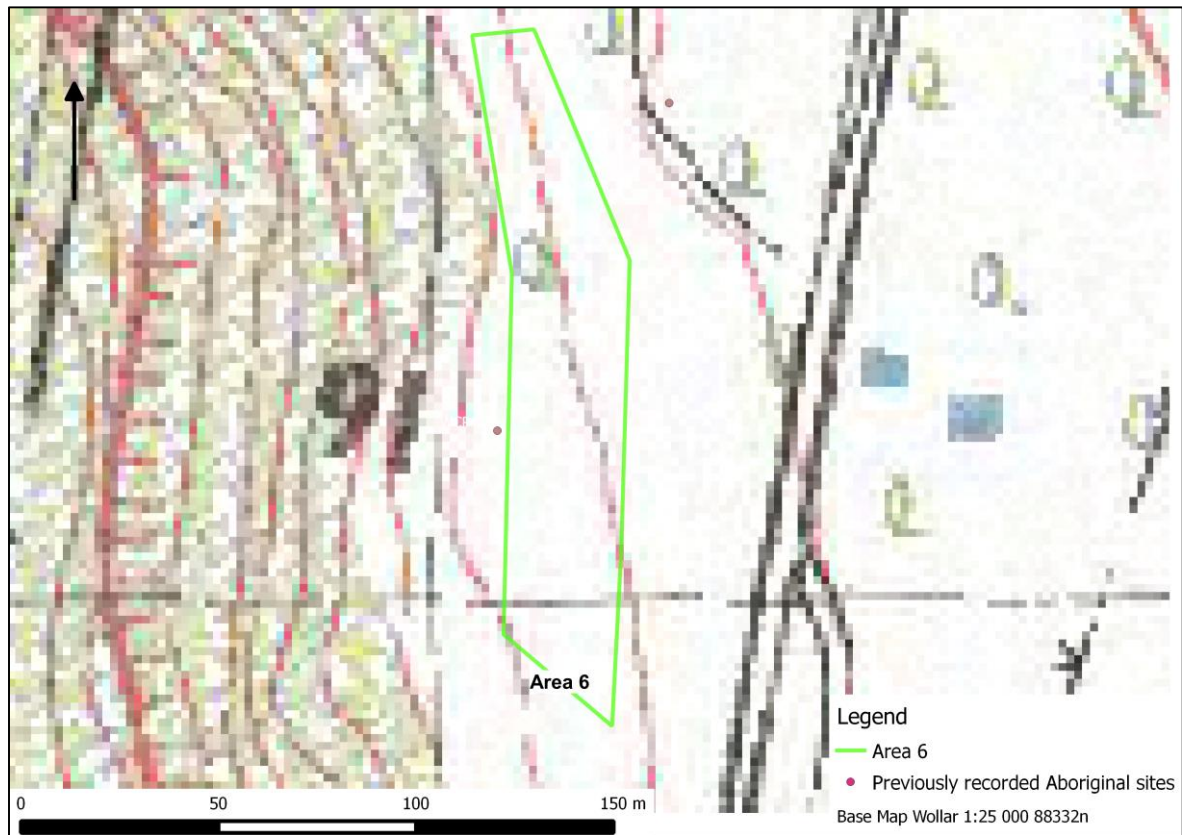


Figure 12 Area 6 (Base map Wollar 1:25 000 8833-2-N)

Previous Recording

No previously lodged site recordings occur in Area 6.

Clearance Survey Results

No newly identified Aboriginal sites were recorded in Area 6 during the survey conducted on 5 April 2016.



Area 14

Area 14 is shown outlined in green in Figure 13 and was surveyed as part of this clearance work program on 5 April 2016.

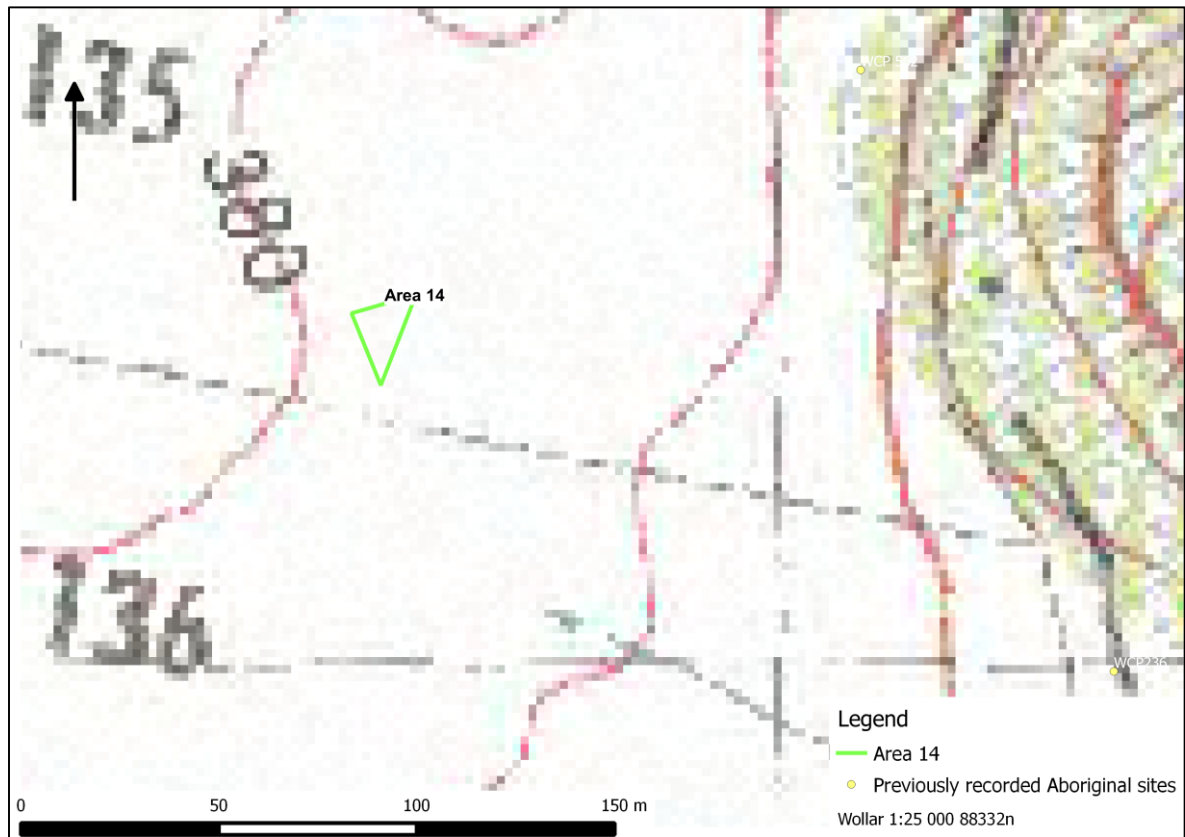


Figure 13 Area 14 (Base map Wollar 1:25 000 8833-2-N))

Previous Recording

No previously lodged site recordings occur in Area 14.

Clearance Survey Results

No newly identified Aboriginal sites were recorded in Area 14 during the survey conducted on 5 April 2016.



Stem Pad Access

Stem Pad Access is outlined in green in Figure 14 and was surveyed as part of this clearance work program on 6 April 2016.

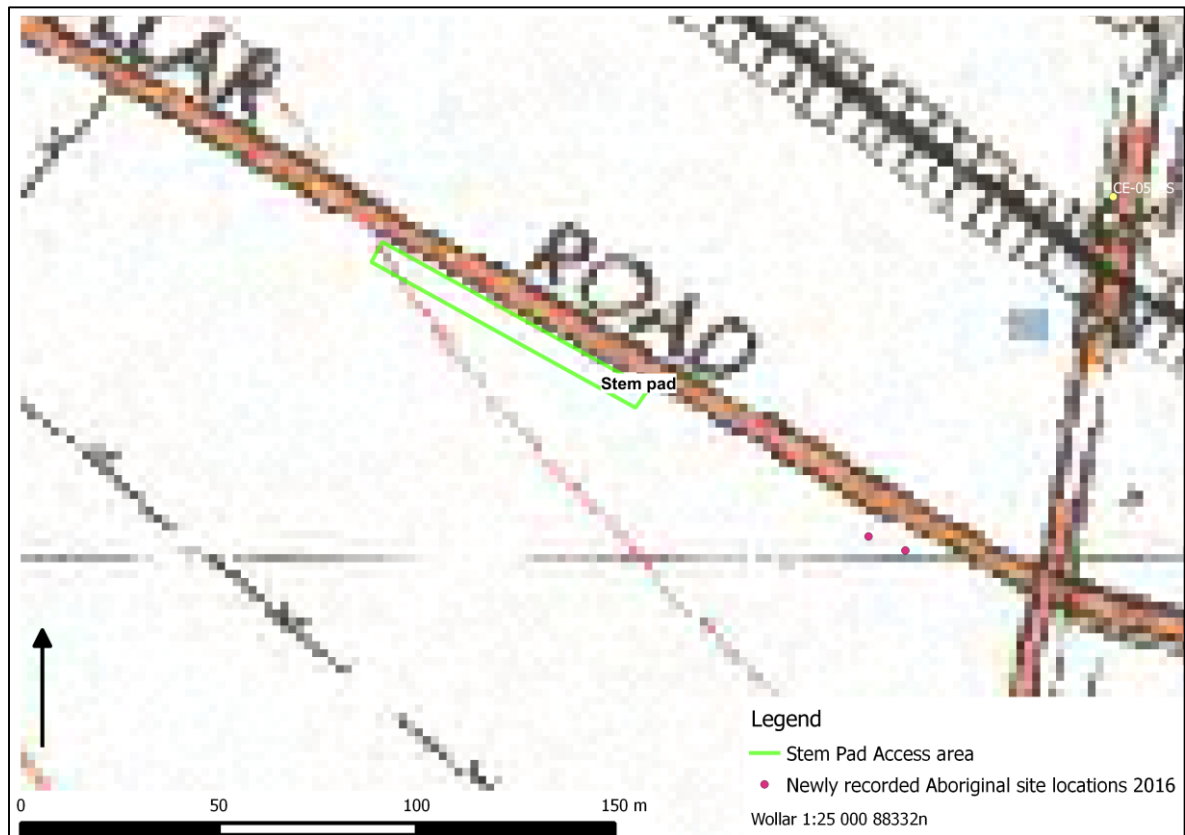


Figure 14 Stem Pad Access (Base map Wollar 1:25 000 8833-2-N)

Previous Recording

No previously lodged site recordings occur in Stem Pad Access.

Clearance Survey Results

The area elected for Stem Pad Access is located adjacent to Wollar Road. Stem Pad Access area is highly disturbed. Ground surface disturbance consists of underground services, road construction activities and rural fencing. Visibility in this area is low to very low (Figure 15).

No newly identified Aboriginal sites were recorded in Stem Pad Access during the survey conducted on 6 April 2016.



Figure 15 Stem Pad Access looking west



Pit 5 Monitor Station

Pit 5 Monitor Station is shown outlined in green in Figure 16 and was surveyed as part of this clearance work program on 5 April 2016.

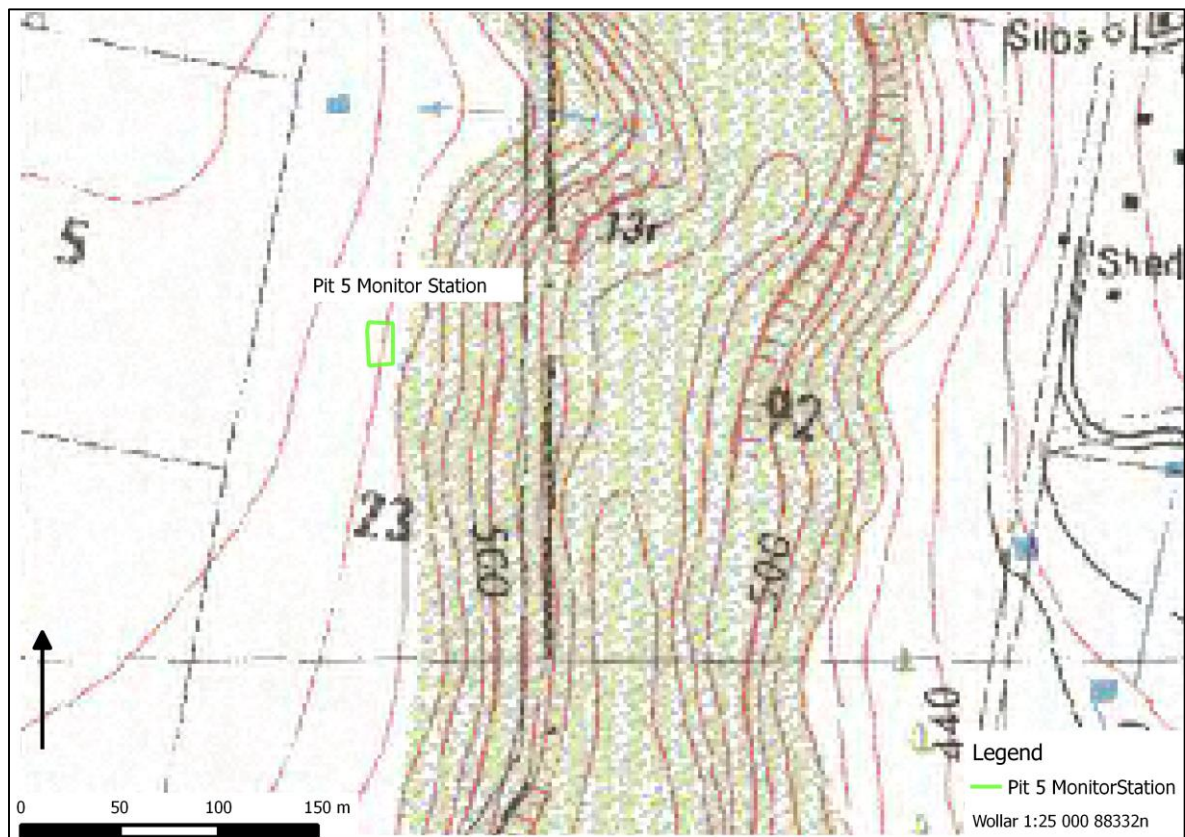


Figure 16 Pit 5 Monitor Area (Base map Wollar 1:25 000 8833-2-N)

Previous Recording

No previously lodged site recordings occur in Pit 5 Monitor Station.

Clearance Survey Results

One quartz artefact was recorded from a previously unrecorded location and constitutes a new recording, WCP621.

Site WCP621 occurs in an area not designated for collection.



WCP621

GDA 768495.6417491

This site consists of one quartz artefact situated within an area of approximately 1 x 1 m. (Figure 17, 18 and 19). The area is located on an erosion scald. The site was located on the lower slope of a major spur line adjacent to current mining operations.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 80% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of surface archaeological material is required for this site.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low



Figure 17 General view of site WCP621



Figure 18 Photo of isolated find – Pit 5 Monitor Station

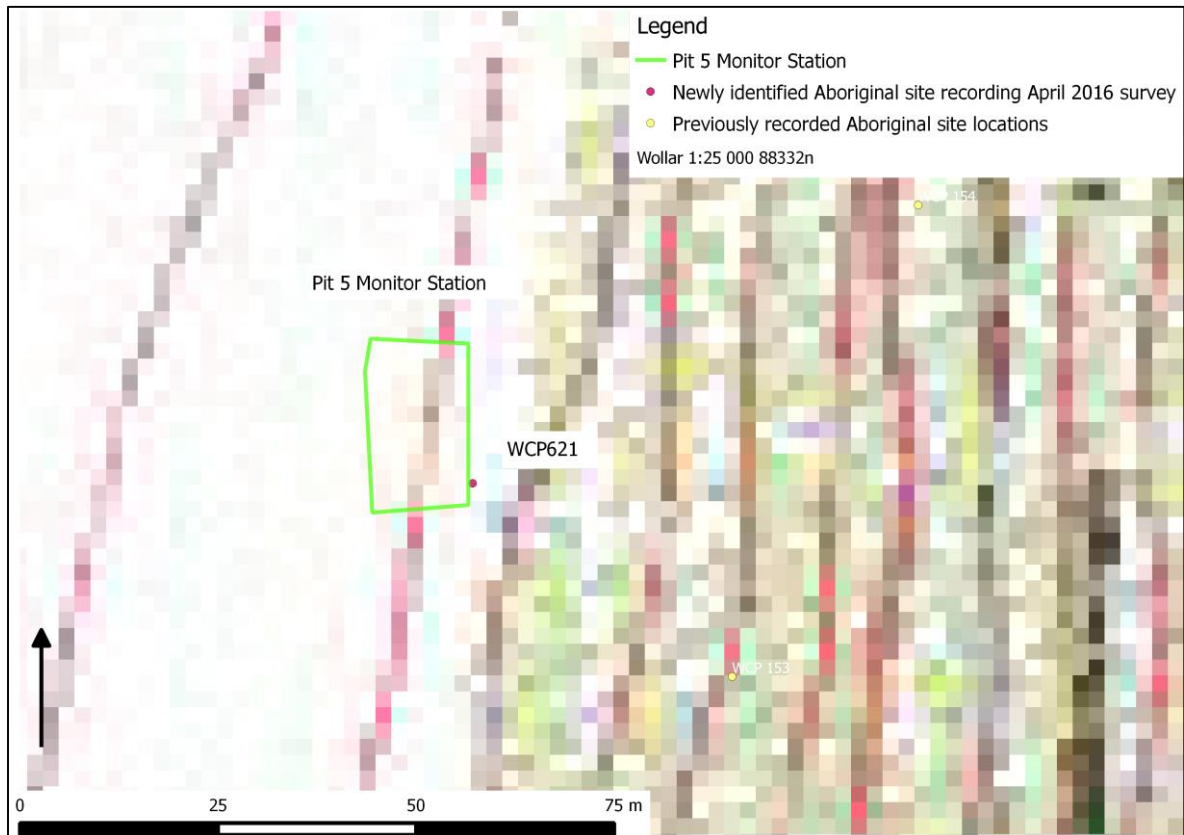


Figure 19 Location of artefact – Pit 5 Monitor Station
(Base map Wollar 1:25 000 8833-2-N)



Optic Fibre Route (part)

Optic Fibre Route (part) is shown outlined in green in Figure 20 and was surveyed as part of this clearance work program on 6 April 2016.

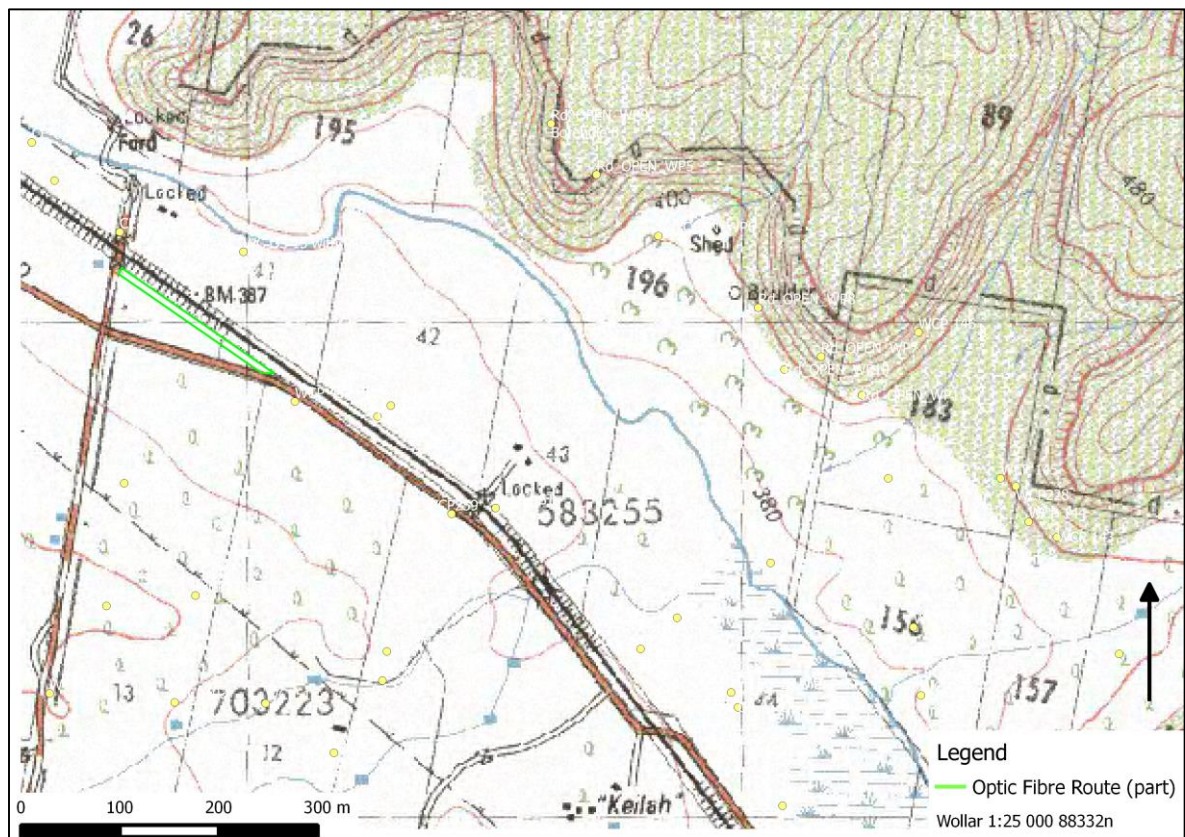


Figure 20 Optic Fibre Route (part) area (Base map Wollar 1:25 000 8833-2-N)

Previous Recording

No previously lodged site recordings occur in Optic Fibre Route (part).

Clearance Survey Results

One confirmed artefact was recorded from a previously unrecorded location and constitutes a new recording, WCP622.

WCP622

GDA 769019.6421177

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 22). The area is located with an area along part of the Optic Fibre Route which was inaccessible during February 2016 survey (NOHC 2016) due to tree clearing debris covering the entire area. The site was located on a valley floor situated between the railway line and Ulan Wollar Road.

Ground surface disturbance consisted of earthmoving machinery works and sheet erosion. The disturbance incidence was 90% with 20% visibility within exposures. There is low potential for subsurface material and low potential for this material to be undisturbed.



Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One quartz artefact was collected from this site (see Table 1).



Figure 21 View east across site WCP622– Optic Fibre Route (part)

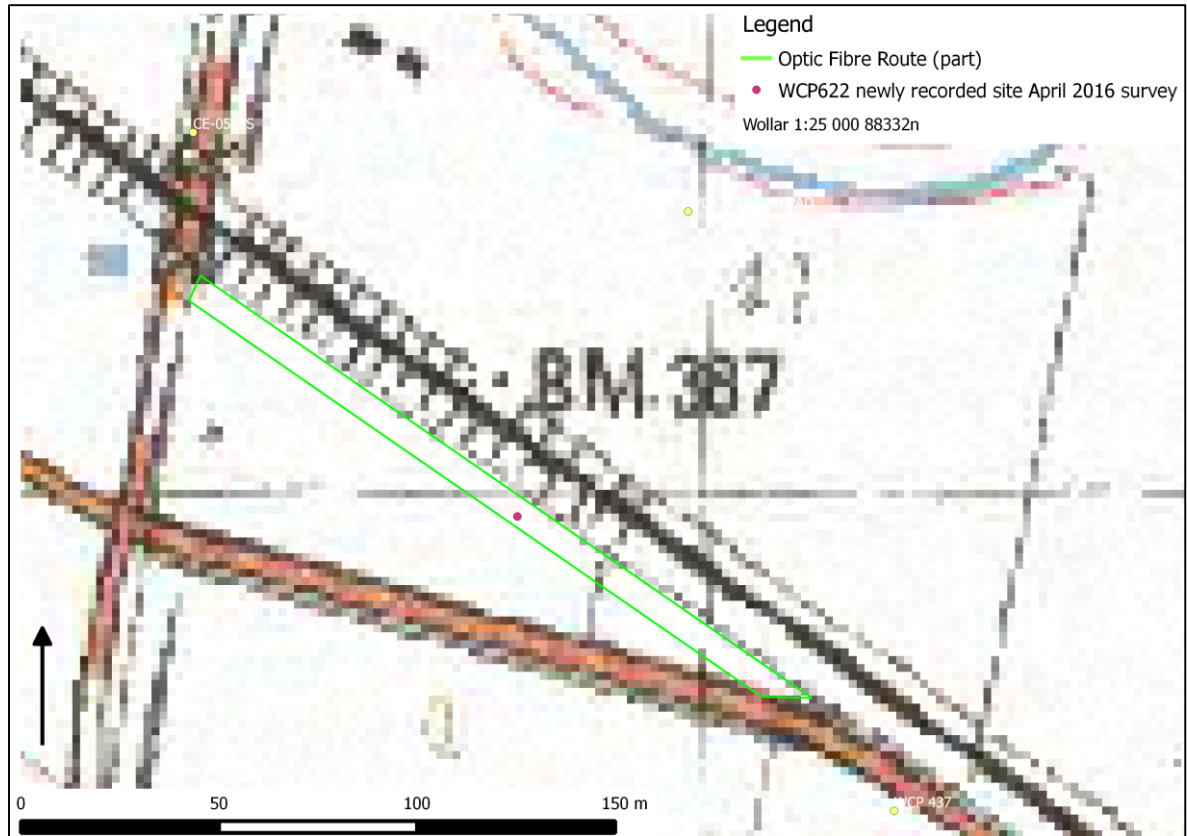


Figure 22 Location of collected artefact – Optic Fibre Route(part)
(Base map Wollar 1:25 000 8833-2-N)



Area 17

Area 17 is shown hatched in blue in Figure 23 and was surveyed as part of this clearance work program on 6 April 2016.



Figure 23 Area 17 with previous recordings marked (map supplied by Wilpinjong Coal Pty Ltd)

Previous Recordings

Eleven previously lodged site recordings occur in Area 17 (revised): These are:

WCP94 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP95 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP96 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP97 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP98 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP99 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP100 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP



WCP101 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP169 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP196 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

WCP197 – scarred tree. This site was assessed by Navin Officer Heritage Consultants (2005) and categorised for ‘unmitigated impact’ in the ACHMP

Clearance Survey Results

Four confirmed artefacts were detected from two previously unrecorded site locations in Area 17 (revised) and constitutes new recordings, WCP623 and WCP624.

Eleven scarred trees were revisited as part of this assessment.

Nine trees were elected for 3D scanning program (WCP94-99, WCP101, WCP196 and WCP197).

Five trees were elected for salvage program (WCP94, WCP95, WCP97, WCP98 and WCP99).

Two trees were elected for possible salvage (WCP96 and WCP196).

Two trees were elected to be removed from AHIMS scarred tree record (WCP100 and WCP169).

WCP623 (artefact scatter)

GDA 774102.6418211 (centre point)

This site consists of four confirmed artefacts situated within an area of approximately 10x 10 m. (Figure 24 and 25). The area is located on the wooded crest of a rocky spur. Disturbance consisted of animal tracks and sheet erosion, artefacts were located on an open area.

The disturbance incidence was 80% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Four quartz artefacts were collected from this site (see Table 1)



Figure 24 General location of site WCP623

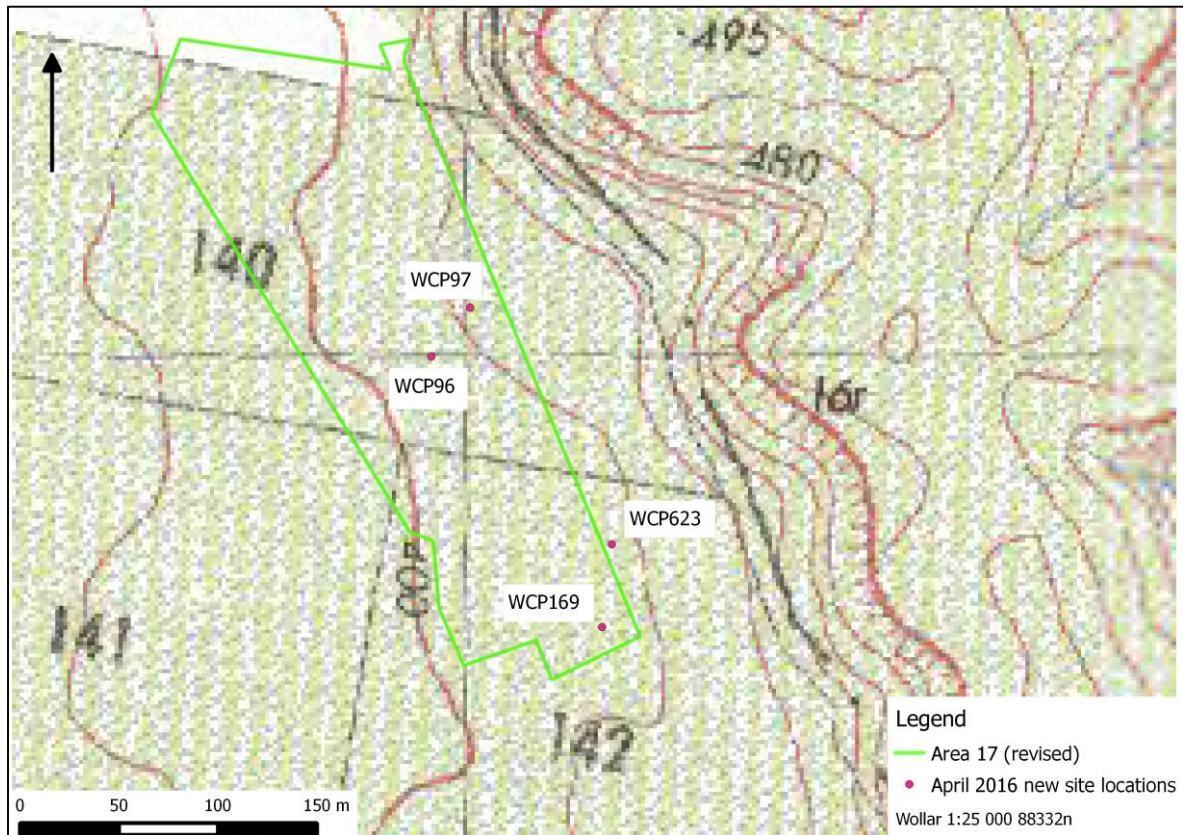


Figure 25 Location of site WCP623 and newly recorded locations for WCP96, 97 and 169. – Area 17 (revised)
(Base map Wollar 1:25 000 8833-2-N)



Scarred Trees

Select Aboriginal scarred trees from the eleven scarred trees (WCP94-101, WCP169, WCP196 and WCP197) occurring in Area 17 (revised) for inclusion in the salvage program was conducted based upon an assessment of its Aboriginal cultural heritage value, age, and origin. Any salvaged Aboriginal scarred trees will be stored in a Keeping Place and will then be re-placed onto rehabilitated landforms.

The methodology for the salvage of scarred trees is included in the ACHMP however as some trees are in poor condition and the methodology for salvage was discussed with the Aboriginal representatives on site during the current assessment.

In addition to the methodology outlined in the ACHMP and included in Attachment 1 it was determined that the following steps would be undertaken for nine of the scarred trees:

- A 3D scan will be completed of each scar, to record the scar prior to the removal of the tree. This information will be provided to the Aboriginal groups and documented in an archival report;
- Removal of the crown (step A5) will be undertaken prior to removing the tree, in addition any superfluous limbs will be removed from around the scar;
- Prior to step A7, the tree around the scar will be braced using appropriate methods such as wooden braces and strapping.
- Remove roots and stump/lower trunk (step A7), retaining at least 200 mm of trunk below lowest most point of original modified section, ie including regrowth. Alternatively, if controlled detachment of scarred trunk from stump is not feasible, and prior to step A7, the alternative method of soil removal from base of tree and pushing trunk over to rest on specially prepared adjacent spoil pile is advised (Additional Step 2 and step A4).

WCP94

GDA 774165.6417995

An assessment of WCP94 was undertaken by NOHC (2005) who determined the two scars with indistinct axe marks may be Aboriginal or European in origin. NOHC reports one upper straight row and one lower straight row of axe marks 210mm apart. In 2013, an additional assessment of WCP94 was undertaken by UTM who determined the origin of both scar wounds were likely to be Aboriginal.

Proposal for salvage of WCP94 was discussed with the Aboriginal representatives on site during the current assessment (Figure 26).

WCP94 was nominated for 3D scanning and the salvage program.



Figure 26 WCP94 scar 1 and 2

WCP95

GDA 774073.6418007

WCP95 was assessed by NOHC (2005) who determined the scar may be Aboriginal or European in origin with three upper straight rows and two lower straight rows of axe marks 215mm apart. In 2013 UTM also assessed the wound as likely to be an Aboriginal scar.

Proposal for salvage of WCP95 was discussed with the Aboriginal representatives on site during the current assessment (Figure 27).

WCP95 was nominated for 3D scanning and the salvage program.



Figure 27 WCP95

WCP96

GDA 774078.6418186

An assessment of WCP96 was undertaken by NOHC (2005) who determined the two scars may be Aboriginal or European in origin.

In 2013, an additional assessment of WCP96, a Yellow Box approximately between 300 - <350 years old, was undertaken by UTM who determined the origin of both scar wounds were likely to be Aboriginal. One scar was determined to be between 125 - <175 years old and the other 150 - <200 years old.

Proposal for salvage of WCP96 was discussed with the Aboriginal representatives on site during the current assessment (Figure 28).

WCP96 was nominated for 3D scanning.

WCP96 is in poor condition and apprehension over scar preservation during the removal process was raised. The proposed salvage of WCP96 will be decided onsite at imaging stage following consultation with tree removalist and Aboriginal representatives.

New location data was recorded for Modified Tree WCP96 during current survey from GDA 774075.6418198 to GDA 774078.6418186.



Figure 28 WCP96 scar 1 and 2

WCP97

GDA 774118.6418236

An assessment of WCP97 was undertaken by NOHC (2005) who determined the scar to be mostly on the fallen and dead section of trunk may be Aboriginal or European in origin. In 2013, an additional assessment of WCP97, a Yellow Box, was undertaken by UTM who determined the age range of tree as 300 - <350 and the scar wound to be between 150 and 200 years old with origin likely to be Aboriginal.

Proposal for salvage of WCP97 was discussed with the Aboriginal representatives on site during the current assessment (Figure 29).

WCP97 was nominated for 3D scanning.

WCP97 section of fallen tree trunk laying on ground was proposed for salvage only.

New location data was recorded for Modified Tree WCP97 during current survey from GDA 774123.6418255 to GDA 774118.6418236



Figure 29 WCP97 view of fallen trunk and remaining stump

WCP98

GDA 774091.6418267

An assessment of WCP98 was undertaken by NOHC (2005) who determined wound with one upper straight row of axe marks may be of Aboriginal or European origin. An additional assessment by UTM (2013) of WCP98, a Yellow Box approximately 250 - <300 years old, bore two scars and determined the origin of one scar (aged between 100 - <150 years old) likely to be Aboriginal and one scar a branch tear approximately 20 - <50 years old.

Proposal for salvage of WCP98 was discussed with the Aboriginal representatives on site during the current assessment (Figure 30).

WCP98 was nominated for 3D scanning and the salvage program.



Figure 30 WCP98 Aboriginal scar (left) and branch tear scar (right)

WCP99

GDA 773907.6418338

An assessment of WCP99 was undertaken by NOHC (2005) who determined the human made scar may be Aboriginal or European in origin. An additional assessment of WCP99, a Yellow Box approximately 250 - <300 years old, was undertaken by UTM (2013) who determined the origin of the scar (aged between 100 - <150 years old) likely to be Aboriginal.

Proposal for salvage of WCP99 was discussed with the Aboriginal representatives on site during the current assessment (Figure 31).

WCP99 was nominated for 3D scanning and the salvage program.



Figure 31 WCP99

WCP100

GDA 773958.6418289

An assessment of WCP100 was undertaken by NOHC (2005) who determined wound may be Aboriginal or European in origin. An additional assessment of WCP100, a Narrow-leaved Red Ironbark approximately 150 - <200 years old, was undertaken by UTM (2013) who determined the origin of the scar to be fire damage.

Proposal for salvage of WCP100 was discussed with the Aboriginal representatives on site during the current assessment (Figure 32).

All present agreed with UTM assessment of WCP100.

No 3D scanning or salvage required for WCP100.



Figure 32 WCP100

WCP101

GDA 773953.6418281

An assessment of WCP101 was undertaken by NOHC (2005) who determined the scar may be Aboriginal or European in origin, tree to be dead with most of scar on fallen dead section of trunk. In 2013, an additional assessment of WCP101, a Narrow-leaved Red Ironbark, was undertaken by UTM who determined the age range of tree as 200 - <250 and the scar wound to be between 100 - <150 years old with origin ambiguous, however, possibly to be Aboriginal.

Proposal for salvage of WCP101 was discussed with the Aboriginal representatives on site during the current assessment (Figure 33).

WCP101 stump and log was nominated for 3D scanning.

WCP101 stump and log was not nominated for salvage.



Figure 33 WCP101

WCP169

GDA 774251.6417913

An assessment of WCP169 was undertaken by NOHC (2005) who determined the two scars to be of indeterminate origin. In 2013, an additional assessment of WCP169, a White Box, was undertaken by UTM who determined the age range of tree as 100 - <150 and the two scar wounds to be caused by longicorn borers and fungus.

Proposal for salvage of WCP169 was discussed with the Aboriginal representatives on site during the current assessment (Figure 34).

All present agreed with UTM assessment of WCP169.

No 3D scanning or salvage required for WCP169.

New location data was recorded for Modified Tree WCP169 during current survey from GDA 774248.6417967 to GDA 774251.6417913.



Figure 34 WCP169

WCP196

GDA 774085.6418319

An assessment of WCP196 was undertaken by NOHC (2005) who determined the scar may be Aboriginal or European in origin. I

In 2013, an additional assessment of WCP196, a Yellow Box approximately aged between 200 - <250 years old, was undertaken by UTM who determined the age of scar between 50 - <75 years old and likely to be of Aboriginal origin.

Proposal for salvage of WCP196 was discussed with the Aboriginal representatives on site during the current assessment (Figure 35).

WCP196 was nominated for 3D scanning.

WCP196 is in poor condition and apprehension over scar preservation during the removal process was raised. The proposed salvage of WCP196 will be decided onsite at imaging stage following consultation with tree removalist and Aboriginal representatives.



Figure 35 WCP196 axe marks (right)

WCP197

GDA 774087.6418334

An assessment of WCP197 was undertaken by NOHC (2005) who determined scars may be Aboriginal or European in origin, with upper part of one scar obscured and a straight row of axe marks present at lower end of scar.

In 2013, an additional assessment of WCP197, a White Box approximately between 300 -<350 years old, was undertaken by UTM who determined the origin of both scar wounds were likely to be Aboriginal. Both scars were determined to be between 100 - <150 years old.

Proposal for salvage of WCP197 was discussed with the Aboriginal representatives on site during the current assessment (Figure 36).

WCP197 was nominated for 3D scanning.

WCP197 was not included in salvage program.



Figure 36 WCP197 scar 1 and 2

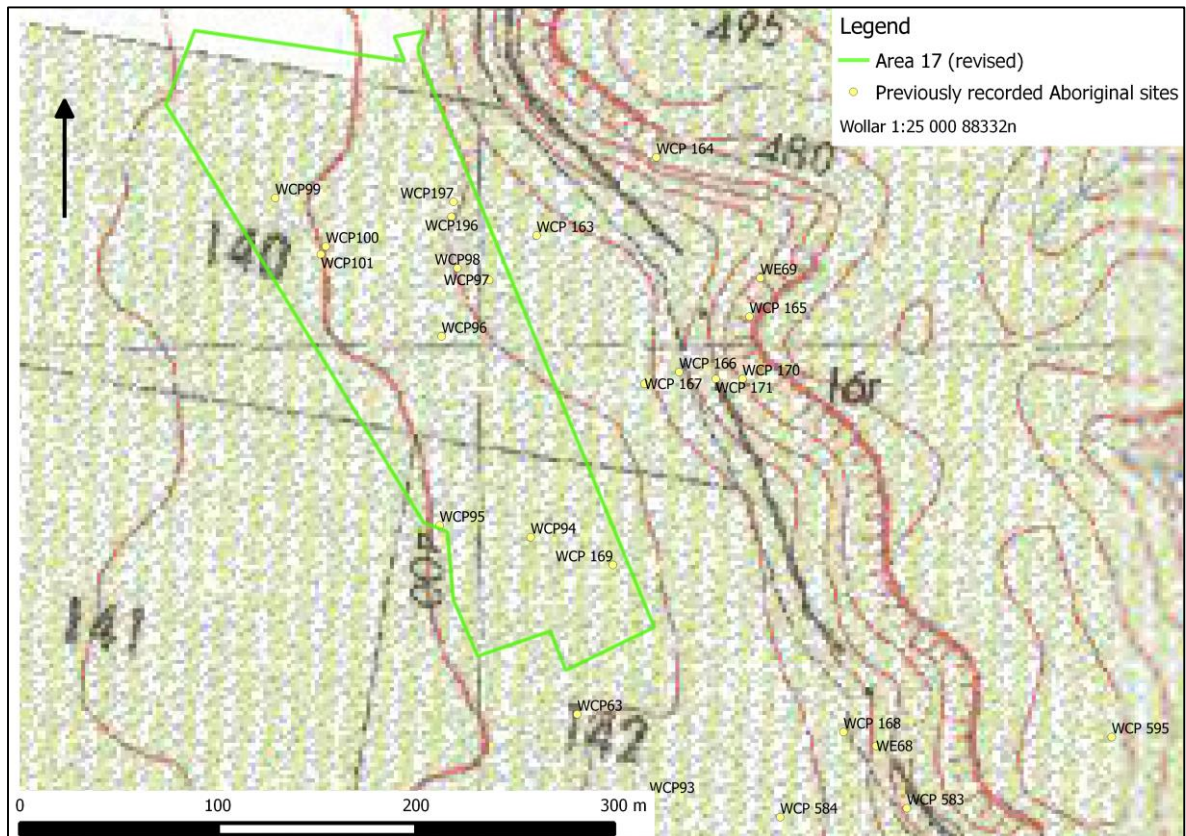


Figure 37 Location of previously recorded sites (scarred trees) – Area 17 (revised)
(Base map Wollar 1:25 000 8833-2-N)



Table 1 Lithic item descriptions

Site ID	Site Area	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness	Platform width	Platform thickness
WCP618	Area 2	Surface	Hammer	265.88	Quartz, vein	Broken						83.6	69.12	39.21		
	Area 3	Surface	Non-artefactual	951.7	Sandstone											
WCP618	Area 2	Surface	Unretouched flake	3.37	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	22.4	17.4	6.81	6.16	2.77
WCP616	Area 2	Surface	Unretouched flake	1.58	Silcrete							12.07	19.88	5.14		
WCP622	Optic Fibre Line	Surface	Unretouched flake	6.16	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Same	14.67	18.75	10.89		
WCP617	Area 2	Surface	Unretouched flake	1.01	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	50	Same	13.93	12.12	3.42		
WCP619	Area 3	Surface	Core	15.79	Silcrete	Complete						31.21	17.62	24.95		
WCP620	Area 3	Surface	Unretouched flake	0.72	Quartz, vein	Distal fragment	None	None	Feather	0	Indeterminate	10.27	10.99	3.14		
WCP618	Area 2	Surface	Unretouched flake	7.31	Chert	Complete	Hertzian	Multiple	Feather	0	Same	27.75	23.77	6.96	14.85	6.62
WCP623	Area 17	Surface	Unretouched flake	15.82	Quartz, vein	Complete	Wedging	Single	Feather	0	Same	18.52	29.45	15.14	36.33	16.5
WCP623	Area 17	Surface	Unretouched flake	4.35	Quartz, vein	Margin missing	Hertzian	Shattered	Feather	0	Same	17.03	12.68	8.62		
WCP623	Area 17	Surface	Unretouched flake	3.31	Quartz, vein	Complete	Wedging	Multiple	Feather	0	Same and opposite	22.04	13.23	9.36		
WCP623	Area 17	Surface	Unretouched flake	1.26	Quartz, vein	Complete	Hertzian	Shattered	Feather	0	Oblique	19.55	12.3	3.94		

Continued over.



Site ID	Site Area	Comment
WCP618	Area 2	Split quartzite cobble with one area of heavily pecked hammer damage. Appears likely to have been a knapping tool, therefore unlikely to have residue of organic materials.
	Area 3	Tabular sandstone block with parallel grooves and ridges on one broad face. No signs of striations or polishing in the grooves, and the regular spacing makes it likely these are natural geological formations.
WCP618	Area 2	
WCP616	Area 2	
WCP622	Optic Fibre Line	
WCP617	Area 2	Artefact 2-5
WCP619	Area 3	Artefact 3-1. Single-scar core made on a split rounded pebble.
WCP620	Area 3	Artefact 3-2
WCP618	Area 2	Artefact 2-3
WCP623	Area 17	Artefact 17-3
WCP623	Area 17	Artefact 17-1
WCP623	Area 17	Artefact 17-2
WCP623	Area 17	



Aboriginal Consultation

Wilpinjong Coal Mine (WCM) and Peabody Energy conduct an ongoing consultation program with Aboriginal stakeholders with regard to cultural heritage management within the Wilpinjong mining lease (ML 1573). There are currently eight organisations or individuals registered as Aboriginal stakeholders (also known as 'registered Aboriginal parties' or RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH). Navin Officer Heritage Consultants contacted each stakeholder to invite a representative of each group to be involved in the site visits for this assessment. This was done via email on 18 March 2016. Four stakeholders responded to the invitation and their representatives attended the fieldwork. The

Field Participation

The following representatives from four registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over two days, 5 and 6 April 2016:

- Coral Williams Warrabinga Native Title Claimants Aboriginal Group;
- Shaen Morgan North East Wiradjuri Company Ltd;
- Debie Foley and Larry Foley Mudgee Local Aboriginal Land Council; and
- Larry Foley and Shannon Foley Murrong Gillinga.

NOHC Fieldwork Personnel

Archaeologists Nicola Hayes and Jo Dibden undertook the survey and artefact collection.

Dr Oliver Macgregor undertook the artefact description.

Conclusions and Recommendations

Eight new Aboriginal sites, WCP616 to WCP623, have been recorded within the Wilpinjong project boundary as a result of this assessment. AHIMS site cards are attached for these sites.

Areas 2, 3 (part), 6, 14, Stem Pad Access and Optic Fibre Route (part) are cleared for impact, all heritage actions have been completed.

Pit 5 Monitor Station is not cleared for impact until this site should be fenced for protection during the installation of the monitor station.

Five scarred trees (WCP94, WCP95, WCP97, WCP98 and WCP99) have been selected for physical salvage.

Two scarred trees (WCP96 and WCP196) were selected for 3D scanning with an additional possibility of selection for physical salvage subject to onsite review with tree removalist.

Two trees (WCP101 and WCP197) selected for 3D scanning only.

Two trees (WCP100 and WCP169) were dismissed as unlikely to be culturally modified trees.

Area 17 (revised) will be cleared for impact following all recommended heritage actions have been completed.



Recommendations:

1. Newly recorded Aboriginal sites WCP616 to WCP623 should be entered on the Wilpinjong sites database.
2. Monitor station should not be installed near site Site WCP621.
3. Area17 (revised) heritage actions required to be completed prior to impact clearance are detailed in the following table.

Action	Scarred Tree Involved
Visual fence placed around scarred trees	WCP94, 95, 96, 97, 98, 99, 100, 101, 169, 196 and 197.
3D image taken of scarred section of tree	WCP94, 95, 96, 97, 98, 99, 101, 196 and 197.
Attempted salvage of scarred tree as outlined on page 23 of this Report	WCP94, 95, 96*, 97, 98, 99, 101, 196* and 197.

*Further discussion required with Community Representatives to resolve whether scarred trees are too damaged/fragile to attempt salvage.

4. Following discussion with the Aboriginal representatives in the field it was requested that a wildlife handler be present with the aim of recovering displaced wildlife during any scarred tree removal actions undertaken in Area 17 (revised).
5. The current recorded locations for Modified Trees WCP96, WCP 97 and WCP169 should be updated on relevant databases. New GDA recordings for these sites are:

WCP96 - **774078.6418186**

WCP97 - **774118.6418236**

WCP169 – **774251.6417913**



References

- Apex Archaeology 2014 *Wilpinjong Pit 7 SOW – Mining Lease 1573. Excavation Report*. Unpublished report prepared for Wilpinjong Coal Pty Ltd and Mid Western Regional Council.
- Kayandel Archaeological Services 2006, Wilpinjong Coal Project Aboriginal Cultural Heritage Survey: Supplemental Survey of Escarpment Areas and Report of Findings. Report prepared for Wilpinjong Coal Pty Ltd.
- Navin Officer Heritage Consultants 2005, Wilpinjong Coal Project Appendix F: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- Navin Officer Heritage Consultants 2016, Wilpinjong Coal Project: Aboriginal Cultural Heritage Clearance Works, Area 1 and Optical Fibre Route. Report prepared for Wilpinjong Coal Pty Ltd.
- South East Archaeology 2013, Wilpinjong Coal Mine, Central Tablelands of New South Wales - Modification: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- South East Archaeology 2015 Wilpinjong Coal Mine, Central Tablelands Of New South Wales – Extension Project: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- Wilpinjong Coal Pty Ltd (WCPL) 2006, Wilpinjong Coal Project Environmental Impact Statement.



ATTACHMENT 1

SCARRED TREE SALVAGE METHODOLOGY



When salvage of probable Aboriginal scar trees is undertaken in accordance with the Aboriginal Cultural Heritage Management Plan, the following methodology would be implemented. In addition to the below, Wilpinjong Coal Pty Limited would provide the Native Title Party with the opportunity to conduct a smoking ceremony for any live probable or possible Aboriginal scar trees salvaged in accordance with the below methodology.

Note that actions in *italics* in the following tables may require a person with specialist experience, such as in dendrochronology, or the archaeological interpretation of scarred trees.

Actions **bolded** are additional actions arising from discussions on 28 May 2015

Salvage Methodology - Probable Scar Trees

(If salvage is adopted as a management option, this methodology could also be implemented for possible Aboriginal scar trees that are in good condition).

- A1. Conduct an assessment of the condition and fragility of the tree. If it is unlikely that the scarred section of trunk can be recovered/salvaged without significant break-up, then consult with Aboriginal stakeholder group(s) as to whether an attempt to salvage the scarred trunk should be continued and whether the recovery and storage of fragments is required.
- A2. In the event that a successful salvage of the scarred section of tree is not considered possible, then conduct salvage step A10 prior to destruction of the tree.
- A3. If it is considered possible to salvage the scarred section of tree without significant break-up, then: Identify section of trunk containing both the remaining exposed scar surface and the healed-over regrowth (refer to the site card for an estimate of the original length of the scar or scars)

Additional Step 1 A 3D scan will be completed of each scar, to record the scar prior to the removal of the tree. This information will be provided to the Aboriginal groups and documented in an archival report

- A5. **Remove crown, conserving as much of the trunk above the top of the scar as is feasible (and making sure that at least 200 mm of trunk remains between the cut and the upper most point of the original scar, ie including the regrowth)**

Additional Step 2 Excavation will occur around the base of the tree, this is to loosen any roots to allow step A4 to be undertaken with less chance of damaging the tree. Excavation will occur preferably on the downslope face of the tree

- A4. Push tree over, taking all reasonable steps to protect the side of the tree with the scar from unnecessarily impact. **The tree around the scar will be braced using appropriate methods such as wooden braces and strapping. Additionally it is preferable to push the tree up-slope and onto a constructed batter/mound to reduce the distance the tree falls to the ground.** If it is unsafe, or for some other reason, it is not feasible to push the tree over, the tree could be felled using a chain saw. Where feasible and safe to do so, the trunk should be cut so that the original scarred section of the trunk remains in one piece (including regrowth).
- A6. Ensure regrowth around scar is retained (regrowth can often be identified by its raised character, hollow sound when tapped, and different surface pattern on bark)
- A7. Remove roots and stump/lower trunk portion, making sure that at least 200 mm of trunk remains between the cut and the lower most point of the original scar (ie including regrowth)



- A8. Relocate to storage area, providing surface protection to scar area (such as by wrapping a geotextile or other such covering around trunk) where there is an assessed risk of accidental scraping, percussion or gauging impact to the scar area
- A9. Store under cover, and off the ground, with site number clearly and permanently identified on trunk (do not place identification on scar or regrowth areas)
- A10. *If agreed by Aboriginal stakeholder group(s), collect two 5mm diameter core samples (providing record of tree rings), one through regrowth into heartwood (if still extant), and one through full trunk radius outside of the scar area. This type of sample is removed using an 'increment borer' and the samples will allow an approximate date to be calculated for the scar*
- A11. *In consultation with the Aboriginal stakeholder group(s), consideration to be given to partially or fully removing the regrowth on selected scarred tree examples to determine the shape of the original scar, the original method of bark removal, and to record the pattern of original axe/hatchet marks.*
- A12. Curate or replace back onto rehabilitated mine landscape, according to the requirements of the Aboriginal stakeholder group(s). The results of the analysis of the age, pattern of axe marks and original shape of the scars should be considered by Aboriginal stakeholders when deciding if the scars are of Aboriginal origin and require any further



Wilpinjong Coal Mine

Aboriginal Cultural Heritage Clearance Works

Area 21

Navin Officer Heritage Consultants Pty Ltd

June 2016

Background

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 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).

The ACHMP includes an Ancillary Disturbance Area Protocol which includes:

1. Pre-clearance archaeological survey (conducted with the assistance of Aboriginal representatives). This survey would include consideration of the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage.
2. Avoidance of the identified Aboriginal object/sites by realigning or adjusting infrastructure/disturbance area if practicable.

If the object/site cannot be avoided:

1. Consider surface salvage (advice from Aboriginal representatives and/or an archaeologist will be sought).
2. If relevant, consider the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage (subject to review of the ACHMP and consultation with Aboriginal representatives and/or an archaeologist).
3. Conduct surface salvage (and subsurface salvage if necessary) with the assistance of Aboriginal representatives and an archaeologist.
4. Store salvaged artefacts in the "Keeping Place".
5. Post-rehabilitation, replace artefacts onto the rehabilitated landform.

Surface Salvage

The ACHMP specifies that surface salvage will involve the systematic recovery of all evident surface artefacts from a representative sample of open artefact scatters and from selected isolated



finds at known sites within the project disturbance area. Surface collections will occur on a progressive basis prior to the commencement of ground surface disturbance works within an area.

A basic level of recording will be conducted on all recovered artefactual surface material including location, technological traits, and stone type. This analysis will be conducted by a qualified lithic specialist.

This Report

This report presents the results of a pre-clearance archaeological survey and surface salvage of Area 21 (Figure 1). Area 21 is situated within the boundaries of the approved project area (05-0021) and are thus subject to the ACHMP.

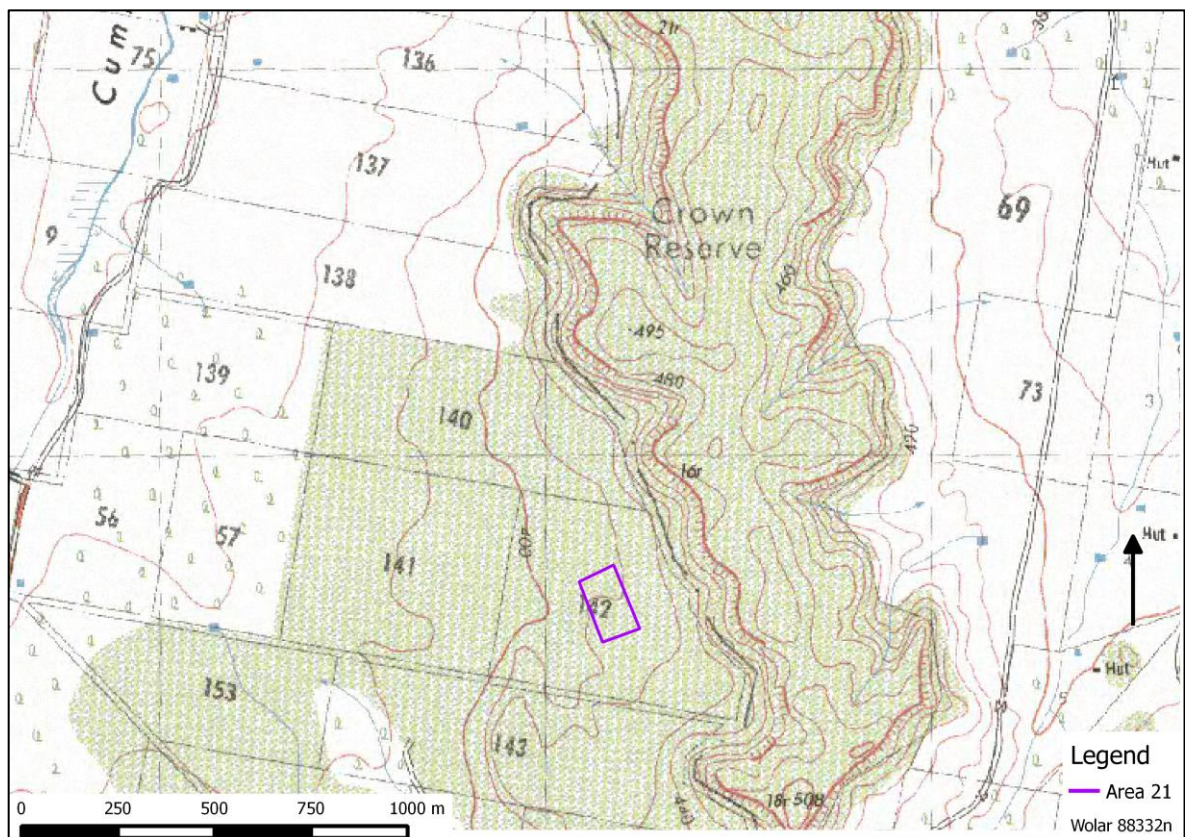


Figure 1 Location of Area 21
(Base map Wollar 1:25 000 8833-2-N.)



Area 21

Area 21 is shown outlined in purple in Figure 2 and was surveyed as part of this clearance work program on 12 May 2016.

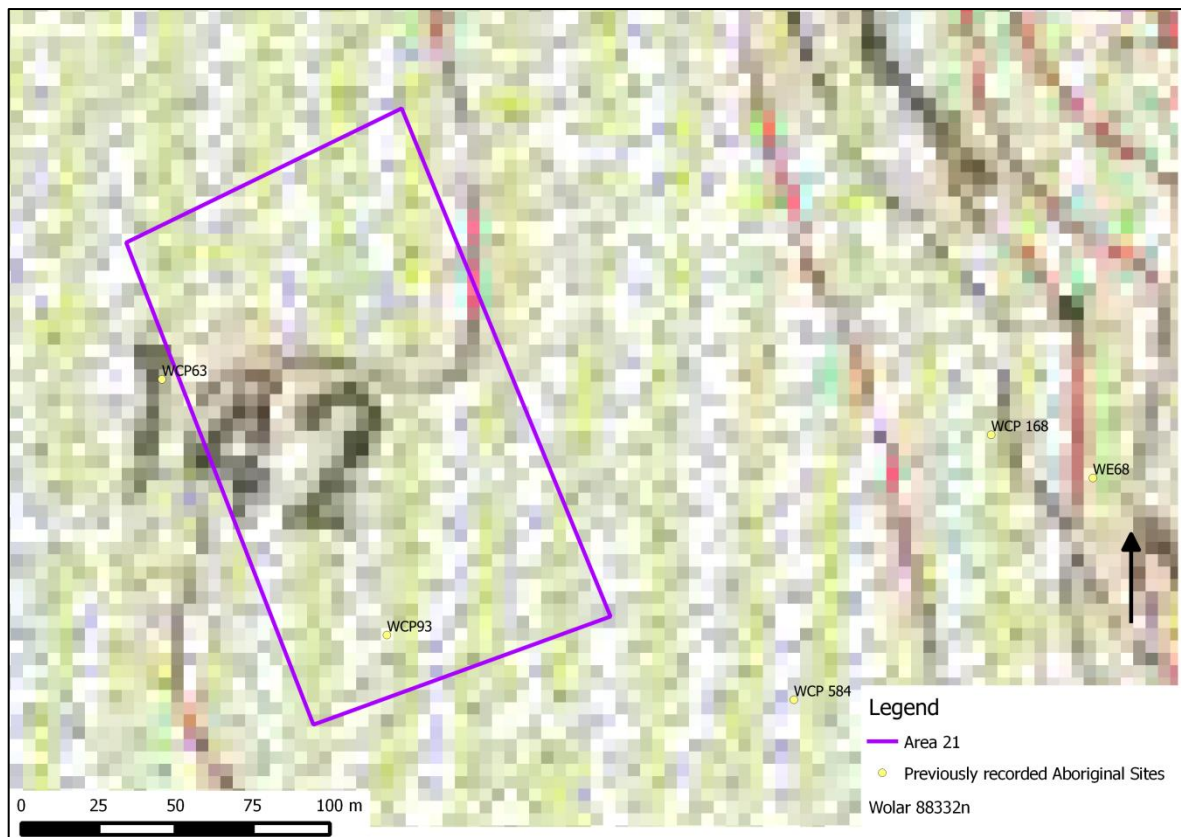


Figure 2 Area 21 (Base Map Wollar 1:25 000 8833-2-N)

Previous Recording

One previously lodged site recording occurs in Area 21. This is:

WCP93 – scarred tree (Navin Officer Heritage Consultants 2005). This site is listed in the ACHMP.

Clearance Survey Results

Seven artefacts were collected from five previously unrecorded locations and constitute five new recordings WCP625, WCP626, WCP627, WCP628 and WCP629 (see Table 1).

WCP93 was revisited as part of this assessment.

WCP93 was elected not to be included in the salvage program.



WCP625

GDA 774214.6417841

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figures 3 and 9). The site was located on the crest of a small rise adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance and sheet erosion. The disturbance incidence was 60% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 1).



Figure 3 WCP625 general location

WCP626

GDA 774279.6417835

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figures 4 and 9). The site was located on the edge of an eroded drainage line adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance and sheet erosion. The disturbance incidence was 80% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.



Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 1).



Figure 4 WCP626 general location

WCP627

GDA 774237.6417797

This site consists of one lithic item situated within an area of approximately 5 x 5 m. (Figures 5 and 9). The site was located on the crest of a small rise adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance, timber milling activities and sheet erosion. The disturbance incidence was 80% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Two confirmed artefacts were collected from this site (see Table 1).



Figure 5 WCP627 general location

WCP628

GDA 774261.6417752

This site consists of two lithic items situated on the crest of a small rise within an area of approximately 5 x 5 m. (Figures 6 and 9). The site was located on a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance, vehicle track and sheet erosion. The disturbance incidence was 80% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Two confirmed artefacts were collected from this site (see Table 1).



Figure 6 General site location of WCP628

WCP629

GDA 774327.6417708

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 7 and 9). The site was located on a lower slope of a low broad spur adjacent to current mining operations.

Ground surface disturbance consisted of vegetation clearance and sheet erosion. The disturbance incidence was 80% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One confirmed artefact was collected from this site (see Table 1).



Figure 7 WCP627 general location

WCP93

GDA 774293.6417725

An assessment of WCP93 was undertaken by NOHC (2005) who determined scar may be Aboriginal in origin.

New location data was recorded for Modified Tree WCP93 during current survey from GDA 774285.6417733 to GDA 774293.6417725

Proposal for salvage of WCP93 was discussed with the Aboriginal representatives on site during the current assessment (Figures 8 and 9).

WCP93 was not included in salvage program



Figure 8 WCP93

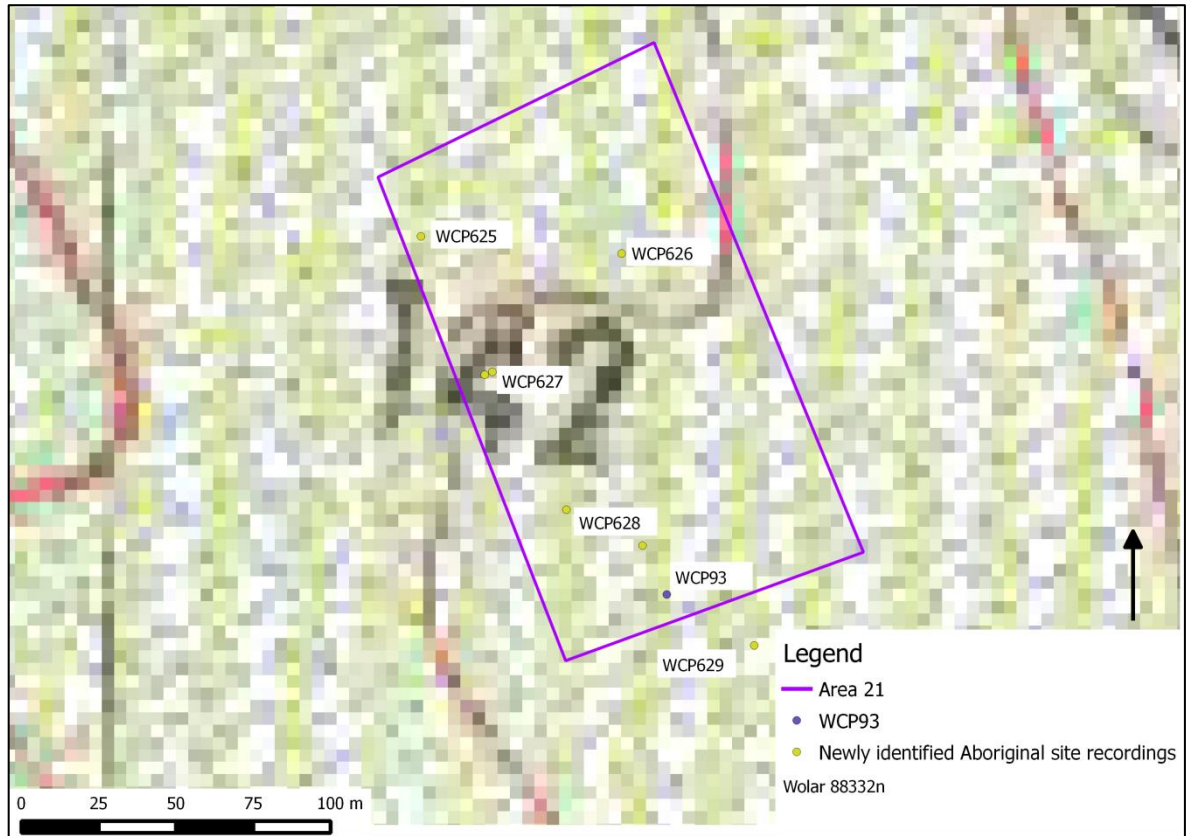


Figure 9 Locations of collected artefacts – Area 21
(Base Map Wollar 1:25 000 8833-2-N)



Table 1 Lithic item descriptions

Site ID	Site Area	Unit	Type	Weight	Material	Completeness	Initiation type	Platform type	Termination type	Cortex proportion	Dorsal scar direction	Length	Width	Thickness
WCP625	Area 21	Surface	Flaked piece	13.59	Quartz, vein	Complete						31.92	23.36	11.26
WCP626	Area 21	Surface	Unretouched flake	0.63	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	9.85	8.82	4.63
WCP627	Area 21	Surface	Unretouched flake	10.11	Quartz, vein	Complete	Hertzian	Single	Feather	70	Same	25.68	20.17	15.01
	Area 21	Surface	Core	122.17	Silcrete	Complete				10		48.9	72.26	25.04
WCP628	Area 21	Surface	Unretouched flake	25.46	Quartz, vein	Margin missing	Hertzian	Single	Step	30	Same	22.18	24.94	18.54
	Area 21	Surface	Core	25.29	Quartz, vein	Broken					70		23.31	25.92
WCP629	Area 21	Surface	Unretouched flake	4.53	Quartz, vein	Complete	Hertzian	Single	Feather	0	Same	19.56	19.84	7.85

Table 1 continued next page



Table 1 Lithic item descriptions continued

Site ID	Site Area	Platform width	Platform thickness	Crazing	Crenated Fracture	Potlidding	Exfoliation	Comments
WCP625	Area 21			Absent	Absent	Absent	Absent	Multiple complete negative scars, originating from two platforms, and one ambiguous surface that could be a truncated ventral face.
WCP626	Area 21	6.26	1.9	Absent	Absent	Absent	Absent	
WCP627	Area 21	13.26	8.09	Absent	Absent	Absent	Absent	Heavily rotated core, with scars originating from 5 separate platforms.
	Area 21			Absent	Absent	Absent	Absent	
WCP628	Area 21			Absent	Absent	Absent	Absent	Single platform core, with two intact negative scars. Core truncated by longitudinal break.
	Area 21	31.74		Absent	Absent	Absent	Absent	
WCP629	Area 21	15.21	4.05	Absent	Absent	Absent	Absent	



Aboriginal Consultation

Wilpinjong Coal Mine (WCM) and Peabody Energy conduct an ongoing consultation program with Aboriginal stakeholders with regard to cultural heritage management within the Wilpinjong mining lease (ML 1573). There are currently eight organisations or individuals registered as Aboriginal stakeholders (also known as 'registered Aboriginal parties' or RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH). Navin Officer Heritage Consultants contacted each stakeholder to invite a representative of each group to be involved in the site visits for this assessment. This was done via email on 2 May 2016. Three stakeholders responded to the invitation and their representatives attended the fieldwork.

Field Participation

The following representatives from three registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over one day, 12 May 2016:

- Shaen Morgan North East Wiradjuri Company Ltd;
- Debbie Foley Mudgee Local Aboriginal Land Council; and
- Larry Foley Murrong Gillinga.

NOHC Fieldwork Personnel

Archaeologists Nicola Hayes and Jo Dibden undertook the survey and artefact collection.

Dr Oliver Macgregor undertook the artefact description.

Conclusions and Recommendations

Five new Aboriginal sites, WCP625 to WCP629 have been recorded within the Wilpinjong project boundary as a result of this assessment. AHIMS site cards are attached for these sites.

WCP93 was revisited as part of this assessment.

WCP93 was elected not to be included in the salvage program.

Area 21 will be cleared for impact following all recommended heritage actions have been completed.

Recommendations:

1. Newly recorded Aboriginal sites WCP625 to WCP629 should be entered on the Wilpinjong sites database.
2. No further action is required for Modified Tree WCP93.
3. The current recorded location for Modified Tree WCP93 should be updated on relevant databases. New GDA recording for this site is:

WCP93 - **774293.6417725**



References

Navin Officer Heritage Consultants 2005, Wilpinjong Coal Project Appendix F: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.

Wilpinjong Coal Pty Ltd (WCPL) 2006, Wilpinjong Coal Project Environmental Impact Statement.



Wilpinjong Coal Mine

Aboriginal Cultural Heritage Clearance Works

Areas 5 and 11

Navin Officer Heritage Consultants Pty Ltd

February 2016

Background

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 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).

The ACHMP includes an Ancillary Disturbance Area Protocol which includes:

1. Pre-clearance archaeological survey (conducted with the assistance of Aboriginal representatives). This survey would include consideration of the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage.
2. Avoidance of the identified Aboriginal object/sites by realigning or adjusting infrastructure/disturbance area if practicable.

If the object/site cannot be avoided:

1. Consider surface salvage (advice from Aboriginal representatives and/or an archaeologist will be sought).
2. If relevant, consider the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage (subject to review of the ACHMP and consultation with Aboriginal representatives and/or an archaeologist).
3. Conduct surface salvage (and subsurface salvage if necessary) with the assistance of Aboriginal representatives and an archaeologist.
4. Store salvaged artefacts in the "Keeping Place".
5. Post-rehabilitation, replace artefacts onto the rehabilitated landform.

Surface Salvage

The ACHMP specifies that surface salvage will involve the systematic recovery of all evident surface artefacts from a representative sample of open artefact scatters and from selected isolated finds at known sites within the project disturbance area. Surface collections will occur on a progressive basis prior to the commencement of ground surface disturbance works within an area.



A basic level of recording will be conducted on all recovered artefactual surface material including location, technological traits, and stone type. This analysis will be conducted by a qualified lithic specialist.

This Report

This report presents the results of a pre-clearance archaeological survey and surface salvage of Areas 5 and 11 (Figure 1). Both areas are situated within the boundaries of the approved project area (05-0021) and are thus subject to the ACHMP.



Figure 1 Location of Areas 5 and 11
(supplied by Wilpinjong Coal Pty Ltd.)



Area 5

Area 5 is shown hatched in pink in Figure 2 and was surveyed as part of this clearance work program on 3 February 2016.



Figure 2 Area 5 (map supplied by Wilpinjong Coal Pty Ltd)

Previous Recordings

Six previously lodged site recordings occur in Area 5. These are:

WCP485 – artefact scatter (South East Archaeology 2015) this site is not listed in the ACHMP

WCP488 – artefact scatter (South East Archaeology 2015) this site is not listed in the ACHMP

WCP439 – isolated artefact (South East Archaeology 2013) and categorised for site salvage in the ACHMP

WCP440 – isolated artefact (South East Archaeology 2013) and categorised for 'site salvage' in the ACHMP

WE53 – rock shelter (Kyandel 2006) and categorised as 'no management recommendations given' in the ACHMP

WE54 – rock shelter (Kyandel 2006) and categorised as 'no management recommendations given' in the ACHMP



Clearance Survey Results

No artefacts were detected or collected at locations WCP440 and WCP488.

Twenty lithic items including 13 artefacts were collected from WCP485 and seven artefact from WCP439 (see Table 1).

No rock shelters were detected in Area 5. The current recorded locations of rock shelters WE53 and WE54 are therefore concluded to be incorrect. A previously unrecorded rock shelter location was noted outside of Area 5 (GPS reference 767579.6417848) and it is possible that this is the actual location for WE53 or WE54.

Fourteen lithic items including 7 artefacts were collected from three previously unrecorded locations. Of these two locations contained confirmed artefacts and constitute new recordings WCP605, and WCP606.

Collection location 1

GDA 767187.6418535

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figures 3 and 5). The site was located in a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 40% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One lithic item was collected from this site (see Table 1). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 3 Collection location 1 looking north



WCP605

GDA 767211.6418486

This site consists of two lithic items including one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 4 and 5). The area is located on a disused vehicle track. The site was located in a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of vehicle tracks and sheet erosion. All artefacts were located on the track. The disturbance incidence was 80% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Two lithic items including one confirmed artefact were collected from this site (see Table 1).

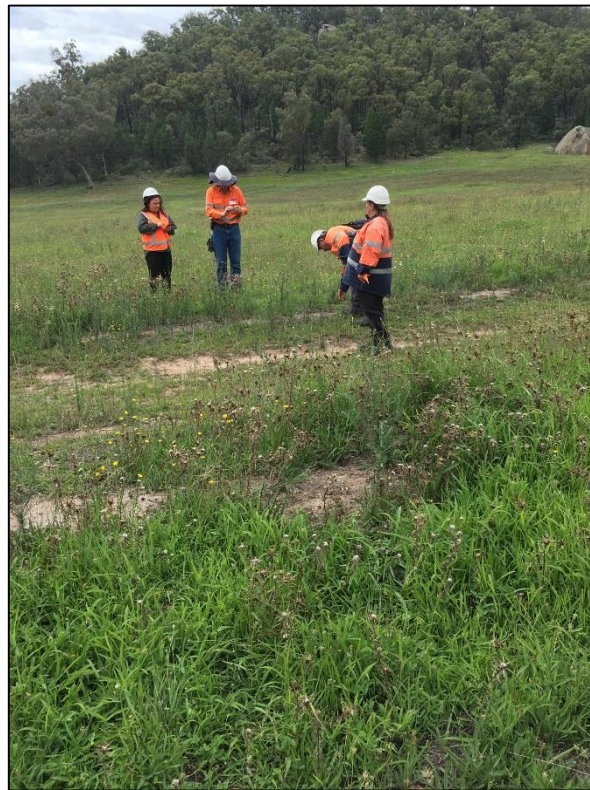


Figure 4 WCP605 looking south east

WCP606

GDA 767251.6418525

This site consists of eleven lithic items including six confirmed artefacts situated within an area of approximately 1 x 1 m. (Figure 5). The area is located on a drainage line. The site was located in a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of sheet erosion. All artefacts were located on the edge of the drainage line. The disturbance incidence was 60% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.



Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Twelve lithic items including six confirmed artefacts were collected from this site (see Table 1).

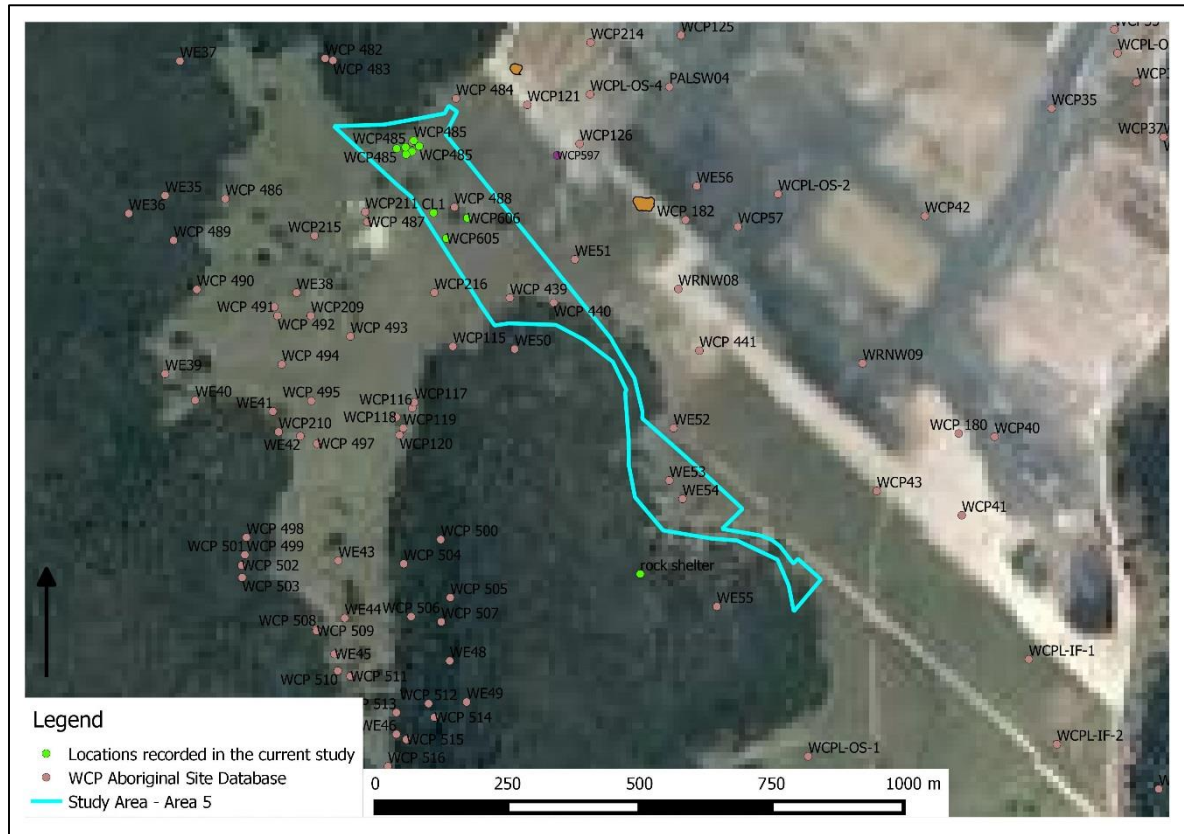


Figure 5 Location of collected artefacts – Area 5
(Base map Google Earth pro)



Table 1 Lithic item descriptions Area 5

Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP439	9.59	Unretouched flake	Quartz, vein	LCS right	Hertzian	Single	Feather	Tertiary	0	19.49	22.64	6.12	22.06				
WCP439	2.46	Unretouched flake	Quartz, vein	Distal fragment	None	None	Feather	Tertiary	0	20.18	12.96	5.99					
WCP439	17.32	Hammer	Quartzite	Broken					60	27.46	28.19	14.28					
WCP439	22.67	Core	Chert	Complete	Complete				0	22.41	47.81	19.49					
WCP439	8.44	Retouched flake	Chert	Complete	Hertzian	Single	Feather	Tertiary	0	27.62	25.65	10.77	9.61	1.14	23.21	25.74	22.86
WCP439	1.09	Unretouched flake	Chert	Complete	Hertzian	Multiple	Feather	Tertiary	0	14.42	14.76	2.83	11.97	2.51	15.29	15.81	2.53
WCP439	11.57	Unretouched flake	Chert	Complete	Bending	Multiple	Feather	Tertiary	0	23.98	33.02	9.22	28.27	13.79	30.87	33.58	9.05
WCP485	3.65	Unretouched flake	Quartz, vein	Distal fragment	None	None	Feather	Tertiary	0	11.95	24.89	7.31					
WCP485	2.44	Unretouched flake	Quartz, vein	Complete	Hertzian	Single	Feather	Tertiary	0	19.26	15.18	4.64	7.67	1.37	11.82	18.57	13.16
WCP485	9.47	Core	Quartz, vein	Complete	None	None	None	Tertiary	0	16.89	28.64	19.63					
WCP485	0.89	Non-artefactual	Quartz, vein														
WCP485	0.12	Non-artefactual	Quartz, vein														
WCP485	1.61	Unretouched flake	Quartz, vein	Medial fragment	None	None	None	Tertiary	0	13.55	15.16	4.36					
WCP485	1.26	Non-artefactual	Quartz, vein														
WCP485	11.2	Non-artefactual	Quartz, vein														
WCP485	3.37	Unretouched flake	Quartz, vein	Complete	Hertzian	Single	Step	Tertiary	0	17.41	23.08	5.67	8.26	0.88	16.43	23.21	8.55
WCP485	0.74	Unretouched flake	Quartz, vein	Marginal fragment	None	None	None	Tertiary	0	22.91	9.45	2.36					
WCP485	0.9	Unretouched flake	Quartz, vein	Complete	Bending	Single	Feather	Tertiary	0	15.89	10.8	3.78	12.97	5.27	11.93	12.89	0
WCP485	0.24	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	Tertiary	0	11.21	6.6	1.89					
WCP485	1.08	Unretouched flake	Silcrete	Proximal fragment	Bending	Single	None	Tertiary	0	17.74	18.31	2.27	7.56	1.99			



Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP485	2.54	Unretouched flake	Quartz, vein	Complete	Hertzian	Multiple	Feather	Tertiary	0	24.6	14.79	4.11	13.13	6.1	16.07	17.24	17.46
WCP485	9.19	Non-artefactual	Quartz, vein														
WCP485	1.81	Unretouched flake	Quartz, vein	Complete	Hertzian	Multiple	Feather	Tertiary	0	14.16	9.2	6.64	11.01	8.01	10.89	11.33	1.45
WCP485	2.36	Unretouched flake	Quartz, vein	Medial fragment	None	None	None	Tertiary	0	12.43	16.31	8.22					
WCP485	0.84	Non-artefactual	Quartz, vein														
WCP485	1.09	Non-artefactual	Quartz, vein														
WCP485	1.64	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Multiple	None	Tertiary	0	8.77	14.84	6.3	14.35	6.24			
WCP605	4.1	Unretouched flake	Quartz, vein	Complete	Hertzian	Shattered	Feather	Tertiary	0	14.33	19.97	9.75					
WCP605	3.28	Non-artefactual	Quartz, vein														
CL 1	15.21	Non-artefactual	Quartz, vein														
WCP606	14.39	Non-artefactual	Quartz, vein														
WCP606	5.72	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Multiple	None	Tertiary	0	16.68	16.65	9.39	18.99	8.73			
WCP606	6.93	Non-artefactual	Quartz, vein														
WCP606	1.8	Non-artefactual	Quartz, vein														
WCP606	2.8	Non-artefactual	Quartz, vein														
WCP606	0.59	Unretouched flake	Quartz, crystal	Complete	Hertzian	Single	Feather	Tertiary	0	9.41	9.93	3.42	5.77	3.22	8.78	14.11	8.41
WCP606	1.16	Non-artefactual	Quartz, vein														
WCP606	0.31	Non-artefactual	Quartz, vein														
WCP606	0.54	Unretouched flake	Quartz, vein	Complete	Hertzian	Single	Feather	Patch right	20	10.98	9.18	2.62	11.91	3.52			
WCP606	0.32	Unretouched flake	Quartz, vein	Distal fragment	None	None	Feather	Tertiary	0	8.04	7.98	3.38					
WCP606	0.32	Unretouched flake	Quartz, vein	LCS right	Hertzian	Single	Feather	Tertiary	0	10.4	6.1	2.36	8.67	2.8			



Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP606	0.51	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	Tertiary	0	11.96	9.09	3.35	5.93				



Area 11

Area 11 is shown hatched in yellow in Figure 6 and was surveyed as part of this clearance work program on 2 February 2016.



Figure 6 Area 11 (map supplied by Wilpinjong Coal Pty Ltd)

Previous Recordings

Six previously lodged site recordings occur in Area 11: These are:

WCP58 – Aboriginal cultural site. This site was assessed by South East Archaeology (2013) and categorised for 'unmitigated impact' in the ACHMP

WCP61 – Possible waterhole. This site was assessed by South East Archaeology (2013) and categorised for 'unmitigated impact' in the ACHMP

WCP70 – isolated artefact (NOHC 2005) and categorised for 'unmitigated impact' in the ACHMP

WCP71 – isolated artefact (NOHC2005) and categorised for 'unmitigated impact' in the ACHMP

WCP442 – isolated artefact (South East Archaeology 2013) and categorised for 'unmitigated impact' in the ACHMP

WCP443 – isolated artefact (South East Archaeology 2013) and categorised for 'unmitigated impact' in the ACHMP



Clearance Survey Results

No artefacts were detected or collected at location WCP71.

Twelve lithic items, including five artefacts were collected from WCP70, WCP442 and WCP443 (see Table 2). The lithic item collected from location WCP443 was assessed as non-artefactual, the item is therefore recorded as Collection Location 2 (CL2)

Locations WCP58 and WCP61 were not revisited as part of this assessment, the ACHMP specifies 'unmitigated impact' at these locations.

Ten lithic items including three artefacts were collected from five previously unrecorded site locations. Of these three locations contained confirmed artefacts and constitute new recordings WCP607, WCP608 and WCP609.

Collection Location 2

GDA 772165.6417751

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 10). The item was found close to the approximate area of lodged site recordings WCP 443 but not at the original site recording.

One lithic item was collected from this site (see Table 2). Analysis determined that these items were not artefactual and as a consequence no site name has been allocated.

Collection Location 3

GDA 771974.6417505

This site consists of six lithic items situated within an area of approximately 15 x 8 m. (Figure 7 and 10). None of the collected items have been confirmed as artefactual during individual analysis. The area is located on an erosion scald. The site was located on mid slopes above a valley floor.

Ground surface disturbance consisted of animal disturbance. The disturbance incidence was 80% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Six lithic items were collected from this site (see Table 2). Analysis determined that these items were not artefactual and as a consequence no site name has been allocated.



Figure 7 Collection location 3 looking north

Collection Location 4 (CL4)

GDA 772099.6417935

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 8 and 10). The collected item was not confirmed as artefactual during individual analysis. The area is located on an erosion scald. The site was located on mid slopes of a spur above a valley floor.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 70% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One lithic item was collected from this site (see Table 2). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 8 Collection location 4 looking west

WCP607

GDA 771974.6417505

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 10). The area is located on a wombat burrow. The site was located on a spur crest.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 90% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One artefact was collected from this site (see Table 2).

WCP608

GDA 771926.6417689

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 9 and 10). The area is located on an erosion scald. The site was located on a spur crest.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 90% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.



One artefact was collected from this site (see Table 2).



Figure 9 WCP608 looking south west

WCP609

GDA 772224.6418067

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 9 and 10). The area is located on a vehicle track. The site was located on a valley floor.

Ground surface disturbance consisted of vehicle track and sheet erosion. The disturbance incidence was 50% with 70% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One artefact was collected from this site (see Table 2).



Figure 10 Location of collected artefacts – Area 11
(Base map Google Earth pro)



Table 2 Lithic item descriptions Area 5

Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP442	21.38	Non-artefactual	Quartz, vein														
WCP442	0.12	Unretouched flake	Quartz, vein	Medial fragment	None	None	None	Tertiary	0	4.68	9.67	1.57					
WCP442	2	Unretouched flake	Quartz, vein	Medial fragment	None	None	None	Tertiary	0	14.57	16	5.9					
WCP442	1.21	Non-artefactual	Quartz, vein														
WCP442	5.8	Non-artefactual	Quartz, vein														
WCP442	1.42	Unretouched flake	Quartz, vein	Marginal fragment	Hertzian	None	None	Tertiary	0	24.16	9.21	2.25					
WCP442	0.95	Unretouched flake	Quartz, vein	Complete	Hertzian	Multiple	Step	Tertiary	0	16.35	8.81	3.79	9.27	2.74	9.62	9.74	4.95
WCP442	1.98	Non-artefactual	Quartz, vein														
CL2	0.67	Non-artefactual	Quartz, vein														
WCP607	17.06	Unretouched flake	Quartz, vein	Complete	Hertzian	Shattered	Feather	Primary	20	25.18	27.67	18.21					
CL3	96.95	Non-artefactual	Quartz, vein														
CL3	7.15	Non-artefactual	Quartz, vein														
CL3	24.24	Non-artefactual	Quartz, vein														
CL3	22.07	Non-artefactual	Quartz, vein														
CL3	10.25	Non-artefactual	Quartz, vein														
CL3	2.36	Non-artefactual	Quartz, vein														
WCP608	2.71	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	Tertiary	0	22.34	12.12	6.19					
CL4	27.31	Non-artefactual	Quartz, vein														
WCP609	1.01	Unretouched flake	Quartz, vein	Margin missing	Hertzian	Shattered	Feather	Primary	100	19.99	11.34	3.03					
WCP70	19.84	Non-artefactual	Quartz, vein														



Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP70	5.45	Unretouched flake	Quartz, vein	Complete	Hertzian	Shattered	Feather	Tertiary	0	29.9	24.42	5.83	12.11	3.28	19.26	24.86	16.6
WCP70	2.19	Non-artefactual	Quartzite														



Aboriginal Consultation

Wilpinjong Coal Mine (WCM) and Peabody Energy conduct an ongoing consultation program with Aboriginal stakeholders with regard to cultural heritage management within the Wilpinjong mining lease (ML 1573). There are currently eight organisations or individuals registered as Aboriginal stakeholders (also known as 'registered Aboriginal parties' or RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH). Navin Officer Heritage Consultants contacted each stakeholder to invite a representative of each group to be involved in the site visits for this assessment. This was done via email on 21 January. Four stakeholders responded to the invitation and their representatives attended the fieldwork. The stakeholders and their representatives are identified below.

In addition to the consultation program, WCM directly employ Tanietta de Launey as a Native Title Claimant Liaison Officer. Tanietta is involved in all Aboriginal heritage aspects of the WCM operation.

Field Participation

The following representatives from four registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over the 26 November 2015:

Coral Williams	Warrabinga Native Title Claimants Aboriginal Group;
Shaen Morgan	North East Wiradjuri Company Ltd;
Debie Foley	Mudgee Local Aboriginal Land Council; and
Larry Foley	Murrong Gillinga.

NOHC Fieldwork Personnel

Archaeologists Nicola Hayes and Jo Dibden undertook the survey and artefact collection.

Dr Oliver Macgregor undertook the artefact description.

Conclusions and Recommendations

Five new Aboriginal sites, WCP605 to WCP609, have been recorded within the Wilpinjong project boundary as a result of this assessment. AHIMS site cards are attached for these sites.

Areas 5 and 11 are cleared for impact, all heritage actions have been completed.

Recommendations:

1. Newly recorded Aboriginal sites WCP605 to WCP612 should be entered on the Wilpinjong sites database.
2. The current recorded locations for rock shelters WE53 and WE54 should be tagged on relevant databases as incorrect. Future fieldwork should seek to confirm if the rock shelter noted at location GPS reference 767579.6417848 conforms to either of these previous recordings.



References

- Kayandel Archaeological Services 2006, Wilpinjong Coal Project Aboriginal Cultural Heritage Survey: Supplemental Survey of Escarpment Areas and Report of Findings. Report prepared for Wilpinjong Coal Pty Ltd.
- Navin Officer Heritage Consultants 2005, Wilpinjong Coal Project Appendix F: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- South East Archaeology 2013, Wilpinjong Coal Mine, Central Tablelands of New South Wales - Modification: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- South East Archaeology 2015 Wilpinjong Coal Mine, Central Tablelands Of New South Wales – Extension Project: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- Wilpinjong Coal Pty Ltd (WCPL) 2006, Wilpinjong Coal Project Environmental Impact Statement.



Wilpinjong Coal Mine

Aboriginal Cultural Heritage Clearance Works

Areas 5 and 11

Navin Officer Heritage Consultants Pty Ltd

February 2016

Background

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 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).

The ACHMP includes an Ancillary Disturbance Area Protocol which includes:

1. Pre-clearance archaeological survey (conducted with the assistance of Aboriginal representatives). This survey would include consideration of the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage.
2. Avoidance of the identified Aboriginal object/sites by realigning or adjusting infrastructure/disturbance area if practicable.

If the object/site cannot be avoided:

1. Consider surface salvage (advice from Aboriginal representatives and/or an archaeologist will be sought).
2. If relevant, consider the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage (subject to review of the ACHMP and consultation with Aboriginal representatives and/or an archaeologist).
3. Conduct surface salvage (and subsurface salvage if necessary) with the assistance of Aboriginal representatives and an archaeologist.
4. Store salvaged artefacts in the "Keeping Place".
5. Post-rehabilitation, replace artefacts onto the rehabilitated landform.

Surface Salvage

The ACHMP specifies that surface salvage will involve the systematic recovery of all evident surface artefacts from a representative sample of open artefact scatters and from selected isolated finds at known sites within the project disturbance area. Surface collections will occur on a progressive basis prior to the commencement of ground surface disturbance works within an area.



A basic level of recording will be conducted on all recovered artefactual surface material including location, technological traits, and stone type. This analysis will be conducted by a qualified lithic specialist.

This Report

This report presents the results of a pre-clearance archaeological survey and surface salvage of Areas 5 and 11 (Figure 1). Both areas are situated within the boundaries of the approved project area (05-0021) and are thus subject to the ACHMP.



Figure 1 Location of Areas 5 and 11
(supplied by Wilpinjong Coal Pty Ltd.)



Area 5

Area 5 is shown hatched in pink in Figure 2 and was surveyed as part of this clearance work program on 3 February 2016.



Figure 2 Area 5 (map supplied by Wilpinjong Coal Pty Ltd)

Previous Recordings

Six previously lodged site recordings occur in Area 5. These are:

WCP485 – artefact scatter (South East Archaeology 2015) this site is not listed in the ACHMP

WCP488 – artefact scatter (South East Archaeology 2015) this site is not listed in the ACHMP

WCP439 – isolated artefact (South East Archaeology 2013) and categorised for site salvage in the ACHMP

WCP440 – isolated artefact (South East Archaeology 2013) and categorised for 'site salvage' in the ACHMP

WE53 – rock shelter (Kyandel 2006) and categorised as 'no management recommendations given' in the ACHMP

WE54 – rock shelter (Kyandel 2006) and categorised as 'no management recommendations given' in the ACHMP



Clearance Survey Results

No artefacts were detected or collected at locations WCP440 and WCP488.

Twenty lithic items including 13 artefacts were collected from WCP485 and seven artefact from WCP439 (see Table 1).

No rock shelters were detected in Area 5. The current recorded locations of rock shelters WE53 and WE54 are therefore concluded to be incorrect. A previously unrecorded rock shelter location was noted outside of Area 5 (GPS reference 767579.6417848) and it is possible that this is the actual location for WE53 or WE54.

Fourteen lithic items including 7 artefacts were collected from three previously unrecorded locations. Of these two locations contained confirmed artefacts and constitute new recordings WCP605, and WCP606.

Collection location 1

GDA 767187.6418535

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figures 3 and 5). The site was located in a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 40% with 40% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One lithic item was collected from this site (see Table 1). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 3 Collection location 1 looking north



WCP605

GDA 767211.6418486

This site consists of two lithic items including one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 4 and 5). The area is located on a disused vehicle track. The site was located in a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of vehicle tracks and sheet erosion. All artefacts were located on the track. The disturbance incidence was 80% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Two lithic items including one confirmed artefact were collected from this site (see Table 1).



Figure 4 WCP605 looking south east

WCP606

GDA 767251.6418525

This site consists of eleven lithic items including six confirmed artefacts situated within an area of approximately 1 x 1 m. (Figure 5). The area is located on a drainage line. The site was located in a valley floor adjacent to current mining operations.

Ground surface disturbance consisted of sheet erosion. All artefacts were located on the edge of the drainage line. The disturbance incidence was 60% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.



Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Twelve lithic items including six confirmed artefacts were collected from this site (see Table 1).

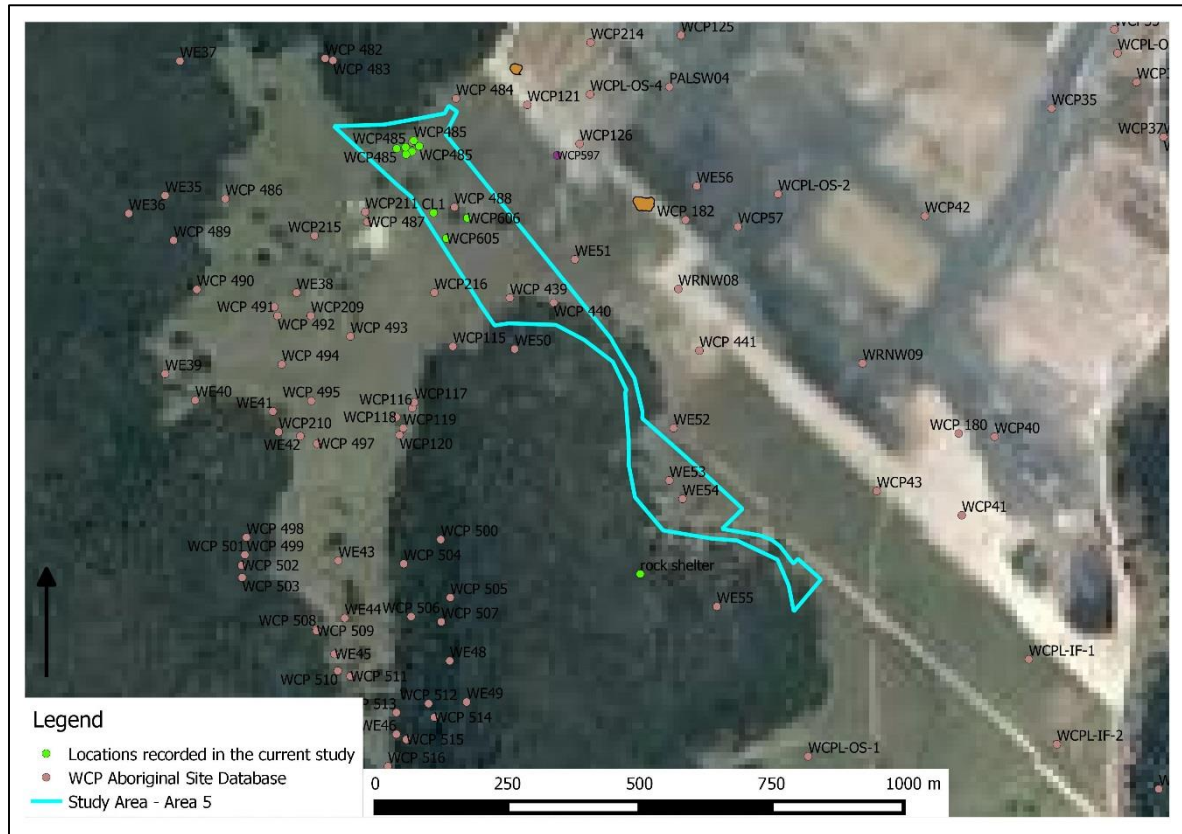


Figure 5 Location of collected artefacts – Area 5
(Base map Google Earth pro)



Table 1 Lithic item descriptions Area 5

Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP439	9.59	Unretouched flake	Quartz, vein	LCS right	Hertzian	Single	Feather	Tertiary	0	19.49	22.64	6.12	22.06				
WCP439	2.46	Unretouched flake	Quartz, vein	Distal fragment	None	None	Feather	Tertiary	0	20.18	12.96	5.99					
WCP439	17.32	Hammer	Quartzite	Broken					60	27.46	28.19	14.28					
WCP439	22.67	Core	Chert	Complete	Complete				0	22.41	47.81	19.49					
WCP439	8.44	Retouched flake	Chert	Complete	Hertzian	Single	Feather	Tertiary	0	27.62	25.65	10.77	9.61	1.14	23.21	25.74	22.86
WCP439	1.09	Unretouched flake	Chert	Complete	Hertzian	Multiple	Feather	Tertiary	0	14.42	14.76	2.83	11.97	2.51	15.29	15.81	2.53
WCP439	11.57	Unretouched flake	Chert	Complete	Bending	Multiple	Feather	Tertiary	0	23.98	33.02	9.22	28.27	13.79	30.87	33.58	9.05
WCP485	3.65	Unretouched flake	Quartz, vein	Distal fragment	None	None	Feather	Tertiary	0	11.95	24.89	7.31					
WCP485	2.44	Unretouched flake	Quartz, vein	Complete	Hertzian	Single	Feather	Tertiary	0	19.26	15.18	4.64	7.67	1.37	11.82	18.57	13.16
WCP485	9.47	Core	Quartz, vein	Complete	None	None	None	Tertiary	0	16.89	28.64	19.63					
WCP485	0.89	Non-artefactual	Quartz, vein														
WCP485	0.12	Non-artefactual	Quartz, vein														
WCP485	1.61	Unretouched flake	Quartz, vein	Medial fragment	None	None	None	Tertiary	0	13.55	15.16	4.36					
WCP485	1.26	Non-artefactual	Quartz, vein														
WCP485	11.2	Non-artefactual	Quartz, vein														
WCP485	3.37	Unretouched flake	Quartz, vein	Complete	Hertzian	Single	Step	Tertiary	0	17.41	23.08	5.67	8.26	0.88	16.43	23.21	8.55
WCP485	0.74	Unretouched flake	Quartz, vein	Marginal fragment	None	None	None	Tertiary	0	22.91	9.45	2.36					
WCP485	0.9	Unretouched flake	Quartz, vein	Complete	Bending	Single	Feather	Tertiary	0	15.89	10.8	3.78	12.97	5.27	11.93	12.89	0
WCP485	0.24	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	Tertiary	0	11.21	6.6	1.89					
WCP485	1.08	Unretouched flake	Silcrete	Proximal fragment	Bending	Single	None	Tertiary	0	17.74	18.31	2.27	7.56	1.99			



Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP485	2.54	Unretouched flake	Quartz, vein	Complete	Hertzian	Multiple	Feather	Tertiary	0	24.6	14.79	4.11	13.13	6.1	16.07	17.24	17.46
WCP485	9.19	Non-artefactual	Quartz, vein														
WCP485	1.81	Unretouched flake	Quartz, vein	Complete	Hertzian	Multiple	Feather	Tertiary	0	14.16	9.2	6.64	11.01	8.01	10.89	11.33	1.45
WCP485	2.36	Unretouched flake	Quartz, vein	Medial fragment	None	None	None	Tertiary	0	12.43	16.31	8.22					
WCP485	0.84	Non-artefactual	Quartz, vein														
WCP485	1.09	Non-artefactual	Quartz, vein														
WCP485	1.64	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Multiple	None	Tertiary	0	8.77	14.84	6.3	14.35	6.24			
WCP605	4.1	Unretouched flake	Quartz, vein	Complete	Hertzian	Shattered	Feather	Tertiary	0	14.33	19.97	9.75					
WCP605	3.28	Non-artefactual	Quartz, vein														
CL 1	15.21	Non-artefactual	Quartz, vein														
WCP606	14.39	Non-artefactual	Quartz, vein														
WCP606	5.72	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Multiple	None	Tertiary	0	16.68	16.65	9.39	18.99	8.73			
WCP606	6.93	Non-artefactual	Quartz, vein														
WCP606	1.8	Non-artefactual	Quartz, vein														
WCP606	2.8	Non-artefactual	Quartz, vein														
WCP606	0.59	Unretouched flake	Quartz, crystal	Complete	Hertzian	Single	Feather	Tertiary	0	9.41	9.93	3.42	5.77	3.22	8.78	14.11	8.41
WCP606	1.16	Non-artefactual	Quartz, vein														
WCP606	0.31	Non-artefactual	Quartz, vein														
WCP606	0.54	Unretouched flake	Quartz, vein	Complete	Hertzian	Single	Feather	Patch right	20	10.98	9.18	2.62	11.91	3.52			
WCP606	0.32	Unretouched flake	Quartz, vein	Distal fragment	None	None	Feather	Tertiary	0	8.04	7.98	3.38					
WCP606	0.32	Unretouched flake	Quartz, vein	LCS right	Hertzian	Single	Feather	Tertiary	0	10.4	6.1	2.36	8.67	2.8			



Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP606	0.51	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	Tertiary	0	11.96	9.09	3.35	5.93				



Area 11

Area 11 is shown hatched in yellow in Figure 6 and was surveyed as part of this clearance work program on 2 February 2016.



Figure 6 Area 11 (map supplied by Wilpinjong Coal Pty Ltd)

Previous Recordings

Six previously lodged site recordings occur in Area 11: These are:

- WCP58 – Aboriginal cultural site. This site was assessed by South East Archaeology (2013) and categorised for 'unmitigated impact' in the ACHMP
- WCP61 – Possible waterhole. This site was assessed by South East Archaeology (2013) and categorised for 'unmitigated impact' in the ACHMP
- WCP70 – isolated artefact (NOHC 2005) and categorised for 'unmitigated impact' in the ACHMP
- WCP71 – isolated artefact (NOHC2005) and categorised for 'unmitigated impact' in the ACHMP
- WCP442 – isolated artefact (South East Archaeology 2013) and categorised for 'unmitigated impact' in the ACHMP
- WCP443 – isolated artefact (South East Archaeology 2013) and categorised for 'unmitigated impact' in the ACHMP



Clearance Survey Results

No artefacts were detected or collected at location WCP71.

Twelve lithic items, including five artefacts were collected from WCP70, WCP442 and WCP443 (see Table 2). The lithic item collected from location WCP443 was assessed as non-artefactual, the item is therefore recorded as Collection Location 2 (CL2)

Locations WCP58 and WCP61 were not revisited as part of this assessment, the ACHMP specifies 'unmitigated impact' at these locations.

Ten lithic items including three artefacts were collected from five previously unrecorded site locations. Of these three locations contained confirmed artefacts and constitute new recordings WCP607, WCP608 and WCP609.

Collection Location 2

GDA 772165.6417751

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 10). The item was found close to the approximate area of lodged site recordings WCP 443 but not at the original site recording.

One lithic item was collected from this site (see Table 2). Analysis determined that these items were not artefactual and as a consequence no site name has been allocated.

Collection Location 3

GDA 771974.6417505

This site consists of six lithic items situated within an area of approximately 15 x 8 m. (Figure 7 and 10). None of the collected items have been confirmed as artefactual during individual analysis. The area is located on an erosion scald. The site was located on mid slopes above a valley floor.

Ground surface disturbance consisted of animal disturbance. The disturbance incidence was 80% with 50% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

Six lithic items were collected from this site (see Table 2). Analysis determined that these items were not artefactual and as a consequence no site name has been allocated.



Figure 7 Collection location 3 looking north

Collection Location 4 (CL4)

GDA 772099.6417935

This site consists of one lithic item situated within an area of approximately 1 x 1 m. (Figure 8 and 10). The collected item was not confirmed as artefactual during individual analysis. The area is located on an erosion scald. The site was located on mid slopes of a spur above a valley floor.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 70% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One lithic item was collected from this site (see Table 2). Analysis determined that this item was not artefactual and as a consequence no site name has been allocated.



Figure 8 Collection location 4 looking west

WCP607

GDA 771974.6417505

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 10). The area is located on a wombat burrow. The site was located on a spur crest.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 90% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One artefact was collected from this site (see Table 2).

WCP608

GDA 771926.6417689

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 9 and 10). The area is located on an erosion scald. The site was located on a spur crest.

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 90% with 60% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.



One artefact was collected from this site (see Table 2).



Figure 9 WCP608 looking south west

WCP609

GDA 772224.6418067

This site consists of one confirmed artefact situated within an area of approximately 1 x 1 m. (Figure 9 and 10). The area is located on a vehicle track. The site was located on a valley floor.

Ground surface disturbance consisted of vehicle track and sheet erosion. The disturbance incidence was 50% with 70% visibility within exposures. There is low to moderate potential for subsurface material and low potential for this material to be undisturbed.

Pre-construction management of subsurface archaeological material is not required for this site as this site is highly disturbed by surrounding activities and the archaeological potential is assessed to be low to moderate, the likelihood of intact deposits is extremely low.

One artefact was collected from this site (see Table 2).



Figure 10 Location of collected artefacts – Area 11
(Base map Google Earth pro)



Table 2 Lithic item descriptions Area 5

Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP442	21.38	Non-artefactual	Quartz, vein														
WCP442	0.12	Unretouched flake	Quartz, vein	Medial fragment	None	None	None	Tertiary	0	4.68	9.67	1.57					
WCP442	2	Unretouched flake	Quartz, vein	Medial fragment	None	None	None	Tertiary	0	14.57	16	5.9					
WCP442	1.21	Non-artefactual	Quartz, vein														
WCP442	5.8	Non-artefactual	Quartz, vein														
WCP442	1.42	Unretouched flake	Quartz, vein	Marginal fragment	Hertzian	None	None	Tertiary	0	24.16	9.21	2.25					
WCP442	0.95	Unretouched flake	Quartz, vein	Complete	Hertzian	Multiple	Step	Tertiary	0	16.35	8.81	3.79	9.27	2.74	9.62	9.74	4.95
WCP442	1.98	Non-artefactual	Quartz, vein														
CL2	0.67	Non-artefactual	Quartz, vein														
WCP607	17.06	Unretouched flake	Quartz, vein	Complete	Hertzian	Shattered	Feather	Primary	20	25.18	27.67	18.21					
CL3	96.95	Non-artefactual	Quartz, vein														
CL3	7.15	Non-artefactual	Quartz, vein														
CL3	24.24	Non-artefactual	Quartz, vein														
CL3	22.07	Non-artefactual	Quartz, vein														
CL3	10.25	Non-artefactual	Quartz, vein														
CL3	2.36	Non-artefactual	Quartz, vein														
WCP608	2.71	Unretouched flake	Quartz, vein	Proximal fragment	Hertzian	Shattered	None	Tertiary	0	22.34	12.12	6.19					
CL4	27.31	Non-artefactual	Quartz, vein														
WCP609	1.01	Unretouched flake	Quartz, vein	Margin missing	Hertzian	Shattered	Feather	Primary	100	19.99	11.34	3.03					
WCP70	19.84	Non-artefactual	Quartz, vein														



Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP70	5.45	Unretouched flake	Quartz, vein	Complete	Hertzian	Shattered	Feather	Tertiary	0	29.9	24.42	5.83	12.11	3.28	19.26	24.86	16.6
WCP70	2.19	Non-artefactual	Quartzite														



Aboriginal Consultation

Wilpinjong Coal Mine (WCM) and Peabody Energy conduct an ongoing consultation program with Aboriginal stakeholders with regard to cultural heritage management within the Wilpinjong mining lease (ML 1573). There are currently eight organisations or individuals registered as Aboriginal stakeholders (also known as 'registered Aboriginal parties' or RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH). Navin Officer Heritage Consultants contacted each stakeholder to invite a representative of each group to be involved in the site visits for this assessment. This was done via email on 21 January. Four stakeholders responded to the invitation and their representatives attended the fieldwork. The stakeholders and their representatives are identified below.

In addition to the consultation program, WCM directly employ Tanietta de Launey as a Native Title Claimant Liaison Officer. Tanietta is involved in all Aboriginal heritage aspects of the WCM operation.

Field Participation

The following representatives from four registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over the 26 November 2015:

Coral Williams	Warrabinga Native Title Claimants Aboriginal Group;
Shaen Morgan	North East Wiradjuri Company Ltd;
Debie Foley	Mudgee Local Aboriginal Land Council; and
Larry Foley	Murrong Gillinga.

NOHC Fieldwork Personnel

Archaeologists Nicola Hayes and Jo Dibden undertook the survey and artefact collection.

Dr Oliver Macgregor undertook the artefact description.

Conclusions and Recommendations

Five new Aboriginal sites, WCP605 to WCP609, have been recorded within the Wilpinjong project boundary as a result of this assessment. AHIMS site cards are attached for these sites.

Areas 5 and 11 are cleared for impact, all heritage actions have been completed.

Recommendations:

1. Newly recorded Aboriginal sites WCP605 to WCP612 should be entered on the Wilpinjong sites database.
2. The current recorded locations for rock shelters WE53 and WE54 should be tagged on relevant databases as incorrect. Future fieldwork should seek to confirm if the rock shelter noted at location GPS reference 767579.6417848 conforms to either of these previous recordings.



References

- Kayandel Archaeological Services 2006, Wilpinjong Coal Project Aboriginal Cultural Heritage Survey: Supplemental Survey of Escarpment Areas and Report of Findings. Report prepared for Wilpinjong Coal Pty Ltd.
- Navin Officer Heritage Consultants 2005, Wilpinjong Coal Project Appendix F: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- South East Archaeology 2013, Wilpinjong Coal Mine, Central Tablelands of New South Wales - Modification: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- South East Archaeology 2015 Wilpinjong Coal Mine, Central Tablelands Of New South Wales – Extension Project: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.
- Wilpinjong Coal Pty Ltd (WCPL) 2006, Wilpinjong Coal Project Environmental Impact Statement.



Wilpinjong Coal Mine

Aboriginal Cultural Heritage Clearance Works and Due Diligence Assessment

Drill sites: ML1573_PAL

LOX_BH

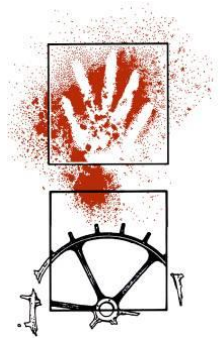
EL6169_BH

EL7091_ST

EL7091_BH



February 2016



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Report Register

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

Issue No.	Notes/Description	Issue Date
v1	Draft for proponent comment	24 February 2016
v2	Further draft following proponent comment	24 February 2016
v3	Final version	26 February 2016



EXECUTIVE SUMMARY

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.

This report documents Aboriginal cultural heritage clearance works and assessments at five drill sites proposed by Wilpinjong Coal Pty Ltd. The assessment includes locations both within and outside of the Wilpinjong Coal Project approval boundary.

Drill sites ML1573_PAL, LOX_BH and EL6169_BH are within the project approval boundary and are subject to the Wilpinjong Coal Mine Aboriginal Cultural Heritage Management Plan (ACHMP). Surface salvage and area clearance actions were undertaken at these sites.

Drill sites EL7091_ST and EL7091_BH are outside of the project approval boundary. A due diligence assessment was undertaken at each of these sites.

Results

Clearance Surveys

- Four Aboriginal sites have been previously recorded in the subject drill sites within the Wilpinjong Coal Project boundary.

WCP45	artefact scatter	Drill Site ML1573_PAL	one artefact collected
WCP46	artefact scatter	Drill Site ML1573_PAL	no artefacts detected
WCP87	artefact scatter	Drill Site LOX_BH	one artefact collected
WCP546	artefact scatter	Drill Site LOX_BH	no artefacts detected

- Four previously unrecorded Aboriginal sites were identified in the subject drill sites within the Wilpinjong Coal Project boundary as a result of this current assessment.

WCP610	artefact scatter	Drill Site ML1573_PAL	four artefacts collected
WCP611	isolated find	Drill Site EL6169_BH	one artefact collected
WCP612	isolated find	Drill Site EL6169_BH	one artefact collected
WCP613	artefact scatter	Drill Site EL6169_BH	fourteen artefacts collected

Due Diligence Assessment

- Two Aboriginal sites have been previously recorded in the subject drill sites outside of the Wilpinjong Coal Project boundary.

WCP563	artefact scatter	Drill Site EL7091_ST	no direct impact to site
WCP564	artefact scatter	Drill Site EL7091_ST	no direct impact to site

- Two previously unrecorded Aboriginal sites were identified in the subject drill sites outside of the Wilpinjong Coal Project boundary as a result of this current assessment.

WCP614	isolated find	Drill Site EL7091_ST	no direct impact to site
WCP615	isolated find	Drill Site EL7091_ST	no direct impact to site



Conclusions

Drill site ML1573_PAL is cleared for drilling; all required heritage actions have been completed.

Drill site LOX_BH is cleared for drilling; all required heritage actions have been completed.

Drill site EL6169_BH is cleared for drilling; all required heritage actions have been completed.

Drill site EL7091_ST is cleared for drilling; all required heritage actions have been completed.

Drill site EL7091_BH is cleared for drilling; all required heritage actions have been completed.

Recommendations:

1. Aboriginal sites WCP610 to WCP615 should be entered on to the Wilpinjong Aboriginal sites database.
2. The fence at site WCP46 should be removed.
3. The locations of sites WCP563 and WCP564, situated in the area of drill site EL7091_ST, should be marked on all project mapping and identified as no-go areas.
4. The existing but dilapidated fencing around sites WCP563 and WCP564 should be removed.
5. Temporary fencing should then be erected for the duration of the drilling works around sites WCP563 and WCP564, and expanded to include the area of the additional recordings WCP614 and WCP615.

(The purpose of the fencing is to define a no-go area, rather than create a secure barrier).

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1. BACKGROUND

1.1 The Wilpinjong Coal Project

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.

1.2 Aboriginal Cultural Heritage Management Plan

The conditions of the Wilpinjong Coal 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).

The ACHMP includes an Ancillary Disturbance Area Protocol which includes:

1. Pre-clearance archaeological survey (conducted with the assistance of Aboriginal representatives). This survey would include consideration of the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage.
2. Avoidance of the identified Aboriginal object/sites by realigning or adjusting infrastructure/disturbance area if practicable.

If the object/site cannot be avoided:

1. Consider surface salvage (advice from Aboriginal representatives and/or an archaeologist will be sought).
2. If relevant, consider the archaeological and cultural heritage values associated with the site and the potential value of conducting subsurface salvage (subject to review of the ACHMP and consultation with Aboriginal representatives and/or an archaeologist).
3. Conduct surface salvage (and subsurface salvage if necessary) with the assistance of Aboriginal representatives and an archaeologist.
4. Store salvaged artefacts in the "Keeping Place".
5. Post-rehabilitation, replace artefacts onto the rehabilitated landform.

The current assessment includes areas both within and outside of the Wilpinjong Coal Project approval boundary.

Drill sites ML1573_PAL, LOX_BH and EL6169_BH are within the project approval boundary and are subject to the ACHMP. Surface salvage and area clearance has been undertaken at these sites.

Drill sites EL7091_ST and EL7091_BH are outside of the project approval boundary. A due diligence assessment has been undertaken at each drill site.



1.2.1 Surface Salvage

The ACHMP specifies that salvage will involve the systematic recovery of all evident surface artefacts from a representative sample of open artefact scatters and from selected isolated finds at known sites within the Project disturbance area.

Surface collections will occur on a progressive basis prior to the commencement of ground surface disturbance works within an area.

A basic level of recording will be conducted on all recovered artefactual surface material including location, technological traits, and stone type. This analysis will be conducted by a qualified lithic specialist.

1.2.2 Due Diligence Assessment

A due diligence assessment is undertaken to satisfy the NSW Office of Environment and Heritage *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*.

This Code of Practice helps individuals and organisations to exercise due diligence when conducting activities that may harm Aboriginal objects and to identify whether they need to apply for an Aboriginal Heritage Impact Permit (AHIP) (NSW DECCW 2010: 2).

The Code sets out the steps to take in order to:

- 1 identify whether or not Aboriginal objects are, or likely to be, present in an area;
- 2 determine whether or not their activities are likely to harm Aboriginal objects (if present); and
- 3 determine whether an AHIP application is required.

The steps are:

- Step 1:** Determine if the activity will disturb the ground surface.
- Step 2a:** Search the AHIMS database and use any other sources of information of which you are already aware.
- Step 2b:** Determine if the activity is in area where landscape features indicate the presence of Aboriginal objects.
- Step 3:** Can you avoid harm to the object or disturbance of the landscape feature?
- Step 4:** Desktop assessment and visual inspection.
- Step 5:** Further investigation and impact assessment.

1.3 This Report

This report presents:

1. The results of a pre-clearance archaeological survey and surface salvage of drill sites ML1573_PAL, LOX_BH and EL6169_BH (Figure 1); and
2. The results of a due diligence assessment of drill sites EL7091_ST and EL7091_BH (Figure 1).

The report was commissioned by Wilpinjong Coal Pty Ltd.

NOHC Project Personnel



Fieldwork (survey and lithic collection) was carried out by archaeologists Nicola Hayes and Jo Dibden.

Lithic analysis and description was carried out by Oliver Macgregor.

This report was prepared by Nicola Hayes and Kelvin Officer, and edited by Kerry Navin.

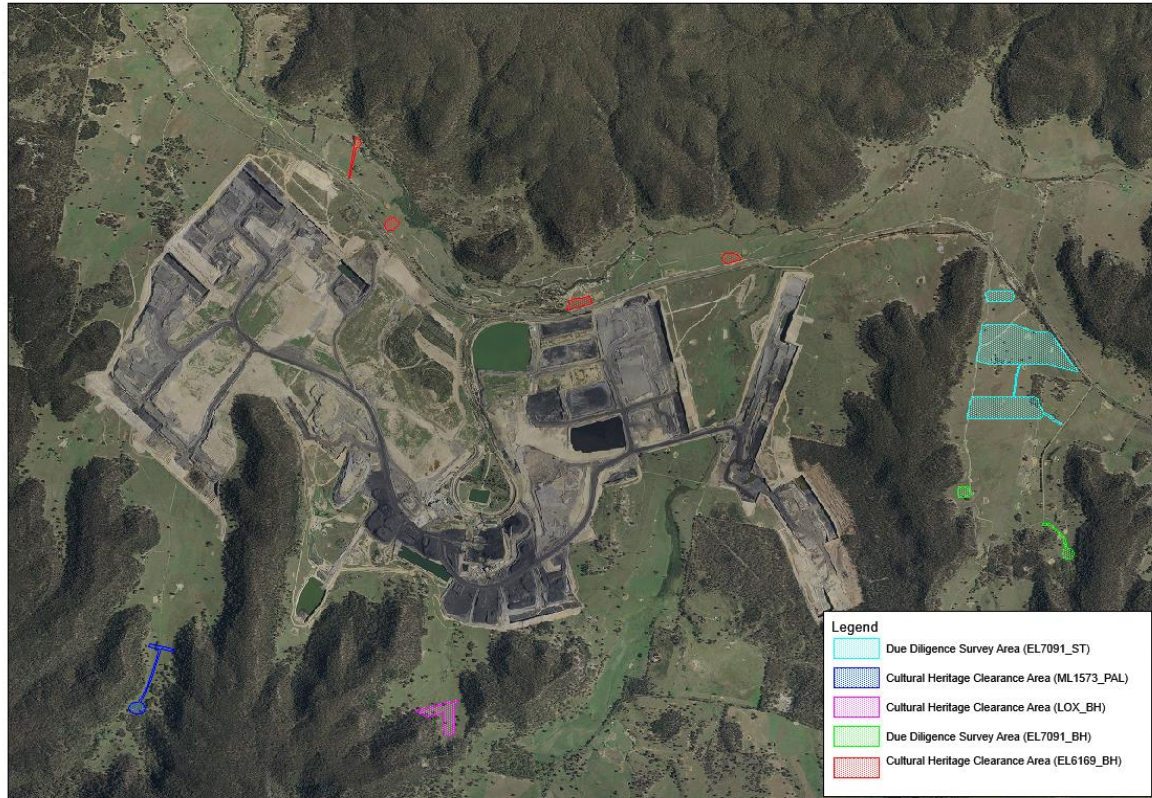


Figure 1 Location of Drill Sites EL7091_ST, ML1573_PAL, LOX_BH, EL7091_BH and EL6169_BH (map supplied by Wilpinjong Coal Pty Ltd.)



2. SURFACE SALVAGE AND PRE CLEARANCE SURVEY

Drill sites ML1573_PAL, LOX_BH and EL6169_BH are within the Wilpinjong Coal Project approval boundary and are subject to the ACHMP.

Surface salvage and area clearance was undertaken at these drill sites in February 2016.

2.1 Drill Site ML1573_PAL

Drill site ML1573_PAL was surveyed as part of this clearance work program on 2 February, 2016 (shown in blue on Figure 2).



Figure 2 Drill Site ML1573_PAL
(map supplied by Wilpinjong Coal Pty Ltd)

2.1.1 Previous Recordings

Two previously recorded Aboriginal sites occur in Drill Site ML1573_PAL. These are:

WCP45 – artefact scatter (NOHC 2005); categorised as ‘site whose current status is unclear and requires verification’ in the ACHMP

WCP46 – artefact scatter (NOHC 2005); categorised as ‘site whose current status is unclear and requires verification’ in the ACHMP

Lithic items and artefacts are described in Table 1.

The locations of collected lithic items are shown on Figure 5.



2.1.2 Clearance Survey Results

- One artefact was collected from the recorded location of site WCP45 (see Table 1).
- No artefacts were detected or collected at the recorded location of site WCP46. This site has previously been fenced, however, the fence is now in a collapsed state.
- Twenty lithic items were collected from two previously unrecorded locations.

One lithic item (which was found not to be artefactual) was identified at Collection Location 5.

Nineteen lithic items, including four confirmed artefacts, were identified and constitute new recording WCP610 (see Table 1).

Collection Location 5

GDA 767910.6416705

This recording consists of one lithic item situated within an area of approximately 1 x 1 m on a vehicle track in a valley floor context (Figure 3).

The area has been highly disturbed by surrounding activities. Ground surface disturbance consisted of vehicle track and sheet erosion. The disturbance incidence was 60%, with 40% visibility within exposures.

There is low to moderate potential for subsurface cultural material to be present in this area., and low potential for this material to be undisturbed. The archaeological potential of this area is assessed to be low to moderate.

One lithic item was collected from this location. Analysis determined that this item was not artefactual, and as a consequence no site name has been allocated.

Pre-construction management of subsurface archaeological material is not required for this site.

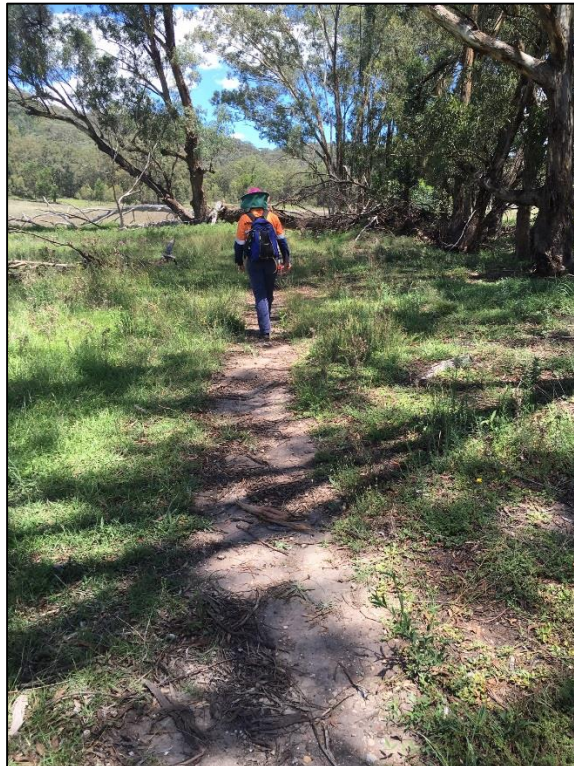


Figure 3 Location of Collection Location 5 (CL5) - looking south



WCP610

GDA 767672.6416107

The site consists of four artefacts situated within an area of approximately 5 x 5 m on a vehicle track and adjacent erosion in a valley floor context. (Figure 4).

Ground surface disturbance consisted of vehicle track and sheet erosion. The disturbance incidence was 80% with 60% visibility within exposures. There is low to moderate potential for subsurface cultural material to be present in this area and extremely low potential for this material to be undisturbed.

Nineteen lithic items, including four confirmed artefacts, were collected from this site.

Pre-construction management of subsurface archaeological material is not required for this site.



Figure 4 Location of Aboriginal site WCP610 looking north

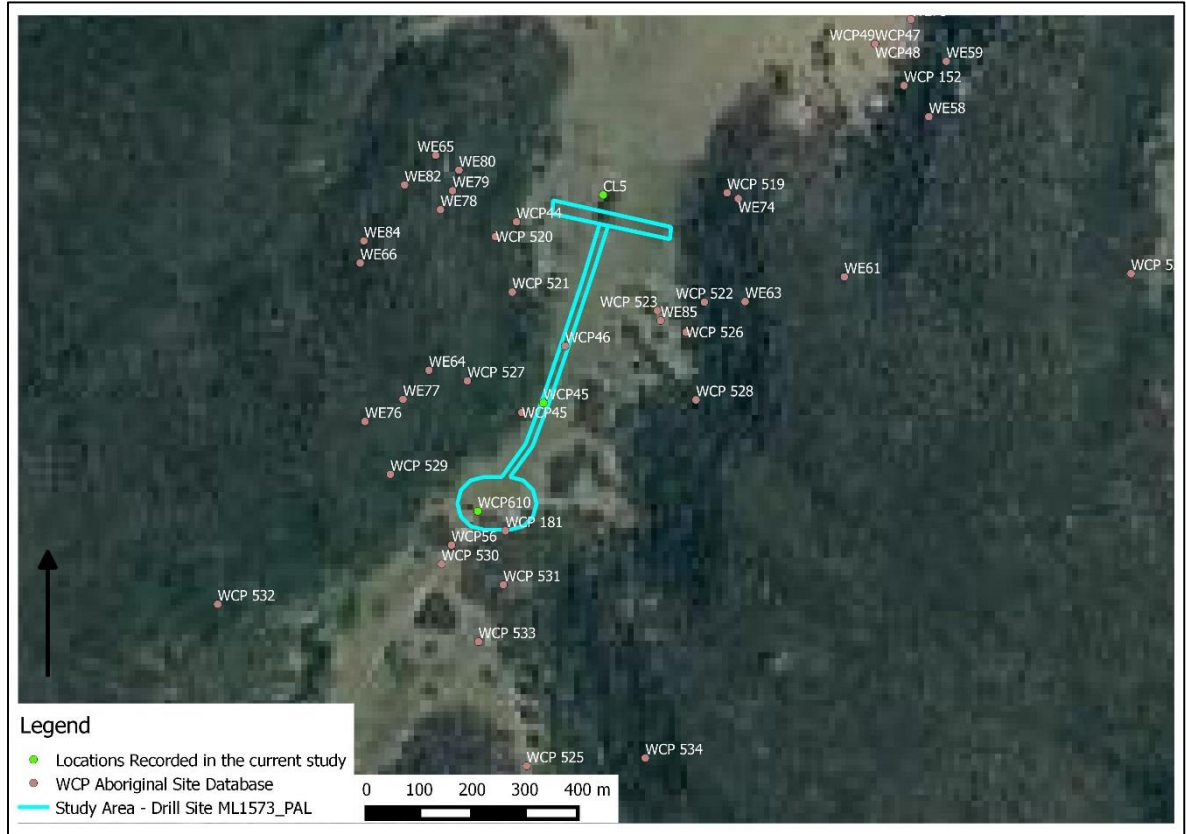


Figure 5 Location of collected lithic items – Drill Site ML1573_PAL
(Base map Google Earth pro)



Table 1 Lithic item descriptions Drill Site ML1573_PAL

Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
CL5	1.33	non-artefactual	igneous														
WCP45	2.43	retouched flake	hornfels	distal fragment	Hertzian	none	none	distal only	80	16.39	19.96	6.96					
WCP610	6.16	unretouched flake	quartz, vein	complete	Hertzian	multiple	feather	tertiary	0	14.63	21.32	11.64	24.94	11.34	24.86	25.58	6.47
WCP610	3.6	non-artefactual	quartz, vein														
WCP610	4.74	non-artefactual	chert														
WCP610	7.69	non-artefactual	quartz, vein														
WCP610	0.84	unretouched flake	quartz, vein	complete	Hertzian	multiple	step	tertiary	0	16.77	7.59	4.35	6.43	2.6	7.33	7.79	6.33
WCP610	0.38	non-artefactual	quartz, vein														
WCP610	1.23	non-artefactual	quartz, vein														
WCP610	1.87	non-artefactual	quartz, vein														
WCP610	2.33	unretouched flake	quartz, vein	complete	Hertzian	single	feather	tertiary	0	12.45	18.33	5.63	9.13	6.56	11.69	19.73	10.67
WCP610	2.89	unretouched flake	quartz, vein	proximal fragment	Hertzian	shattered	none	tertiary	0	19.33	14.45	9.7					
WCP610	1.07	non-artefactual	quartz, vein														
WCP610	4.63	non-artefactual	quartz, vein														
WCP610	1.31	unretouched flake	quartz, vein														
WCP610	0.47	non-artefactual	quartz, vein														



Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP610	1.34	unretouched flake	quartz, vein														
WCP610	2.43	non-artefactual	quartz, vein														
WCP610	0.92	non-artefactual	quartz, vein														
WCP610	1.87	unretouched flake	quartz, vein														
WCP610	1.49	unretouched flake	quartz, vein														



2.2 Drill Site LOX_BH

Drill site LOX_BH was surveyed as part of this clearance work program on 2 February, 2016 (shown in pink on Figure 6).



Figure 6 Drill Site LOX_BH (map supplied by Wilpinjong Coal Pty Ltd)

2.2.1 Previous Recordings

Two previously recorded Aboriginal sites occur in Drill Site LOX_BH. These are:

WCP87 – artefact scatter (NOHC 2005); categorised as ‘site salvaged’ in the ACHMP.

WCP546 – artefact scatter (South East Archaeology 2013); not included in the ACHMP.

2.2.2 Clearance Survey Results

- No artefacts were detected or collected at site WCP546.
- Two lithic items, including one confirmed artefact, were collected from site WCP87.

Lithic items and artefacts are described in Table 2.

The locations of collected lithic items are shown on Figure 7.



Figure 7 Location of collected lithic items – LOX_BH
(Base map Google Earth pro)



Table 2 Lithic item descriptions LOX_BH

Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP87	2.73	non-artefactual	quartz, vein														
WCP87	6.33	unretouched flake	quartz, vein	proximal fragment	hertzian	multiple	none	tertiary	0	17.56	16.05	9.54					



2.3 Drill Site EL6169_BH

Drill site EL6169_BH was surveyed as part of this clearance work program on 3 February, 2016 (shown in red on Figure 8).



Figure 8 Drill Site EL6169_BH
(map supplied by Wilpinjong Coal Pty Ltd)

2.3.1 Previous Recordings

No previously recorded Aboriginal sites occur in Drill Site EL6169_BH.

2.3.2 Clearance Survey Results

- Thirty lithic items were collected from three previously unrecorded locations.
- Fourteen of these lithic items were found not to be artefactual.
- Sixteen of these lithic items were confirmed as artefacts and constitute new site recordings:

WCP611 - one artefact

WCP612 - one artefact

WCP613 - fourteen artefacts

Lithic items and artefacts are described in Table 3.

The locations of collected lithic items are shown on Figure 11.



WCP611

GDA 769661.6420873

This site consists of one artefact visible within an area approximately 1 x 1 m on a vehicle track in a valley floor context adjacent to Wilpinjong Creek. (Figure 9).

Ground surface disturbance consisted of vehicle track and sheet erosion. The disturbance incidence was 50%, with 70% visibility within exposures. There is low to moderate potential for subsurface cultural material to be present in this area and low potential for this material to be undisturbed.

Three lithic items, including one confirmed artefact, were collected from this site.

Pre-construction management of subsurface archaeological material is not required for this site.



Figure 9 Location of Aboriginal site WCP611 looking north

WCP612

GDA 769961.6420545

This site consists of one artefact visible within an area approximately 1 x 1 m on a vehicle track. (Figure 9).

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 50% with 70% visibility within exposures. There is low to moderate potential for subsurface cultural material to be present in this area and low potential for this material to be undisturbed.

Two lithic items, including one confirmed artefact, were collected from this site.

Pre-construction management of subsurface archaeological material is not required.



WCP613

GDA 771646.6419775 to 771762.6419787

The site consists of fourteen artefacts visible within an area approximately 114 x 5 m on a vehicle track and erosion associated with a dam in a valley floor context adjacent to Wilpinjong Creek. (Figure 10 and 11).

Ground surface disturbance consisted of vehicle tracks and sheet erosion. The disturbance incidence was 70% with 50% visibility within exposures. There is low to moderate potential for subsurface cultural material to be present in this area and low potential for this material to be undisturbed.

Twenty-four lithic items, including fourteen confirmed artefacts, were collected from this site.

Pre-construction management of subsurface archaeological material is not required for this site.



Figure 10 Location of Aboriginal site WCP613 looking west

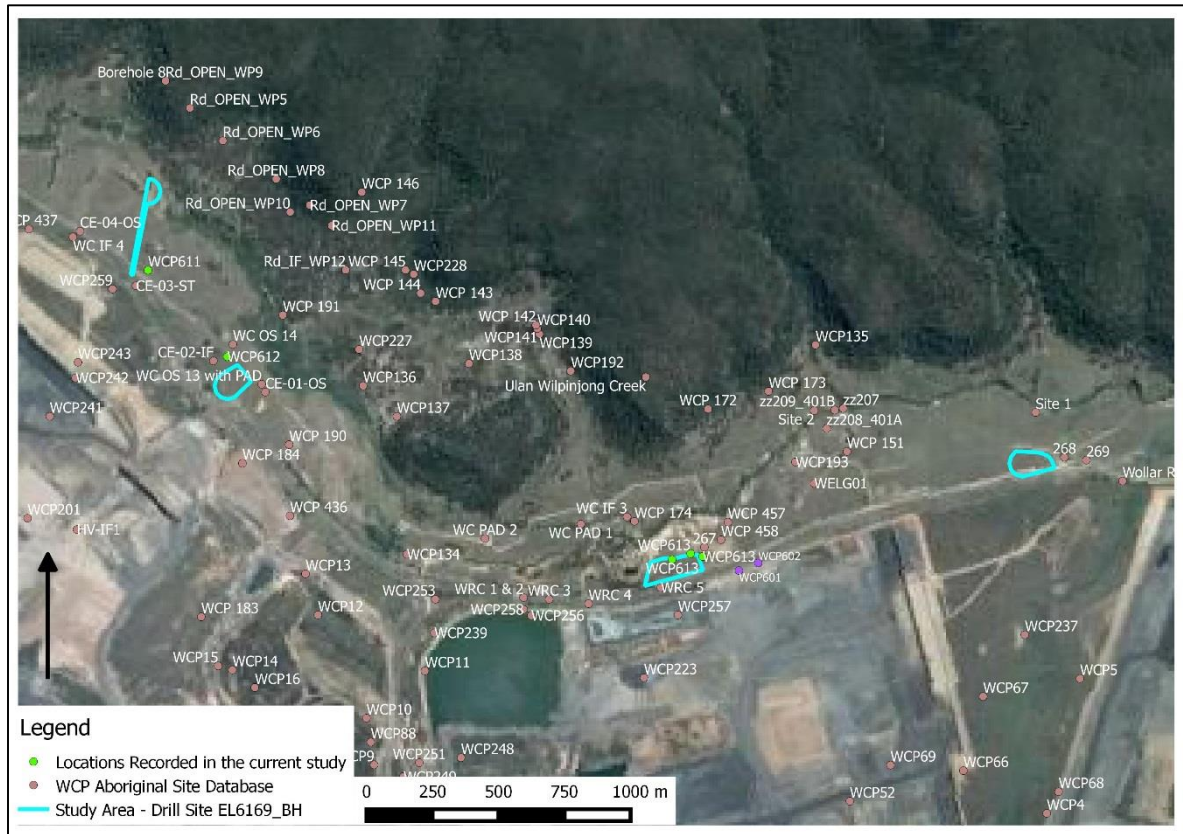


Figure 11 Location of collected lithic items – EL6169_BH
(Base map Google Earth pro)



Table 3 Lithic item descriptions Drill Site ML1573_PAL

Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP611	0.53	unretouched flake	quartz, vein	medial fragment	none	none	none	tertiary	0	15.57	9.61	2.85					
WCP611	1.88	non-artefactual	quartz, vein														
WCP611	0.28	non-artefactual	quartz, vein														
WCP612	63.87	non-artefactual	quartz, vein														
WCP612	0.5	unretouched flake	quartz, vein	distal fragment	Hertzian	none	feather	tertiary	0	9.24	9.97	4.12					
WCP613	5.57	unretouched flake	quartz, vein	complete	Hertzian	shattered	feather	tertiary	0	24.03	18.23	10.02	17.53		17.47	19.58	10.83
WCP613	0.33	unretouched flake	quartz, vein	medial fragment	none	none	none	tertiary	0	10.64	9.95	2.84					
WCP613	130.03	non-artefactual	quartz, vein														
WCP613	22.93	unretouched flake	quartz, vein	complete	Hertzian	multiple	feather	tertiary	0	28.75	34.98	13.47	25.22	8.22	31.84	34.96	9.08
WCP613	2.4	unretouched flake	quartz, vein	margin missing	Hertzian	shattered	feather	tertiary	0	27.57	13.21	5.39					
WCP613	4.57	non-artefactual	quartz, vein														
WCP613	12.04	non-artefactual	quartz, vein														
WCP613	3.18	non-artefactual	quartz, vein														
WCP613	1	unretouched flake	quartz, vein	complete	Hertzian	multiple	feather	distal only	20	20.31	10.96	2.55	8.54	2.27	9.67	11.56	16.66
WCP613	2.13	non-artefactual	quartz, vein														



Site	Weight	Type	Material	Completeness	Initiation type	Platform type	Termination type	Cortex distribution	Cortex proportion	Length	Width	Thickness	Platform width	Platform thickness	Quarter width	Maximum width	Maximum width location
WCP613	1.48	non-artefactual	quartz, vein														
WCP613	0.9	unretouched flake	quartz, vein	medial fragment	none	none	none	tertiary	0	9.53	12.15	4.69					
WCP613	0.33	unretouched flake	quartz, vein	distal fragment	none	none	none	tertiary	0	14.67	6.61	2.67					
WCP613	0.32	unretouched flake	quartz, vein	complete	Hertzian	multiple	feather	tertiary	0	14.59	5.1	3.77	4.96	2.64	5.32	5.92	11.75
WCP613	0.55	non-artefactual	quartz, vein														
WCP613	0.38	non-artefactual	quartz, vein														
WCP613	0.23	unretouched flake	quartz, vein	medial fragment	none	none	none	tertiary	0	8.47	9.55	1.86					
WCP613	0.13	unretouched flake	quartz, vein	complete	bending	single	feather	tertiary	0	7.13	6.78	2.19	7.57	2.36			
WCP613	0.52	unretouched flake	quartz, vein	medial fragment	none	none	none	tertiary	0	11.9	7.7	3.75					
WCP613	0.57	non-artefactual	quartz, vein														
WCP613	0.29	non-artefactual	quartz, vein														
WCP613	0.29	unretouched flake	quartz, vein	distal fragment	none	none	feather	tertiary	0	10.94	9.61	2.08					
WCP613	1.63	retouched flake	chert	complete	none	none	none	tertiary	0	20.03	15.27	5.16				16.08	9.41
WCP613	2.73	retouched flake	chert	complete	none	none	none	tertiary	0	27.09	16.11	5.84				17.22	11.91



3. DUE DILIGENCE ASSESSMENT

Drill sites EL7091_ST and EL7091_BH are located outside of the Project Approval boundary (05-0021). As a consequence a due diligence assessment was undertaken at each site.

These areas fall within the Wilpinjong Coal Mine extension areas and have been previously surveyed by Kuskie (2015).

3.1 Drill Site EL7091_ST

Drill site EL7091_ST was surveyed as part of this clearance work program on 4 February, 2016 (shown in blue on Figure 12).

The drill site area is situated within 'Slate Gully' to the east of the project approval area. The area is characterized by low spur lines and drainage lines. Soils are typically derived from bedrock sandstones and conglomerates.

Vegetation within the proposed drill site area consists of open (agricultural) grasslands, with pockets of regenerating and open forest.

Ground surface disturbance evident across the area includes, forest clearance, agricultural ploughing and pasture improvement, erosion scalds from stock animal treadage and surface water erosion, and vehicle track construction.

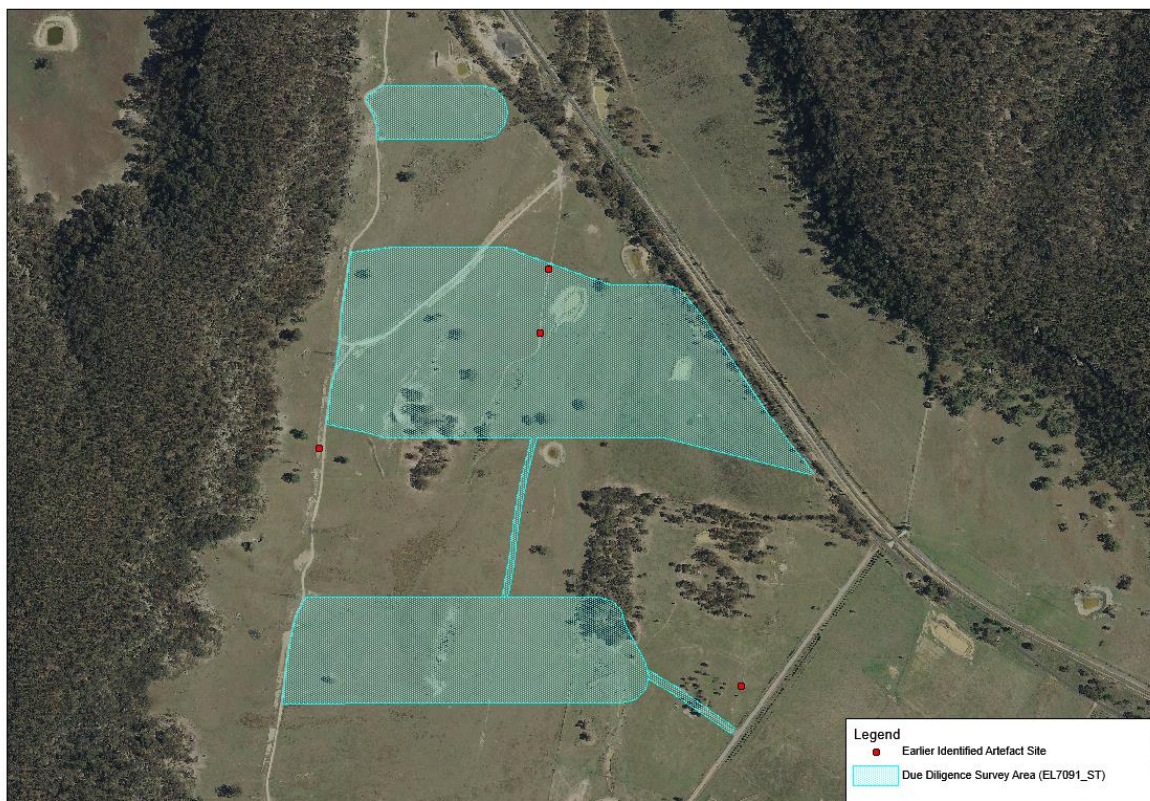


Figure 12 Drill Site EL7091_ST
(map supplied by Wilpinjong Coal Pty Ltd)



3.1.1 Previous Recordings

Two previously recorded Aboriginal sites occur in Drill Site EL7091_ST. These are:

WCP563 –artefact scatter; recommended for ‘unmitigated impact’ (South East Archaeology 2015)

WCP564 –artefact scatter; recommended for ‘unmitigated impact’ (South East Archaeology 2015)

The map grid co-ordinates for these sites have been updated in this current study.

3.1.2 Survey Results

- Previously recorded site locations WCP563 and WCP564 were re-found during this investigation. Both locations have formerly been fenced, however, this fencing has now collapsed. More artefacts have been recorded at each location and over a wider area than previously noted.

- Two previously unrecorded sites were unidentified during the current assessment.

WCP614 - one artefact

WCP615 - one artefact

The locations of recorded artefacts are shown on Figure 15.

WCP563

Updated co-ordinates: GDA 775599.6419529 to 775609.6419521 to 775605.6419509

Artefacts recorded during the current survey:

1. Quartz broken flake, proximal, 7 x 8 x 6 mm
2. Quartz flake, 20 x 17 x 9 mm
3. Quartz flake, 18 x 15 x 9 mm
4. Grey fine grained siliceous flake, retouch, retouch, 30 x 37 x 13 mm,
5. Quartz possible flaked piece/core, 32 x 23 x 20 mm

WCP564

Updated co-ordinates: GDA 775592.6419431 to 775590.6419389

Artefacts recorded during the current survey:

1. Quartz broken flake, proximal, 14 x 4 x 11 mm
2. Quartz broken flake distal, 12 x 10 x 6 mm
3. Quartz broken flake, proximal, 11 x 12 x 4 mm
4. Quartz longitudinal cone split (lcs), 15 x 10 x 8 mm
5. Quartz recently broken proximal flake, 18 x 12 x 5 mm
6. Quartz broken flake, proximal 20 x 18 x 7 mm
7. Quartz lcs, 18 x 7 x 5 mm
8. Quartz broken flake distal, 7 x 11 x 5 mm



WCP614

GDA 775309.6419331

The site consists of one artefact visible within an area of approximately 1 x 1 m on an erosion scald in a basal slope context (Figure 13).

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 10% with 20% visibility within exposures. There is low to moderate potential for subsurface cultural material to be present in this area and low potential for this material to be undisturbed.

Artefact.

1. Grey volcanic broken axe piece, 39 x 64 x 7 mm



Figure 13 Location of Aboriginal site WCP614 looking east

WCP615

GDA 775732.6419501

The site consists of one artefact visible within an area of approximately 1 x 1 m on an erosion scald adjacent to an old sediment guard fence in a basal slope context (Figure 14).

Ground surface disturbance consisted of sheet erosion. The disturbance incidence was 20% with 70% visibility within exposures. There is low to moderate potential for subsurface cultural material to be present in this area and low potential for this material to be undisturbed.

Artefact.

1. Quartz flake, retouch, 18 x 10 x 4 mm,



Figure 14 Location of Aboriginal site WCP615 looking west



Figure 15 Location of recorded artefacts – Drill Site EL7091_ST (Base map Google Earth pro)



3.2 Drill Site EL7091_BH

Drill site EL7091_BH was surveyed as part of this clearance work program on 4 February, 2016 (shown in green on Figure 16).

The drill site is situated within 'Slate Gully' to the east of the project approval area. The area is characterized by low spur lines and drainage lines. Soils are typically derived from bedrock sandstones and conglomerates.

Vegetation within the proposed drill site consists of open (agricultural) grasslands, with pockets of regenerating and open forest.

Ground surface disturbance evident across the area includes, forest clearance, agricultural ploughing and pasture improvement, erosion scalds from stock animal treadage and surface water erosion, and vehicle track construction.



Figure 16 Drill Site EL7091_BH
(map supplied by Wilpinjong Coal Pty Ltd)

3.2.1 Previous Recordings

- No previous Aboriginal site recordings occur within Drill Site EL7091_BH.

3.2.2 Survey Results

- No unrecorded Aboriginal sites were identified within Drill Site EL7091_BH during the current investigation.



4. ABORIGINAL CONSULTATION

Wilpinjong Coal Mine (WCM) and Peabody Energy conduct an ongoing consultation program with Aboriginal stakeholders with regard to cultural heritage management within the Wilpinjong mining lease (ML 1573). There are currently eight organisations or individuals registered as Aboriginal stakeholders (also known as 'registered Aboriginal parties' or RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH).

Navin Officer Heritage Consultants contacted each stakeholder to invite a representative of each group to be involved in the site visits for this assessment. This was done via email on 21 January, 2016

In addition to the consultation program, WCM directly employ Tanietta de Launey as a Native Title Claimant Liaison Officer. Tanietta is involved in all Aboriginal heritage aspects of the WCM operation.

Field Participation

The following representatives from four registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over the 2nd to 4th February, 2016:

Coral Williams	Warrabinga Native Title Claimants Aboriginal Group;
Shaen Morgan	North East Wiradjuri Company Ltd;
Debbie Foley	Mudgee Local Aboriginal Land Council; and
Larry Foley	Murrong Gillinga.

The Aboriginal stakeholders requested that one representative be present at the time of the excavation of the drill sites.

Subsequent to the communication of this request, WCM provided the following response:

Wilpinjong Coal does not see any reasonable justification for these extra inspections for the following reasons:

- The ACHMP does not require these inspections within the Project Approval Area.
- The *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* does not require these inspections for areas outside of the Project Approval area.
- The exploration drilling work occurs on disturbed land (as defined by the *National Parks and Wildlife Regulation 2009*) and so deemed low impact.

The sites described in this report will not be directly impacted and will be avoided by the works. No impacts to Aboriginal sites will occur from these works.

No aboriginal sites are located within the area of drill site EL7091_BH. No impacts to Aboriginal sites will occur from these works.



5. RECOMMENDATIONS

It is recommended that:

1. Aboriginal sites WCP610 to WCP615 should be entered on to the Wilpinjong Aboriginal sites database.
2. The fence at site WCP46 should be removed.
3. The locations of sites WCP563 and WCP564, situated in the area of drill site EL7091_ST, should be marked on all project mapping and identified as no-go areas.
4. The existing but dilapidated fencing around sites WCP563 and WCP564 should be removed.
5. Temporary fencing should then be erected for the duration of the drilling works around sites WCP563 and WCP564, and expanded to include the area of the additional recordings WCP614 and WCP615.

(The purpose of the fencing is to define a no-go area, rather than create a secure barrier).

6. REFERENCES

Navin Officer Heritage Consultants 2005, Wilpinjong Coal Project Appendix F: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.

Wilpinjong Coal Pty Ltd (WCPL) 2006, Wilpinjong Coal Project Environmental Impact Statement.

South East Archaeology 2013, Wilpinjong Coal Mine, Central Tablelands of New South Wales - Modification: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.

South East Archaeology 2015 Wilpinjong Coal Mine, Central Tablelands Of New South Wales – Extension Project: Aboriginal Cultural Heritage Assessment. Report prepared for Wilpinjong Coal Pty Ltd.

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Wilpinjong Coal Mine Aboriginal Rock Art Monitoring and Management Program

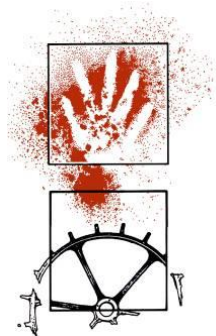
Report on Oct 2015 fire hazard management works and fence removal

WCP 72, 152 & 153

Wilpinjong, NSW

DRAFT

June 2016



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Proponent: Peabody Energy Australia

Report Register

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

Issue No.	Notes/Description	Issue Date
v1.3	Draft for stakeholder comment	30 June 2016

EXECUTIVE SUMMARY

As part of an ongoing monitoring and management program at three Aboriginal rock art sites (WCP72, 152 and 153) within the Wilpinjong Coal mine lease, NOHC directed a day of field works on the 27 October 2015. The aim of the works was to reduce the fire hazard around each site by removing dead trees and fallen debris, and improve the cultural and landscape integrity of WCP72 by the removal of a now redundant agricultural fenceline. This report documents those works.

The field actions were completed successfully and there are no reported stakeholder concerns or outstanding actions.

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1. INTRODUCTION

1.1 The Wilpinjong Coal Mine rock art monitoring and management program

The Wilpinjong Coal Mine (WCM) 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; associated Coal Handling and Preparation Plant; raw and product handling facilities; and rail and train loading infrastructure. It is operated by Wilpinjong Coal Pty Ltd, which is owned by Peabody Energy, Australia.

In 2006 Project Approval was granted under Section 75J of the *Environmental Planning and Assessment Act 1979* (Project Approval 05-0021). 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).

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

1.2 Recommendations regarding removal of combustible materials and a redundant fenceline

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 (NOHC 2015) The assessment found that the accumulation of combustible material, such as leaf litter and dead wood within or near to the rock shelters posed a risk to rock art panels in the event of a wildfire or control burn. It was considered a sensible and expedient strategy to monitor, manage and periodically remove combustible material from around rock art sites.

It was recommended that combustible material be removed from within or near the entrances to rock shelter sites WCP72, WCP152 and 153 (NOHC 2015:31).

In addition, the following description of an agricultural fenceline at site WCP72 was presented:

A well-built, wooden post and wire stock fence extends eastwards and downslope from near the northern end of the rock shelter. 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.

Aboriginal stakeholders recommended that the redundant fenceline be removed, noting that removal would:

- make visitor access to the site easier and safer;
- remove the fire risk posed by the close proximity of the wood to the rock shelter rock surfaces, and;
- increase the aesthetic quality of the site surrounds (NOHC 2015:19).

1.3 This Report

As a consequence of the recommendations of the 2014 monitoring report, Peabody Energy commissioned Navin Officer Heritage Consultants to direct a field team of contractors and Aboriginal stakeholders with the aims of: removing combustible dead wood and leaf litter from within and around sites WCP72, 152 and 153, and the removal of the redundant fenceline at ECP72. This report documents those actions.



1.4 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

1.5 Restricted Information

Information provided in this report which relates to the exact location of the subject rock art sites should not be published or made available to the general public. 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.

1.6 Confidentiality

No information in this report has been classified as confidential.

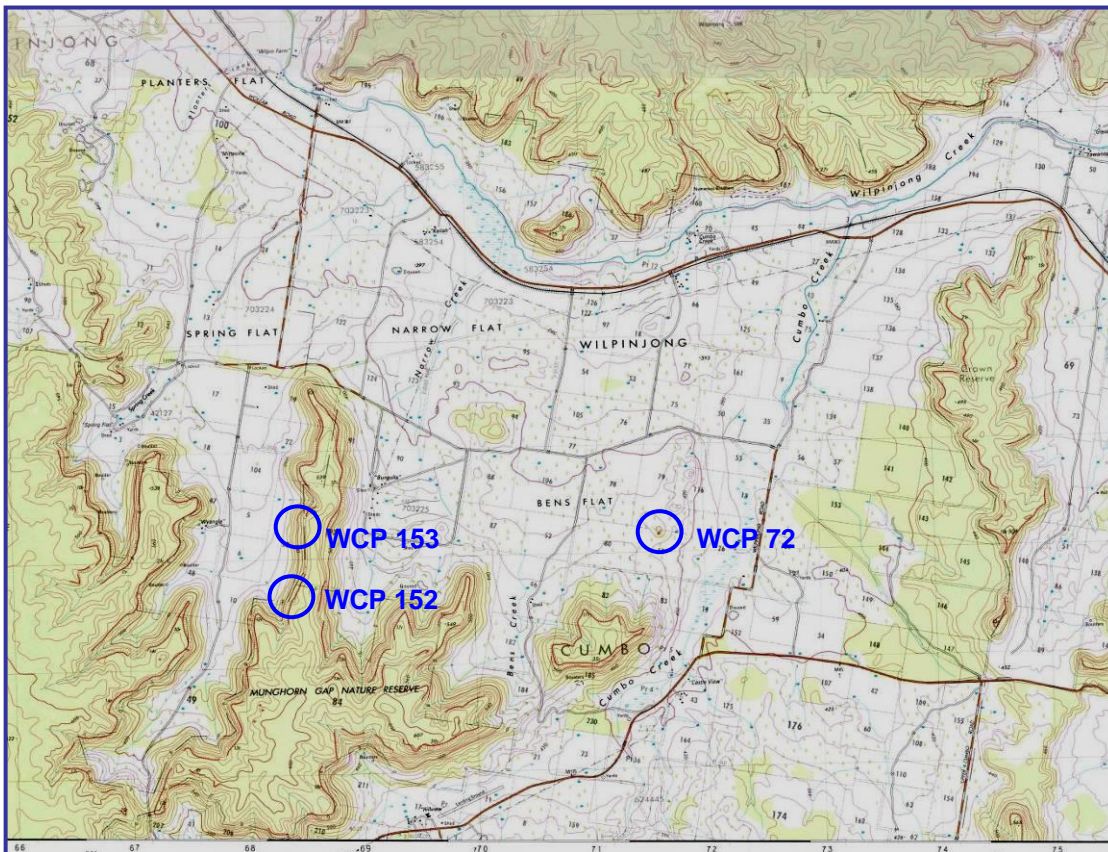
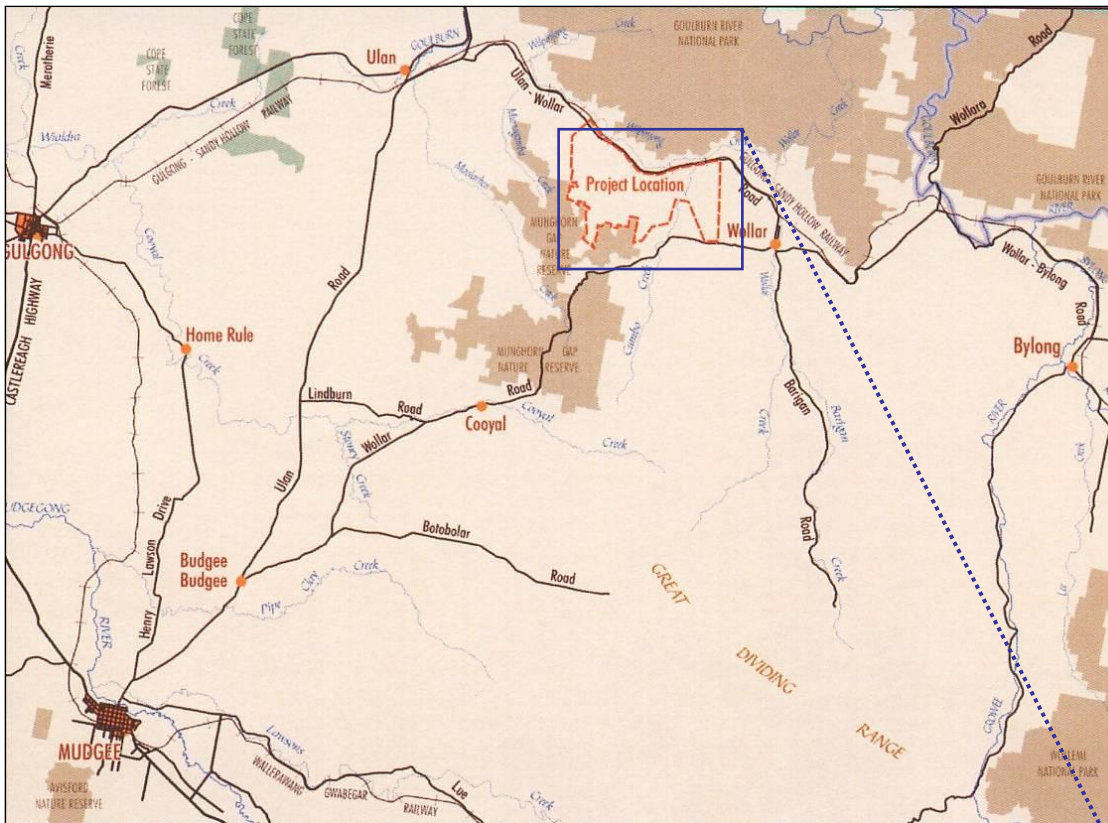


Figure 1.1 The location of the sites WCP72, 152 and 153, relative to the Wilpinjong Coal Project Area (General map supplied by client, Large scale map: Wollara 1:25,000 topographic map 1st Ed, CMA 1986)



2. METHODOLOGY

2.1 Participants

Fieldwork was directed by Kelvin Officer, Director NOHC, and undertaken by WCM employees and contractors Castlereagh Contracting Services, with the assistance of Tanietta Delaney, Native Title Liaison Officer, and Aboriginal stakeholders: Coral Williams (Warrabinga), Larry Foley (Murrong Gillinga), Shaen Morgan (North East Wiradjuri Co), and Christine Maynard (MLALC).

This report was written by Kelvin Officer.

2.2 Field Methodology

The fieldwork was conducted over the course of a single day, 27 October 2015. This was the second of a combined two day field program. On the previous day, field work had been conducted at site WCP72 as part of a separate dust analysis project (NOHC 2016).

Removal of combustible materials within and around each site involved the following actions:

- Conduct of site specific OH&S overview and discussion;
- General inspection of area by field team and discussion with Aboriginal representatives regarding agreed scope of works;
- Direction of contractors regarding required tasks;
- Felling and cutting of dead timber as required using chainsaw;
- Manual removal of sawn and other material from rock shelter floor, entrance and immediate surrounds (defined as a zone within approximately 5m of the shelter overhang);
- Re-location of removed material downslope of, and outside of a zone, 5m around the rock shelter entrance.

Demolition and removal of agricultural fence from WCP72 involved the following actions:

- Conduct of site specific OH&S overview and discussion;
- General inspection of area by field team and discussion with Aboriginal representatives regarding agreed scope of works;
- Removal of wire and wire netting from fence poles;
- Removal of star picket poles using manual post remover;
- Dismantling and removal of wooden rails and wire fastenings;
- Manual removal of wooden log stay bracing the strainer post;
- Cut wooden strainer-post (situated within rock shelter), as close as possible to ground level using chain saw, and remove.

All dismantled fencing materials were removed by the WCM contractors for off-site disposal.



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 'registered Aboriginal parties' or RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH).

As a part of the consultation program at the time of the fieldwork program, Wilpinjong Coal Mine directly employed Tanietta Delaney as a Native Title Claimant Liaison Officer. Tanietta supported the consultation for this field program by issuing fieldwork invitations and background information to all registered stakeholders, and participating and coordinating field transport and discussions.

An invitation to participate in the field program was provided to all of the eight registered Aboriginal stakeholder groups. Four of the stakeholder groups responded to the invitation and were represented by fieldwork participants.

3.2 Field Participation

The following representatives from four of the registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over the 26 and 27 October 2015:

- Coral Williams Warrabinga Native Title Claimants Aboriginal Group;
- Christine Maynard Mudgee Local Aboriginal Land Council;
- Shannon Foley and Larry Foley Murrong Gillinga; and
- Shaen Morgan North East Wiradjuri Co.



Figure 3.1
Larry Foley (middle) at WCP 153
discussing changes in site condition over
time.



4. RECORD OF ACTIONS AND OBSERVATIONS

4.1 WCP72

- The wooden end-post, strainer and rails of an agricultural fence was removed from within the northern end of shelter area. The post was cut at ground level using a chain saw and the below ground level section of the post was left in situ.
- The remaining downslope fenceline for a distance of approximately 120 metres was demolished and removed, including all metal star pickets, barbed and round-wire, and wire netting.
- All fallen limbs and branches on the ground within 5m of overhang extent were removed to locations further downslope.
- At the request of Tanietta Delaney, a large recently fallen and partly detached limb on a Eucalypt tree adjacent to the informal vehicle parking area was fully detached, made safe and cut up using a chainsaw.
- It was noted that a group of trees have died adjacent to, and downslope of the southern end of the shelter. These standing dead trees will be a source of fallen ground timber for years ahead.
- It was observed that the thick and compacted layer of dung present across many parts of the shelter floor is now cracking and pieces are becoming dislodged, especially where the dung forms a shallow deposit over rock floor. Further consideration is required regarding the potential fire and smoke hazard the dung deposit poses to the rock art panels.

4.2 WCP152

- A number of large fallen limb and trunk portions situated in front of the northern portion of the shelter were cut up and removed to a location further downslope.
- A remnant and decayed tree stump, situated at the northern end of the shelter floor was removed. The stump was easily dislodged due to minimal remaining connection with its former root ball. Removal or dislodgement of below-ground remains was not attempted.
- Fallen branches and forest litter were cleared from within 2m of the shelter extent, especially from the upslope fans of sediment situated at either end of the shelter.
- Care was taken not to dislodge or disturb the vibration monitor installed on the floor of the shelter at the southern end.
- It was noted that a young fig tree has become established in a rock face crack several metres above the rock shelter. If the roots of this tree penetrate and widen the rock crack, there is potential, over the long term, for an increase in water penetration into the overlying rock mass, and this may promote changes to the rock shelter hydrology.

4.3 WCP153:

- A small diameter dead standing tree, lying against the outside edge of the shelter overhang was cut at close to ground level and removed to further downslope.
- A small amount of surrounding leaf and branch litter was removed from within 2m of the shelter entrance.



4.4 Stakeholder comments and discussion

All stakeholder representatives were generally supportive of the actions and recognised the need to clear combustibles from the vicinity of the rock shelters.

All representatives welcomed the removal of the fenceline from WCP72, and the consequential benefit to the natural character and cultural integrity of the site.

Concern was expressed at the planned future open cut extraction of coal to the north of the WCP72 site, and the potential impacts to the viewshed from the site.

The presence of the compacted upper dung layer across the WCP72 shelter deposit was noted and generally considered to be an issue for further consideration. Some considered it to be discordant with the Aboriginal heritage of the site. Others suspect it may be a heat or smoke hazard in the event of wild fire. Some initial thoughts were that the dung layer should be removed from the site.



4.5 Pictorial Record

4.5.1 WCP72



View of end post and rails at shelter end of fenceline, looking N.



View of shelter end of fenceline looking S.



Removal of strainer post and rails.



Cutting of end post at base, (portion below ground left *in situ*).



View of former post location, after removal, looking N.



View of former post location, after removal, looking S.



View along fenceline, prior to demolition, looking W, upslope towards rock shelter.



View along fenceline, looking E, downslope and away from the rock shelter.



View of downslope end of fenceline prior to demolition, looking E.



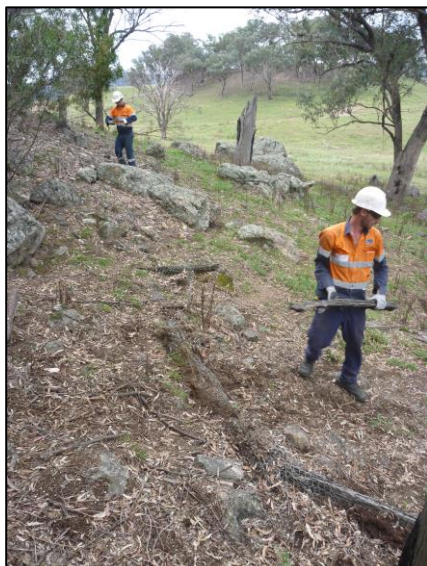
Detail of remnant wooden fencepost along alignment of fenceline subject to demolition.



Removal of wire mesh.



Removal of star pickets.



Removal of select portions of remnant protruding wire mesh from a former fenceline that encircled the rock formation. Looking N.



Removal of collapsed wire mesh along older former fenceline.



Felling and removal of dead tree situated within the shelter space and behind the dripline, looking SE. Note dead standing trees at far right.



Example of fallen timber within the vicinity of the shelter entrance, which was re-positioned further downslope.



Cracking and tabular structure of dung layer evident across the shelter floor.



Sections of the dung layer across the shelter floor are cracking and separating.



4.5.2 WCP152



View looking NW from start of climb to WCP152, showing proximity of mining at time of fieldwork.



Large limb and trunk fall in front of the rock shelter, before removal, looking N.



Large limb and trunk fall and other debris spread across the ground in front of the northern portion of the overhang, looking S.



Remnant tree stump near northern end of rock shelter, looking S.



Detail of southern portion of shelter floor, showing vibration sensor and animal dung, looking S.



Cutting of fallen timber prior to removal, looking N.



Cutting and removal of tree fall near and downslope of S end of shelter, looking NE.



Cutting of trunk fall in front of shelter, looking NE.



Cutting of trunk fall in front of shelter, looking SW.



Dislodgement of remnant stump, looking E.



Cutting and removal of remnant stump, looking E.



Grey huntsman (*Holconia immanis*) revealed during stump removal, approx. breadth 70mm.



Shelter floor and surrounds after clean-up, looking S.



Shelter floor and surrounds after clean-up, looking N.



4.5.3 WCP153



View looking NW from start of climb to WCP153, showing proximity of mining at time of fieldwork.



View, looking N across general area of WCP153 (lower left), showing tree fall debris.



Tree fall and forest litter situated on sediment fan at S end of shelter, looking SE.



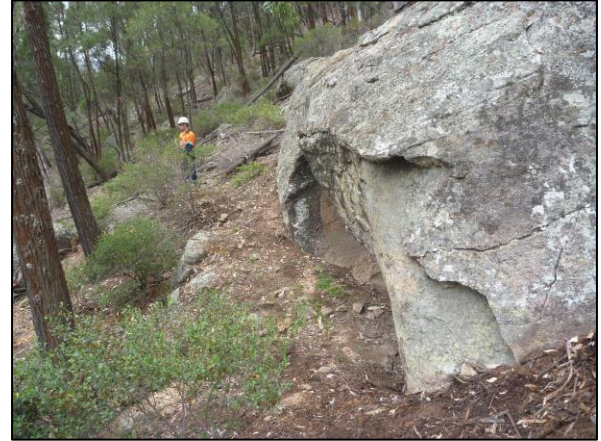
Cutting and removal of standing dead tree, looking S.



Dead standing tree resting on overhang lip, looking NE.



Shelter surrounds following clean-up, looking S.



Shelter surrounds following clean-up, looking N.



Shelter surrounds following clean-up, looking E.



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