APPENDIX 4 – HERITAGE

Heritage Reports

WILPINJONG COAL MINE,
CENTRAL TABLELANDS OF NEW SOUTH WALES:
ABORIGINAL CULTURAL HERITAGE INVESTIGATION
OF BIODIVERSITY OFFSET AREAS 1-5

DRAFT ONLY

A report to

Wilpinjong Coal Pty Limited

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by

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February 2019

EXECUTIVE SUMMARY

The Wilpinjong Coal Mine (the Mine) is an existing open-cut coal mining operation situated approximately 40 kilometres north-east of Mudgee, within the Mid-Western Regional Council Local Government Area, in the Central Tablelands of New South Wales. The Mine is owned and operated by Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited.

The Mine originally operated under a Project Approval (PA 05-0021) that was granted by the Minister for Planning under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) on 1 February 2006. Modification of the Project Approval (PA 05-0021) subsequently occurred six times. On 24 April 2017 WCPL was granted Development Consent (SSD-6764) for the Wilpinjong Extension Project that provides for the continued operation of the Mine until 2033. The Development Consent (SSD-6764) supersedes Project Approval (PA 05-0021).

An Aboriginal Cultural Heritage Management Plan (ACHMP) was initially prepared to manage interactions of the Project with Aboriginal heritage under the Part 3A Project Approval (WCPL 2008). The ACHMP was approved by the NSW Department of Planning and Environment (DP&E) and guided the management of Aboriginal heritage in the Project area *in lieu* of a Section 90 Aboriginal Heritage Impact Permit (AHIP) under the *National Parks and Wildlife Act 1974* (NP&W Act). Various minor revisions have subsequently occurred to the ACHMP and been approved by the DP&E. A new ACHMP (WCPL 2017a) that applies to the entire SSD area has now been approved to address the Development Consent (SSD-6764).

South East Archaeology was engaged by WCPL to undertake an Aboriginal cultural heritage investigation of Biodiversity Offset Areas 1-5 (BOA 1-5). These areas measure 996 hectares in total and have been established for conservation and management in perpetuity via transferral to the National Parks and Wildlife Service estate. The *Wilpinjong Coal Biodiversity Management Plan* (WCPL 2017b) has been prepared to manage these Biodiversity Offset Areas and other aspects of the biodiversity strategy.

The purpose and scope of the Aboriginal cultural heritage investigation of Biodiversity Offset Areas 1-5 was to ensure compliance with and address the relevant requirements of Condition 46 of Schedule 3 of Development Consent (SSD-6764) and Section 5.6.2 of the approved ACHMP.

To address Condition 46(a) of Schedule 3 of Development Consent (SSD-6764), this investigation was undertaken by suitably qualified and experienced persons whose appointment was endorsed by the Secretary of the DP&E.

To address Condition 46(b) of Schedule 3 of Development Consent (SSD-6764), this investigation was undertaken in consultation with the Office of Environment and Heritage (OEH) and the Registered Aboriginal Parties (RAPs), with copies of the draft methodology forwarded for review and comment to the OEH and all RAPs, invitations being extended to all RAPs to participate in the survey, copies of the draft report being forwarded for review and comment to each RAP, and copies of the final report to be forwarded to each RAP and the OEH.

To address Condition 46(c) of Schedule 3 of Development Consent (SSD-6764), the survey was focused on identifying areas of moderate to high significance, such as rock shelter/art sites. It was also undertaken with reference to the OEH *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and knowledge of Aboriginal cultural heritage from previous investigations undertaken at the Mine and surrounds. Field inspection of the BOA1-5 investigation area was undertaken over 12 days from 19 November to 1 December 2018 by archaeologists from South East Archaeology accompanied on every day by representatives of the RAPs. The heritage survey involved sampling across each of the Biodiversity Offset Areas.

To address Condition 46(d) of Schedule 3 of Development Consent (SSD-6764), this detailed report of the findings has been prepared, and to address Section 5.6.2 of the ACHMP, this report will be forwarded to each RAP, including those who elected not to participate in the survey.

To address Condition 46(e) of Schedule 3 of Development Consent (SSD-6764), consideration of how the outcomes would be incorporated into the Biodiversity Management Plan and ACHMP are presented here.

The survey resulted in the identification of 42 Aboriginal sites/PADs within or immediately adjacent to BOA1-5, comprising 32 open artefact sites, four rock shelters with PADs, three rock shelters with artefacts, two waterhole/wells and one ochre source. Two previously recorded sites could not be relocated. The significance of the Aboriginal heritage sites and potential deposits was assessed on a preliminary basis.

Section 5.1.1 and Table A6-1 of the Biodiversity Management Plan specify a number of potential management actions within the Biodiversity Offset Areas which have potential to cause impacts to identified and potential Aboriginal heritage resources and cultural values.

Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NP&W Act) and impacts are not permitted to occur to them in the absence of a Section 90 AHIP or approval of an ACHMP under Part 3A or Division 4.1, Part 4 of the EP&A Act. Although the Biodiversity Offset Areas are approved under the Division 4.1, Part 4 Development Consent, they are outside of the Development Application Area and area covered by the ACHMP. As such, any impacts to Aboriginal objects within the Biodiversity Offset Areas may not be covered by the Part 4 Division 4.1 exemptions to the NP&W Act and may require approval of an AHIP by the OEH.

To date, potential impacts on Aboriginal heritage within the Biodiversity Offset Areas have been managed through implementation of WCPL's Ground Disturbance Permit (GDP) process and the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* as set out in Section 7.4.1 and Table A6-1 of the Biodiversity Management Plan.

The current management process, as outlined in the Biodiversity Management Plan, has been assessed as largely suitable because:

- Through the Ground Disturbance Permit process, the effects of each management activity within BOA1-5, including the potential impacts on Aboriginal heritage, are considered prior to the activity occurring;
- Where ground disturbance may occur, the process allows for the conduct of a due diligence assessment (including survey) of the potential effects on Aboriginal heritage, following the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*; and

- These processes facilitate the identification of and consequent avoidance of impacts to known Aboriginal heritage sites.

However, there is the opportunity for more detail to be included in the Biodiversity Management Plan to clarify the steps required after implementation of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* and in the event that any new heritage evidence is identified during management works within the Biodiversity Offset Areas.

As such, it is recommended that the Biodiversity Management Plan is updated to include that if any Aboriginal heritage evidence is identified in the Biodiversity Offset Areas during a Due Diligence survey or during the conduct of management works:

- Impacts must be avoided to the identified Aboriginal heritage evidence and any work that may cause impacts to the Aboriginal heritage evidence must immediately cease and the ECM and RAPs be notified. In the event that skeletal remains are detected, the finds would also need to be reported to the Police and the OEH;

- Appropriate precautionary measures, such as informing relevant personnel of the nature and location of the identified Aboriginal heritage evidence and the need to avoid impacts, along with temporary protective fencing and/or marking of the site location and signage should be implemented as deemed necessary by the ECM to ensure that inadvertent impacts do not occur; and

- If impacts cannot be avoided to the identified Aboriginal heritage evidence, a Section 90 AHIP would be required to be obtained from the OEH prior to any impacts occurring. Prior to the AHIP application being lodged, an assessment and community consultation consistent with the OEH *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, including the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and Aboriginal community consultation in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy would be required.

The following recommendations are also made:

1) Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object ('strict liability offence'). Therefore, no activities or work should be undertaken within the Aboriginal site areas as described in this report and marked on Figures 9-13 without approval under Division 4.1 of Part 4 of the EP&A Act (or *in lieu* a valid Section 90 AHIP) and subsequent implementation of any relevant approval conditions;

2) Single copies of this report should be forwarded for review and comment to the RAPs, with a minimum 28 days allowed for comment; and

3) After revision of the draft report to include and address the responses of the RAPs, copies of the final report should be forwarded to each organisation and the DP&E and the OEH prior to 31 March 2019.

TABLE OF CONTENTS

FIGURES

TABLES

ABBREVIATIONS

Term	Definition
ACHMP	Aboriginal Cultural Heritage Management Plan
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
BOA	Biodiversity Offset Area
BP	Before Present
CHLSC	Cultural Heritage Liaison Sub-Committee
DECCW	Department of Environment, Climate Change and Water
DP&E	Department of Planning and Environment (NSW)
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EL	Exploration Licence
EP&A Act	*Environmental Planning and Assessment Act 1979*
GDA	Geodetic Datum of Australia
GIS	Geographic Information System
GPS	Global Positioning System
ICOMOS	International Council on Monuments and Sites
kV	kiloVolt
LALC	Local Aboriginal Land Council
LGA	Local Government Area
MGA	Map Grid of Australia
MGATSIC	Murong Gialinga Aboriginal and Torres Straight Islander Corporation
NEWCO	North East Wiradjuri Company Ltd
NP&W Act	*National Parks and Wildlife Act 1974*

Term	Definition
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NTA	*Native Title Act 1973*
OEH	Office of Environment and Heritage (NSW)
PA	Project Approval
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
RAPCC	Registered Aboriginal Parties' Consultation Committee
SEA	South East Archaeology
WCPL	Wilpinjong Coal Pty Limited
WEP	Wilpinjong Extension Project
WNTCAC	Warrabinga Native Title Claimants Aboriginal Corporation
WVWAC	Wellington Valley Wiradjuri Aboriginal Corporation

1. INTRODUCTION

South East Archaeology Pty Ltd has been engaged by Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Ltd (Peabody), to undertake an Aboriginal cultural heritage investigation of Biodiversity Offset Areas 1-5 (BOA 1-5).

WCPL owns and operates the Wilpinjong Coal Mine ('the Mine'), an existing open cut coal mining operation located approximately 40 kilometres north-east of Mudgee, near the village of Wollar, in the Central Tablelands of New South Wales (NSW) (refer to Figure 1). It is situated within the Mid-Western Regional Council Local Government Area.

The Mine originally operated under Project Approval (PA 05-0021) that was granted on 1 February 2006 under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). Modification of the Project Approval (PA 05-0021) subsequently occurred six times, with the most recent Modification approved in August 2016. The Mine has been operating since 2006, and is approved to produce up to 16 million tonnes per annum of run-of-mine coal from various open cut pits.

On 24 April 2017, WCPL was granted Development Consent (SSD-6764) for the Wilpinjong Extension Project that provides for the continued operation of the Mine until 2033, including access to approximately 800 hectares of open cut extensions. The Development Consent (SSD-6764) supersedes Project Approval (PA 05-0021). The Extension Project Development Consent extended the approved Project area to 5,755 hectares (from the previously approved Project area of 4,042 hectares) (refer to Figure 2).

An Aboriginal Cultural Heritage Management Plan (ACHMP) was initially prepared to manage interactions of the Project with Aboriginal heritage under the Part 3A Project Approval (WCPL 2008). The ACHMP was approved by the NSW Department of Planning and Environment (DP&E) and guided the management of Aboriginal heritage in the Project area *in lieu* of a Section 90 Aboriginal Heritage Impact Permit (AHIP) under the *National Parks and Wildlife Act 1974* (NP&W Act). Various minor revisions have subsequently occurred to the ACHMP and been approved by the DP&E. A new ACHMP (WCPL 2017a) has now been approved to address the Development Consent (SSD-6764). It applies to the entire approved SSD application area as shown on Figure 2.

As a condition of Development Consent (SSD-6764), WCPL has augmented its existing Biodiversity Offset Strategy to compensate for additional biodiversity impacts of the Extension Project. Five additional Biodiversity Offset Areas 1-5 (BOA 1-5) have been established for conservation and management in perpetuity via the National Parks and Wildlife Service estate (refer to Figure 3). These areas measure 996 hectares in total.

The *Wilpinjong Coal Biodiversity Management Plan* (WCPL 2017b) has been prepared to manage these Biodiversity Offset Areas and other aspects of the biodiversity strategy (such as Rehabilition Areas). Condition 42 of Schedule 3 of Development Consent (SSD-6764) required the preparation of the Biodiversity Management Plan, including to:

> (d) manage any potential conflicts between the proposed enhancement works in the biodiversity offset strategy areas and any Aboriginal heritage values (both cultural and archaeological) in these areas, as informed by the Aboriginal cultural heritage survey required under condition 46 of this schedule.

It is noted that the Biodiversity Management Plan would not apply to offset areas if they are transferred into the National Park Estate, in accordance with Conditions 34 and 35 of Schedule 3.

Condition 46 of Schedule 3 of Development Consent (SSD-6764) is the focus of the present heritage investigation and includes the following requirements:

> 46. Within 12 months of the commencement of development under this consent, unless the Secretary agrees otherwise, the Applicant shall carry out an investigation into the Aboriginal cultural heritage values in Offset Areas 1 to 5 to the satisfaction of the Secretary. This investigation must:
>
> (a) be undertaken by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary;
>
> (b) be undertaken in consultation with OEH and RAPs;
>
> (c) focus the survey effort to identifying areas of moderate to high significance, such as rock shelter/art sites;
>
> (d) include a detailed report on the findings; and
>
> (e) describe how the outcomes would be incorporated into the Biodiversity Management Plan and Aboriginal Cultural Heritage Plan required under this consent.

Section 5.6.2 of the approved ACHMP encapsulates the above requirements of Condition 46 of Schedule 3 of Development Consent (SSD-6764). In addition to addressing the above requirements, Section 5.6.2 of the ACHMP specifies that:

- Findings will be distributed to all Registered Aboriginal Parties (RAPs), including those who do not attend any surveys;
- The survey methodology will be based on the Office of Environment and Heritage (OEH) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a);
- The survey methodology will be designed in consideration of local knowledge of Aboriginal cultural heritage from previous investigations undertaken at the Mine and surrounds; and
- Following completion of this investigation, WCPL will seek to incorporate key findings with respect to the Aboriginal cultural heritage values of the offset areas in the Biodiversity Management Plan and/or update the ACHMP as required.

Hence, the purpose and scope of this Aboriginal cultural heritage investigation of Biodiversity Offset Areas 1-5 was to ensure compliance with and address the relevant requirements of Condition 46 of Schedule 3 of Development Consent (SSD-6764) and Section 5.6.2 of the approved ACHMP, including key tasks such as:

- WCPL obtaining DP&E approval of the investigation team;
- Undertaking research into the archaeological, Aboriginal history and environmental context of the investigation area building on the extensive work already completed by South East Archaeology in the locality;
- Undertaking searches of the OEH Aboriginal Heritage Information Management System (AHIMS) and other relevant indigenous heritage registers and planning instruments;
- Devising a methodology for the investigation;
- Consulting with the OEH and RAPs regarding the proposed methodology;

- Undertaking a field survey of the investigation area with representatives of the RAPs engaged by WCPL to conduct a sample survey targeting Aboriginal sites of moderate to high significance;
- Completing and submitting Aboriginal Site Recording Forms to the OEH for any new Aboriginal sites identified; and
- Preparing a report documenting the results of the investigation generally consistent with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and Section 5.6.2 of the Wilpinjong ACHMP.

In this report, details of the environmental context of Biodiversity Offset Areas 1-5 are presented in Section 2, details of the archaeological and cultural context in Section 3, Aboriginal community participation in Section 4, methodology in Section 5, results and discussion in Section 6, an assessment of heritage significance in Section 7, and consideration of potential impacts and management strategies in Sections 9 and 10, with recommendations in Section 11. A glossary defining technical terms is presented in Appendix 1. Details of previously recorded Aboriginal sites within Biodiversity Offset Areas 1-5 are presented in Appendix 2 and details of all sites recorded during the present investigation are presented in Appendix 3. Additional photographs are presented in Appendix 4 and records of consultation in Appendix 5.

This assessment has been prepared by Peter Kuskie, an archaeologist with a BA (Honours) degree in Aboriginal archaeology and over 28 years experience in the conduct of Aboriginal cultural heritage assessments throughout Australia, including 18 years experience in the locality of the investigation area and experience with numerous similar projects. The field investigation was undertaken by Michael Marsh, who holds a BA degree in archaeology from the University of New England and has 17 years experience in the conduct of Aboriginal heritage surveys and excavations, and Corey O'Driscoll, who holds a first class BA (Honours) degree in archaeology from the University of Queensland and has over six years experience in the conduct of Aboriginal heritage surveys, excavations and assessments.

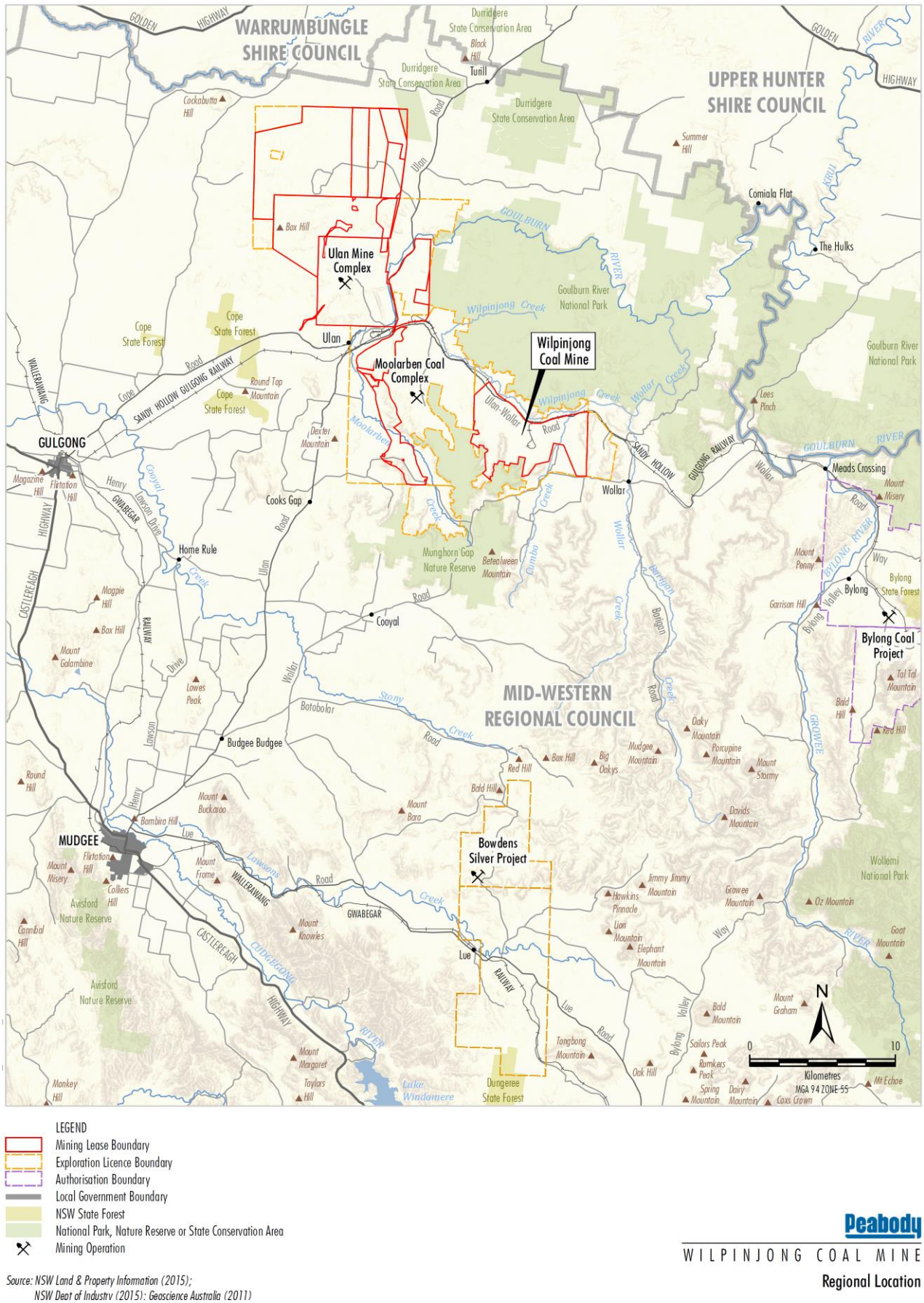

Figure 1: Location of Wilpinjong Coal Mine (courtesy WCPL).

Figure 2: General arrangement of approved Wilpinjong Coal Mine (courtesy WCPL).

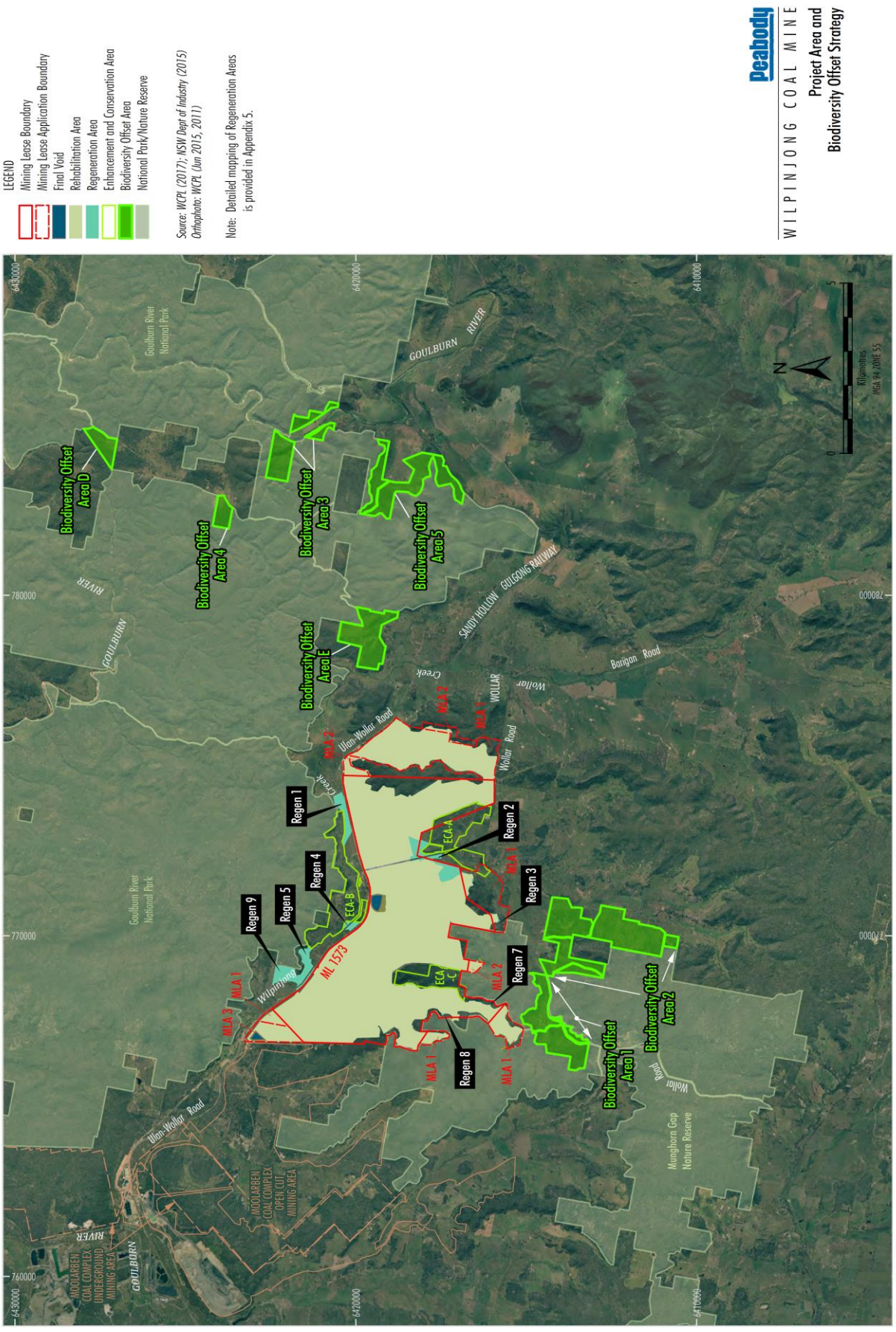

Figure 3: Location of Wilpinjong Biodiversity Offset Areas (courtesy WCPL).

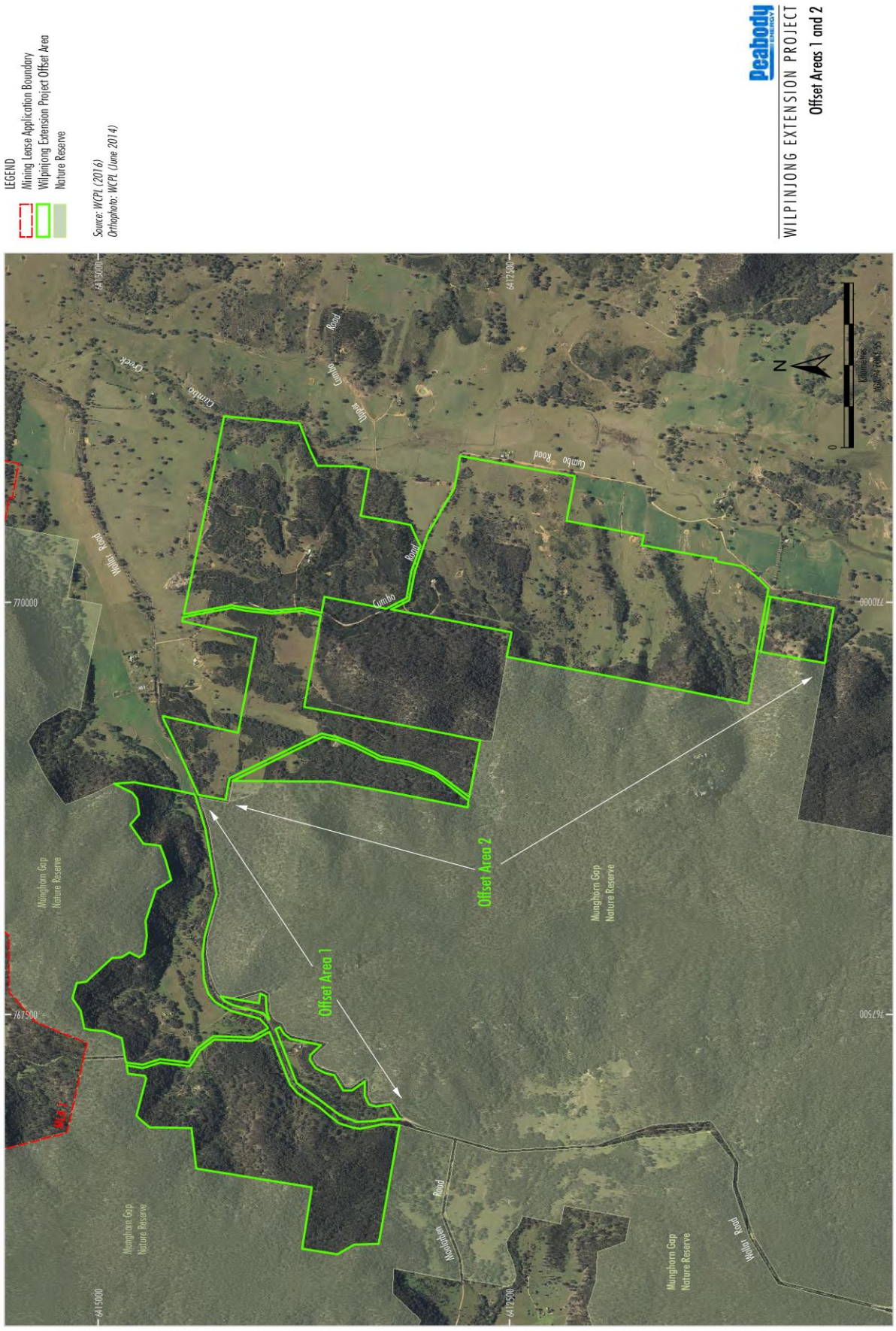

Figure 4: Biodiversity Offset Areas 1 and 2 (courtesy WCPL).

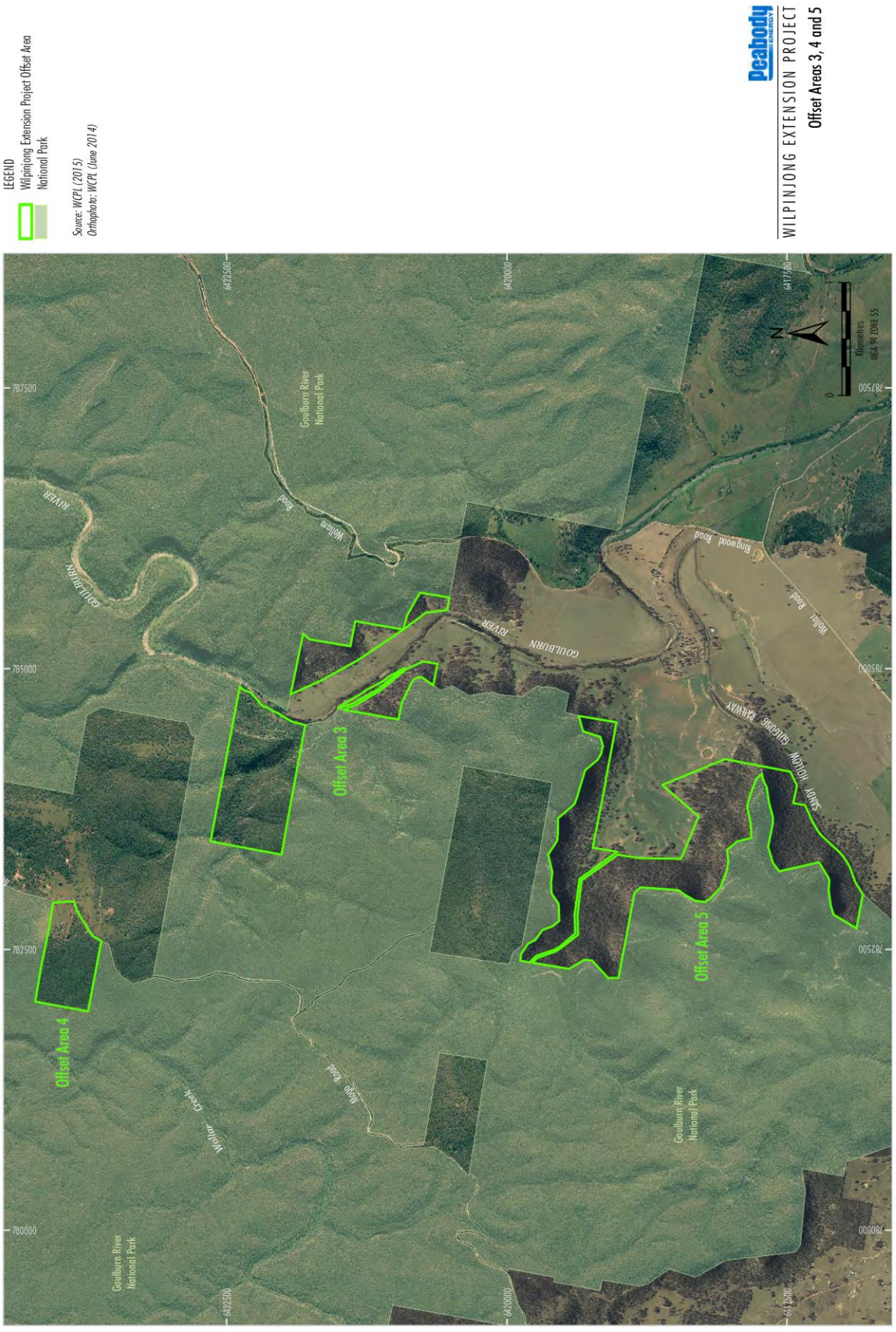

Figure 5: Biodiversity Offset Areas 3, 4 and 5 (courtesy WCPL).

2. ENVIRONMENTAL CONTEXT

The investigation area measures approximately 1,004 hectares (ten square kilometres) in total area. It comprises five spatially separate Biodiversity Offset Areas as described below and shown on Figures 3-5, located between 0.1 and eight kilometres outside of the approved SSD area.

Biodiversity Offset Area 1 (BOA1) measures 201 hectares in area and is located immediately south of the approved SSD area, adjacent to the Munghorn Gap Nature Reserve and Wollar Road (refer to Figures 3 and 4). It is situated between MGA Zone 55 grid reference eastings 766040 and 768910 and northings 6413170 and 6415160 on the Wollar 8833-2N and Munghorn 8833-2S 1:25,000 topographic maps. BOA1 is located marginally east of the Great Divide, in the upper catchment of the Goulburn River, and comprises moderate to steeply inclined slopes descending from the elevated sandstone terrain to the narrow valley of an un-named tributary of Cumbo Creek. Much of the area is forested and portions have been cleared of native vegetation, particularly along the valley. It is largely underlain by Illawarra Coal Measures, with Lees Pinch and Munghorn Plateau Soil Landscapes. Non-indigenous settlement has resulted in some impacts to the area, including from vegetation removal, pastoral activities, rural settlement (including residences) and infrastructure (such as essential services and roads).

Biodiversity Offset Area 2 (BOA2) measures 417 hectares in area and is located between 1.2 and five kilometres south of the approved SSD area, immediately south of the Wollar Road and east of the Munghorn Gap Nature Reserve (refer to Figures 3 and 4). It is situated between MGA Zone 55 grid reference eastings 768800 and 771130 and northings 6410530 and 6414610 on the Munghorn 8833-2S 1:25,000 topographic map. BOA2 is located marginally east of the Great Divide, in the upper catchment of the Goulburn River, and comprises moderate to gently inclined slopes and foothills descending from the elevated sandstone terrain to the valley of Cumbo Creek and one of its un-named tributaries. Part of the area is forested but much has been cleared of native vegetation. It is largely underlain by Illawarra Coal Measures, with Ulan and Lees Pinch Soil Landscapes. Non-indigenous settlement has resulted in some impacts to the area, including from vegetation removal, pastoral activities, rural settlement (including residences) and infrastructure (such as essential services and roads).

Biodiversity Offset Area 3 (BOA3) measures 126 hectares in area and is located between 5.8 and eight kilometres east of the approved SSD area, adjacent to the Goulburn River National Park (refer to Figures 3 and 5). It is situated between MGA Zone 56 grid reference eastings 218360 and 220780 and northings 6420690 and 6422710 on the Mount Misery 8933-3N 1:25,000 topographic map. BOA3 is located east of the Great Divide, in the upper catchment of the Goulburn River, and comprises scarps and slopes bordering the Goulburn River and its tributary. Much of the area is forested, with only a small portion cleared of native vegetation alongside the river. It is largely underlain by Narrabeen Group sandstone, with the Lees Pinch Soil Landscape. Non-indigenous settlement has resulted in minor impacts to the area.

Biodiversity Offset Area 4 (BOA4) measures 39 hectares in area and is located between 5.3 and 6.3 kilometres north-east of the approved SSD area, adjacent to the Goulburn River National Park and Mogo Road (refer to Figures 3 and 5). It is situated between MGA Zone 55 grid reference eastings 781950 and 782920 and northings 6423610 and 6424200 on the Wollar 8833-2N and Mount Misery 8933-3N 1:25,000 topographic maps. BOA4 is located east of the Great Divide, in the upper catchment of the Goulburn River, and comprises headwater tributaries of Wollar Creek. Part of the area is forested and part is cleared of native vegetation. It is largely underlain by Narrabeen Group sandstone, with the Lees Pinch Soil Landscape. Non-indigenous settlement has resulted in some impacts to the area, including from vegetation removal, pastoral activities, rural settlement (including residences) and infrastructure (such as essential services and roads).

Biodiversity Offset Area 5 (BOA5) measures 221 hectares in area and is located between five and 7.2 kilometres east of the approved SSD area, adjacent to the Goulburn River National Park and Sandy Hollow – Ulan Railway (refer to Figures 3 and 5). It is situated between MGA Zone 56 grid reference eastings 217440 and 219760 and northings 6416870 and 6419880 on the Wollar 8833-2N and Mount Misery 8933-3N 1:25,000 topographic maps. BOA5 is located east of the Great Divide, in the upper catchment of the Goulburn River, and comprises moderate to steeply inclined slopes descending from the elevated sandstone terrain to the valley of the Goulburn River. Most of the area is forested and a small portion is cleared of native vegetation. It is largely underlain by Narrabeen Group sandstone and Illawarra Coal Measures, with the Lees Pinch Soil Landscape. Non-indigenous settlement has resulted in some impacts to the area, including from vegetation removal.

Sandstone and conglomerate rock formations occur within the investigation area, including boulders and scarps. These can host evidence of Aboriginal occupation, such as deposits of artefacts and cultural material in rock shelters or overhangs, rock art on surfaces of shelters or overhangs, and grinding grooves on exposed bedrock (open surfaces) or on isolated cobbles/boulders.

Much of the investigation area only comprises a single resource zone (woodland/forest) in which higher-order watercourses are absent. However, portions of the investigation area are located closer to third or higher-order watercourses or other possible areas of water retention (for example, billabongs, swamps or marshes), which are likely to have been significant factors in relation to Aboriginal occupation of the locality (refer to Section 3). These areas include portions of BOA 1 and 2 close to Cumbo Creek and its higher order tributary, portions of BOA3 adjacent to the Goulburn River, and portions of BOA5 close to Craigs Gully.

Consideration of climactic and associated landscape changes over time is important in relation to understanding the nature of Aboriginal occupation. In the late Pleistocene, during the last glacial maximum from about 24,000 to 17,000 years ago, the climate was cooler (possibly 6-10ºC) and drier than at present. Potable water was probably not frequently available in the locality. In terms of subsistence resources and potable water, the investigation area would generally not have represented an environment conducive to Aboriginal occupation. After temperatures rose in the late Pleistocene/early Holocene, potable water may have been more frequently available in the locality, particularly in the higher-order watercourses such as Wilpinjong Creek. As such, the general locality was more conducive to occupation in the Holocene period.

3. ABORIGINAL ARCHAEOLOGICAL CONTEXT

3.1 Heritage Register Searches

A number of Aboriginal heritage investigations have been undertaken within the vicinity of the investigation area for Wilpinjong Coal Mine, which have resulted in the recording of over 700 Aboriginal sites within the Wilpinjong SSD Project Approval Area, including 427 open artefact sites, 157 rock shelters with Potential Archaeological Deposits (PADs), 63 scarred trees, 36 rock shelters with art/artefacts/ochre quarry/waterhole/well, 12 waterhole/wells, three grinding grooves, and a bora/ceremonial/carved tree site (WCPL 2017a).

However, no systematic archaeological surveys have been reported within Biodiversity Offset Areas 1-5. This is reflected in searches undertaken on 2 August 2018 and 4 February 2019 of the OEH AHIMS, of 54 square kilometres encompassing the Biodiversity Offset Areas, in which only 16 Aboriginal sites/PADs (four rock shelters with art, four open artefact sites, three rock shelters with artefacts, three open grinding groove sites, an open context PAD and a waterhole/well) are listed within this broad search area. Only two sites, OEH #36-3-0010, a rock shelter with art, and #36-3-2688, a waterhole/well, are reported to be located within the Biodiversity Offset Areas (both in BOA1; refer to Figure 9). Details of these sites are presented in Appendix 2.

3.2 Previous Archaeological Research

A number of Aboriginal heritage investigations have been undertaken within the vicinity of the investigation area, principally for Environmental Impact Assessments relating to the Wilpinjong Coal Mine, along with the adjacent Moolarben Coal Mine and Ulan Coal Mines.

A summary of the known Aboriginal heritage investigation reports within the Wilpinjong Mine SSD area is presented in Table 3 of the ACHMP and discussed in Section 4.1 of the ACHMP (WCPL 2017a). A summary of known reports at Wilpinjong Mine between 2005 and 2015 is included here as Table 1, with more recent investigations having been undertaken by Navin Officer Heritage Consultants. Notably however, no systematic archaeological surveys have been reported within Biodiversity Offset Areas 1-5.

Archaeological investigations at the Wilpinjong, Moolarben and Ulan coal mines and elsewhere in the locality have resulted in the identification of a large number of rock shelter sites with archaeological deposits and/or rock art or grinding grooves, along with many shelters with potential deposits. The large numbers of shelter sites partly reflects the focus of the underground mining related surveys, which have predominantly targeted sandstone rock formations within elevated terrain. These sites have been identified in isolated rock formations and more commonly along more extensive rock formations. The shelter sites vary widely in terms of topographical context (eg. distance to watercourse, size/order of watercourse and aspect), contents, nature (eg. size of shelter and extent of habitable floor area) and potential (eg. depth and extent of potential artefact deposits). Apart from several major sites such as the "Hands on Rock" complex (approximately 14 kilometres north-west of the Wilpinjong Coal Mine), rock art occurs relatively infrequently in the recorded shelters and tends to comprise red ochre hand stencils (Kuskie 2009).

Table 1: Summary of known Aboriginal heritage investigation reports from 2005 to 2015 within the Wilpinjong Coal Mine.

Author	Date	Title	Investigation Type	Details
Navin Officer	2005	*Wilpinjong Coal Project Appendix F: Aboriginal Cultural Heritage Assessment*	Survey for the original EA	Resulted in identification of 224 heritage sites and PADs.
Navin Officer	2005b	*Supplementary Archaeological Survey of Site Depot, Borrow Pit, ROM PAD and [Proposed] Radio Facility, Wilpinjong Coal Project*	Report on Cultural Heritage Works Program arising from EA	Supplementary archaeological survey of some infrastructure areas to determine if any Aboriginal had become visible since the original EIS. One additional site located in proximity to the Radio Facility.
Navin Officer	2006a	*Wilpinjong Coal Project: Archaeological Salvage and Post EIS Investigations*	Report on Cultural Heritage Works Program arising from EA	Detailed report on the salvage of sites within the "Pit 1" area, initial infrastructure areas, Bungalla Road and new disturbance area; survey of additional disturbance areas not covered in the original EIS.
Navin Officer	2006b	*Baseline Recording of Three Aboriginal Rock Art Sites WCP72, 152 and 153, at Wilpinjong, NSW: Wilpinjong Coal Project Aboriginal Cultural Heritage Management Program*	Report on Cultural Heritage Works Program arising from EA	Baseline recording of three rock art sites beyond the area of direct mine impact; carried out as part of a monitoring program, as required under the Project Approval and Native Title Agreement Ancillary Deed.
Navin Officer	2006c	*Wilpinjong Coal Project: Archaeological Salvage and Post EIS Investigations: Interim Summary Report*	Report on Cultural Heritage Works Program arising from EA	Final report detailing outcomes from the salvage of sites within the "Pit 1" area, initial infrastructure areas, Bungalla Road and new disturbance area; survey of additional disturbance areas not covered in the original EIS.
Navin Officer	2006d	*Archaeological Survey. Three Proposed Fence-Line Alignments and Two Power Pole Locations, Wilpinjong Coal Project*	Summary report on Cultural Heritage Works Program arising from EA	Archaeological survey of three proposed fence-lines and two power poles required for pastoral stock management and installation of site offices.
Kayandel	2006	*Wilpinjong Coal Project Aboriginal Cultural Heritage Survey: Supplemental Survey of Escarpment Areas and Report of Findings*	Report on Cultural Heritage Works Program arising from EA	Survey of the escarpment area beyond the area of direct mine impact to identify sites that may be susceptible to indirect impacts (such as through blasting).
Kayandel (Hubschmann and Markus)	2011	*Archaeological Excavation and Salvage: WCP33, October 2009 and December 2010 – January 2011*	Report on site WCP33 Cultural Heritage Investigations	Draft report on details of salvage of site WCP33 undertaken under approved ACHMP.
Kayandel (Syme, Zaghloul and White)	2013	*WCP216 Archaeological Excavations: Test and Open Area. Main Report and Associated Appendices*	Draft report on site WCP216 Cultural Heritage Investigations	Draft report on details of salvage of site WCP216 undertaken under approved ACHMP.
Brennan	2013	*Wilpinjong Coal Mine, Rock Art Conservation and Monitoring Project: Field Inspection Report and Recommendations*	Report on Rock Art Monitoring	Report on three rock art sites beyond the area of direct mine impact; carried out as part of the monitoring program undertaken under the approved ACHMP (WCPL 2008).

Table 1 (continued):

Author	Date	Title	Investigation Type	Details
Kuskie	2013a	*Wilpinjong Coal Mine - Pit 3 Clearance Areas: Preliminary Discussion Paper Regarding Aboriginal Heritage Management Strategies for Sites WCP 5, 65, 68 and 237*	Report on Cultural Heritage Works Program arising from EA	Advice on Pit 3 clearance areas.
Kuskie	2013b	*Wilpinjong Coal Mine - Pit 3 Clearance Areas: Additional Advice Regarding Aboriginal Heritage Management Strategies for Sites WCP 5, 65 and 237*	Report on Cultural Heritage Works Program arising from EA	Advice on Pit 3 clearance areas.
Kuskie	2013c	*Wilpinjong Coal Mine, Central Tablelands of New South Wales Modification: Aboriginal Cultural Heritage Assessment*	Survey for Mod 5	Survey of additional disturbance areas not covered in the original EIS as part of the Mod 5 EA.
Kuskie	2013d	*Wilpinjong Extension Project - Preliminary Report on Aboriginal Heritage Due Diligence Survey of Soil Test Pit and Drilling Areas*	Due diligence	Due diligence of soil test pits and drilling areas.
Kuskie	2014a	*Wilpinjong Coal Mine - Aboriginal Heritage Salvage of Sites WCP 1, 65 and 237: Interim Status Report, July 2014*	Report on Cultural Heritage Works Program arising from EA and Modification.	Salvage excavation of sites WCP 1, 65 and 237. Interim report.
Kuskie	2014b	*Wilpinjong Coal Mine - Preliminary Report on Aboriginal Heritage Due Diligence Survey of Cumbo Creek Sediment Dams*	Due diligence	Due diligence of Cumbo Creek sediment dams.
Kuskie	2014c	*Wilpinjong Extension Project - Report on Aboriginal Heritage Due Diligence Survey of Drilling Areas*	Due diligence	Due diligence of drilling areas.
Kuskie	2014d	*Wilpinjong Mine - Preliminary Report on Aboriginal Heritage Due Diligence Survey of Proposed Piezometer Near Wollar*	Due diligence	Due diligence of piezometer.
Apex Archaeology	2013a	*Wilpinjong Coal EL Exploration Drilling - Exploration Lease 7091 Due Diligence*	Due diligence	Due diligence of drilling areas.
Apex Archaeology	2013b	*Wilpinjong Coal Exploration Drilling - Mining Lease 1573 Due Diligence*	Due diligence	Due diligence of drilling areas.
Apex Archaeology	2013c	*Wilpinjong Coal Ancillary Works - Due Diligence*	Due diligence	Due diligence of piezometers, tree corridor, soil testing areas and water gauging station.
Apex Archaeology	2013d	*Wilpinjong Pit 5 - Mining Lease 1573 Surface Collection*	Report on Cultural Heritage Works Program arising from EA	Surface collection of sites within Pit 5 under ACHMP.
Apex Archaeology	2014a	*Wilpinjong Pit 7 SOW – Mining Lease 1573 Excavation Report*	Report on Cultural Heritage Works Program arising from EA	Report on excavations carried out at site WCP92 in the Pit 7 area, in compliance with the existing ACHMP.
Apex Archaeology	2014b	*Wilpinjong Coal: Cumbo Creek Salvage Works and Surface Collection of WCP2 and WCP447 Salvage Report*	Report on Cultural Heritage Works Program arising from EA	Surface collection of sites WCP2 and WCP447 and test excavations at Cumbo Creek under ACHMP.

Table 1 (continued):

Author	Date	Title	Investigation Type	Details
Apex Archaeology	2014c	*Wilpinjong Coal: Removal of Modified Tree WCP 122 Salvage Report*	Report on Cultural Heritage Works Program arising from EA	Salvage of modified tree WCP122 under ACHMP.
Navin Officer	2015	*Wilpinjong Coal Aboriginal Rock Art Monitoring and Assessment Program: Report on December 2014 Site Inspection.*	Report on Rock Art Monitoring	Report on three rock art sites beyond the area of direct mine impact; carried out as part of the monitoring program undertaken under the approved ACHMP (WCPL 2008).
Kuskie	2015	*Wilpinjong Coal Mine, Central Tablelands of New South Wales – Extension Project: Aboriginal Cultural Heritage Assessment.*	Survey for the Extension Project EA	Report on survey of 12 square kilometre area for Extension Project, including Slate Gully and areas fringing the existing approved Mine, with an additional 137 sites and PADs located.

Numerous open artefact occurrences have also been identified in the locality. The numbers of artefacts vary from minor scatters and numerous isolated finds, for which details have not often been recorded in earlier studies, to dense concentrations of lithic material with hundreds of artefacts present. A conservative conclusion is that artefact evidence is distributed in a widespread manner across the locality, in generally low densities equating to background discard (manuport and artefactual material which is insufficient either in number or in association with other material to suggest focused activity in a particular location; Rich 1993, Kuskie and Kamminga 2000), with occasional higher densities representing more focused occupation (eg. encampments, or events of longer duration or involving larger numbers of people) or repeated occupation in favourable environmental contexts. Such contexts appear to include elevated, well-drained and low gradient flats, terraces, spur crests, ridge crests and simple slopes adjacent to watercourses, particularly higher order watercourses and/or multiple subsistence resource zones.

The identified artefact evidence tends to predominantly comprise items associated with non-specific stone flaking, on quartz and to a lesser extent tuff, chert and other stone materials. Other activities are also represented, such as microblade and microlith production, discard of microliths and discard of non-microlith tools, many of which are associated with working of plant and/or animal materials, food preparation or tool maintenance (Kuskie 2009).

Grinding groove sites in the locality are typically located in sedimentary bedrock along watercourses, but also occur on open surfaces of sandstone in other contexts (eg. simple slopes) and on smaller sandstone slabs or surfaces in rock shelters.

Other Aboriginal site types have been recorded in low numbers within the locality, including scarred trees, ochre quarries, lithic quarries, stone arrangements, waterhole/wells and a possible burial. Sites of traditional or historical cultural significance to Aboriginal people (excluding the contemporary significance attached to the site types noted above), have also been reported within the locality.

Excavations of rock shelters provide valuable information about the nature and chronology of Aboriginal occupation in the locality. Moore's (1970, 1981) investigations of the Bobadeen 1 site provide a basal date of about 6,000 years Before Present (BP) for the locality, while Pearson (1981) recovered an occupation date of 5,500 years BP from a shelter at Botobolar. Nevertheless, a number of contexts have been identified within the locality that could host older evidence of Aboriginal occupation extending back into the Pleistocene period (ie. over 10,000 years of age), including creek terrace deposits covered by colluvial slopewash and rock shelter sites.

3.3 Local Aboriginal Culture

The investigation area lies within the north-eastern portion of the territory of the Wiradjuri people as defined by Tindale (1974) and Horton (1994, 2000), close to the boundary with the Kamilaroi to the north, and the Geawegal and Wonnarua further to the east (refer to Figure 6).

Pearson (1981:75-76) inferred from the ethnohistorical evidence of Gunther, Lawson, Cox and others, that the upper Macquarie was inhabited by large localised groups of Aboriginal people, who in the normal course of life were divided into small groups of up to 20 people. These groups could easily come together for short periods for subsistence, ceremonial or social reasons and form larger groups of 80 to 150 people.

Pearson (1981:81) inferred that the Wiradjuri in the Upper Macquarie River region was probably subdivided into three groups, one centred in the general Mudgee-Rylstone area and the others in the general areas of Bathurst and Wellington. Haglund (1999) noted that these groups may have comprised several clans each, with descendants of one of at least two clans in the Mudgee-Rylstone group still living in the locality. Pearson's (1981:81a) map of the hypothetical group distributions places the Mudgee-Rylstone group in the vicinity of the Wilpinjong locality, albeit on the fringe of other (probable Kamilaroi) territory to the north.

Haglund (2001) noted in relation to Howitt's (1904) claim that one group of Kamilaroi lived in the Munmurra Creek area, north of Wollar, that this group may have formed a buffer between the Wiradjuri and Geawegal and Wonnarua. However, the reliability of Howitt's evidence is questionable, due to the late period in which it was obtained and admissions to knowing very little about this region. At the time of non-indigenous contact, there was both friendly and hostile contact between the north-east Wiradjuri and the Kamilaroi and Wonnarua people. Cassilis Gap was a known travel route.

A wide variety of subsistence resources were available in the past to the local Aboriginal people. Ethnohistorical and other evidence suggests that the diet of the local Aboriginal people would have included amongst other foods, possum, kangaroo, wallaby, wombat, kangaroo rat, platypus, lizards, snakes, goanna, tortoise, fish, mussels, crayfish, various birds, insects, and various plants (Pearson 1981:335).

The material culture of the local Aboriginal population would have included a range of items related to subsistence, cultural and social activities and shelter. However, in the archaeological record, few of these items are preserved. Stone, bone and shell are the materials most frequently represented in archaeological sites.

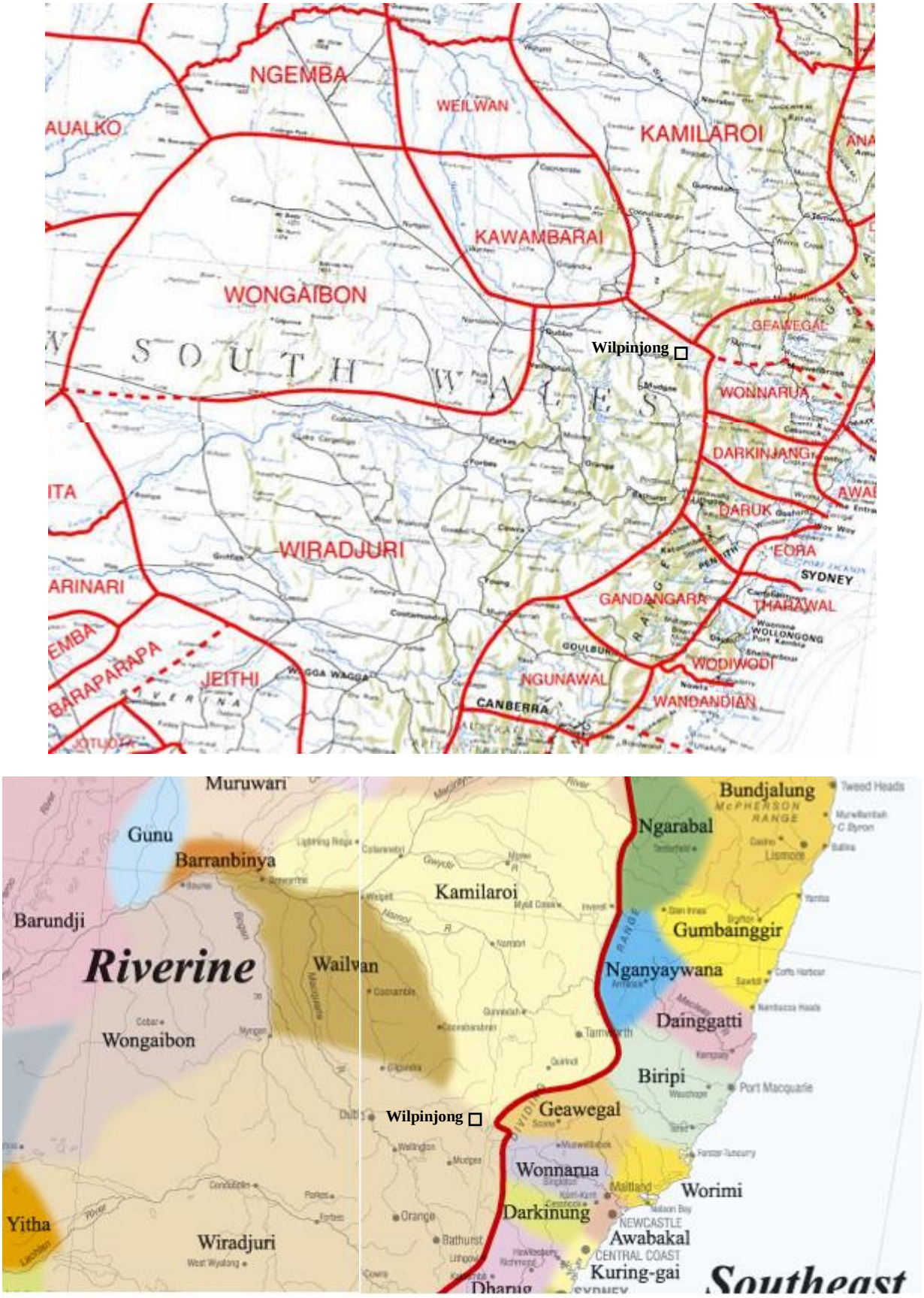

Figure 6: Cultural group boundaries in the Wilpinjong Coal Mine locality (Tindale 1974 above and Horton 2000 below).

The influx of non-indigenous settlers into the region had profound effects upon the Wiradjuri, as the newcomers sought to gain the land for agricultural and pastoral utilisation and later for mining the valuable mineral resources present (Clayton and Barlow 1997). In the Ulan area, fighting between non-indigenous and Aboriginal people occurred in the 1820s as settlers sought to establish grazing runs, with hostilities peaking between 1824 and 1826 (Haglund 1999). The dramatic increase in the number of non-indigenous settlers around Mudgee, Bathurst and Gulgong from the 1850s to the 1870s, during the gold rush, resulted in the displacement of the Aboriginal people and further incidents of warfare (Burless 1997).

Despite all this, the Wiradjuri people survived. Many Wiradjuri families lived apart from the Aboriginal Stations, and no Stations had been established in the late 1800s in the north-eastern Wiradjuri area (Burless 1997). A vibrant Aboriginal population remains in the region today and takes an active interest in the management of their heritage (refer to Section 4 for details of consultation with the Aboriginal community in relation to this investigation).

In terms of ethnohistorical references, few relate directly to the Wilpinjong locality.

Accounts of Jimmy Governor note the presence of an Aboriginal camp at Wollar. The *Bathurst Free Press and Mining Journal* (21 August 1900) reported that men, women and children were camped at the Mechanics Institute at Wollar. As a reaction to the Governor killings, and in fear that either Jimmy and his associates would return to Wollar, or Jacky Governor of Wollar would attempt to join his brothers, stricter controls were placed over the Aboriginal people at Wollar and Police initially removed young, able bodied Aboriginals to Mudgee. Five men noted in the *Bathurst Free Press and Mining Journal* (21 August 1900) report were charged with vagrancy and jailed for eight days (an action for which the legality was questioned). Subsequently, the entire Wollar Aboriginal community was forcibly relocated to the Brewarrina Mission (Ellinghaus 2006).

Navin Officer (2005) report that the Aboriginal camp at Wollar may have existed for a significant part of the late 19th Century and into the early 20th Century. Navin Officer (2005) cite an undated extract from a local Wollar correspondent published by the Wollar Centenary Publications Committee (McDermott 1985):

> By 1896 it was a rare sight, to see a colony of Aborigines, as most have long since died out in these parts – Wollar has such a small colony who have cosy quarters on the creek bank, living peaceably and happily enough and at times doing little jobs in the shape of 'ringing', burning off, and other things. The police are most particular about persons visiting the encampment without a permit, and he who infringes this rule runs the risk of incurring a substantial fine.'

Navin Officer (2005) report that some Wollar residents talked in 1985 about their grandparent's memory of the Aborigines "voices and laughter echoing across the creek in the night" and that the population was severely affected by an influenza epidemic in 1902 (McDermott 1985). Navin Officer (2005) document a local resident, Mrs Lyn Robinson (born 1906), as recalling how her mother-in-law remembered as a young child, local Aboriginal people passing through the valley and camping 'around the rocks'. This information places Aboriginal people camping and passing through the valley in the early 20th Century (Navin Officer 2005). Mrs Robinson believed these people were not those that occupied the Aboriginal encampment at Wollar (Navin Officer 2005).

The surveyor R. H. Mathews (1894) described a bora ceremonial ground near Wilpinjong Creek. Mathews inspected and recorded the bora ground in December 1893 with a local resident, Mr William Carr, who had resided there since childhood. Mr Carr is cited as knowing of the bora ground for more than 30 years and that several boras had been held there. Mr Carr also mentioned numerous marked trees (carved trees) but that most of them had been destroyed by bush fires (Mathews 1894). Mathews (1894) described the bora as comprising a larger circle separated from a smaller circle by a distance of '17 chains' (c. 340 metres) by a winding track. The larger circle, on sandy soil, measures 50 feet (15 metres) in diameter, and the small circle on a gravelly, well-wooded ridge was better preserved. A raised earth outline of a human figure was also present. The OEH AHIMS register lists the approximate location of this site (#36-3-0044) as being on a ridge north of Wilpinjong Creek, over five kilometres from the Biodiversity Offset Areas.

3.4 Aboriginal Occupation Model

A detailed occupation model for the locality and a predictive model of site location were devised and reassessed during the Wilpinjong Modification 5 and Extension Projects by Kuskie (2013c, 2015; following from Kuskie 2009). The general model of occupation for the locality involves the following key elements (Kuskie 2015):

- Members of the north-eastern clan of the Wiradjuri, that was centred around the Mudgee-Rylstone area, predominantly occupied the area. Interactions with and visitation from members of neighbouring cultural groups (particularly the Kamilaroi) may also have sporadically occurred;

- Occupation primarily occurred within the past 5,000 years, but may have extended as far back as 30,000 - 40,000 years Before Present (BP) (although it is uncertain that any evidence for this may remain);

- Occupation was predominantly focused on the relatively more abundant and diverse resource rich zones within the north-east Wiradjuri territory (eg. the junction of multiple resource zones) particularly along higher order watercourses (eg. the Goulburn River and Talbragar River). Within these *primary resource zones*, such occupation could include nuclear/extended family base camps, community base camps and occasional larger congregations of groups where resources permitted. Encampments in more favourable locations (eg. abundant resources and water) may have been the subject of stays of longer duration and more frequent episodes of occupation than in other areas (eg. *secondary resource zones*);

- Outside of the primary resource zones sporadic occupation of *secondary resource zones*, focused on the watercourses and swamps/wetlands, particularly within close proximity of higher order watercourses and associated flats and terraces (eg. the higher order portions of Wilpinjong Creek). These zones were utilised for encampments by small parties of hunters/gatherers and nuclear/extended family groups during the course of the seasonal round. There was a strong preference for camping on level ground, adjacent to reliable water sources and more abundant subsistence resources. A greater range and frequency of activities were undertaken at the encampments, rather than in the surrounding landscape. Camp sites near the watercourses were occupied by these small groups of people for varying lengths of time (but of typically short duration), during both the course of the seasonal round and in different years. Occupation of these camp sites was predominantly sporadic, rather than continuous;

- Occupation outside of the primary resource zones and secondary resource zones tended to involve hunting and gathering activities by small parties of men and/or women and children, along with transitory movement between locations and procurement of stone materials. However, the utilisation of these areas (eg. typically simple slopes, ridge crests, spur crests and lower order watercourses) was far less intense than along the higher order watercourses or swamp margins where encampments were situated and potable water and more abundant resources present. These areas outside of the primary and secondary resource zones were probably typically exploited during the course of the normal daily round by inhabitants of encampments located in the primary or secondary resource zones, foraging within an area of up to ten kilometres radius from their campsites;

- Occupation outside of the primary and secondary resource zones also involved special purpose journeys (eg. to procure stone or ochre from a known source or to access an area for ceremonial/spiritual purposes) and non-secular activities (eg. ceremonial activities);

- Activities varied in frequency and occurrence within the landscape (and between the different occupation site types), probably in relation to numerous variables such as topography, distance to resource zones, distance to water, aspect, slope and cultural choice. However, few activities will be evident within the archaeological record other than those involving the use of stone, or where preservation conditions permit, other materials such as bone, shell and wood. The majority of evidence within an archaeological context will relate to the reduction of stone, but some evidence will exist of hearths, food processing, food procurement and ceremonial and other activities.

As noted in Section 2, much of the Biodiversity Offset Areas only comprise a single resource zone in which higher-order watercourses are absent. Occupation of these areas may have tended to involve hunting and gathering activities by small parties of men and/or women and children, along with transitory movement between locations and procurement of stone materials.

However, portions of BOA 1 and 2 close to Cumbo Creek and its higher order tributary, portions of BOA3 adjacent to the Goulburn River, and portions of BOA5 close to Craigs Gully may represent areas consistent with a *secondary resource zone* under the occupation model (or even a *primary resource zone* in the case of the Goulburn River). Occupation of these areas, where more reliable potable water and subsistence resources may have been available, may have included camping by small parties of hunters/gatherers and nuclear/extended family groups, in addition to hunting and gathering and transitory movement between locations. Occupation of these areas is expected to have occurred at a higher intensity than in the surrounding areas.

3.5 Predictive Model of Site Location

A predictive model of site location is constructed to identify areas of archaeological sensitivity (ie. locations where there is a potential of archaeological evidence occurring), so it can be used as a basis for the planning and management of Aboriginal heritage. Predictive modelling involves reviewing existing literature to determine basic patterns of site distribution. These patterns are then modified according to the specific environment of the investigation area to form a predictive model of site location. A sampling strategy is employed to test the predictive model and the results of the survey used to confirm, refute or modify aspects of the model.

The use of land systems and environmental factors in predictive modelling is based upon the assumption that they provided distinctive sets of constraints that influenced Aboriginal land use patterns. Following from this is the expectation that land use patterns may differ between each zone, because of differing environmental constraints, and that this may result in the physical manifestation of different spatial distributions and forms of archaeological evidence (Hall and Lomax 1993:26).

The predictive model is based on information from the following sources:

- Identification of land systems and landform units;
- Previous archaeological surveys conducted within the region;
- Distribution of recorded sites and known site density;
- Traditional Aboriginal land use patterns; and
- Known importance of any parts of the investigation area to the local Aboriginal community.

The following is a brief description of the site types that may occur within the BOA 1-5 investigation area (following from Kuskie 2015).

Artefact Scatters:

In most archaeological contexts, an artefact scatter has been defined as either the presence of two or more stone artefacts within 50 or 100 metres of each other, or a concentration of artefacts at a higher density than surrounding low density 'background scatter'. The definition of an artefact scatter 'site' is often an arbitrary one, which can offer benefits from a heritage management perspective but is a source of theoretical/analytical debate for heritage practitioners. Due to the nature of the underlying evidence, its identification only within exposures created by erosion or disturbance, and the limited suitability of existing definitions, artefact scatter sites are defined within this study as the presence of one or more stone artefacts within a *survey area* (*cf*. Kuskie 2000). The boundaries of the site are defined by the boundaries of the visible extent of artefacts within the survey area.

The survey areas are based on discrete, repeated *environmental contexts* or *archaeological terrain units* (eg. a particular combination of landform unit and class of slope). It is generally assumed that there is a similar probability for comparable evidence to occur elsewhere within the same survey area. As such, while the visible site boundaries are defined by the extent of visible evidence (consistent with the definition of an Aboriginal object under the NP&W Act), across the entire survey area in which a site is identified there exists a *potential resource* of comparable evidence.

An artefact scatter may consist of surface material only, which has been exposed by erosion, or it more typically involves a sub-surface deposit of varying depth. Other features may be present within artefact scatter sites, including hearths or stone-lined fireplaces, and heat treatment pits.

Artefact scatters may represent the evidence of:

- Camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of stone or wooden tools, management of raw materials, preparation and consumption of food and storage of tools has occurred;
- Hunting or gathering events;

- Other events spatially separated from a camp site (eg. tool production or maintenance); or
- Transitory movement through the landscape.

The detection of artefact scatters depends upon conditions of surface visibility and ground disturbance and whether recent sediment deposition has occurred (*cf*. Dean-Jones and Mitchell 1993). Vegetation cover and deposition of sediments generally obscures artefact scatter sites and prevents their detection during surface surveys. High levels of ground disturbance can also obscure or remove evidence of a site.

Artefact scatters are a common site type in the Ulan - Wilpinjong locality and the broader Central Tablelands region. There is potential for stone artefact evidence to occur in the investigation area wherever A unit soil is present, apart from in areas which have been substantially impacted by recent land-use (ie. areas in which the A unit or upper soil horizon has been totally removed). In general, the artefact evidence may be of a low to very low density consistent with background discard. However, a higher artefact density and potentially deposits of research significance may occur where more focused occupation (eg. encampments, or events of longer duration or involving larger numbers of people) and/or repeated Aboriginal occupation has occurred. These contexts may comprise areas of low gradient close to higher order watercourses.

Bora/Ceremonial Sites:

Bora grounds are a type of ceremonial site associated with initiation ceremonies. They are usually made of two circular depressions in the earth, sometimes edged with stone. Bora grounds can occur on soft sediments in river valleys and elsewhere, although occasionally they are located on high, rocky ground where they may be associated with stone arrangements. Pearson (1981:104-105) identified that the location of ceremonial sites appears to have related to a desire to isolate the site in a secret or seldom visited location.

The potential for bora/ceremonial sites within the investigation area is assessed as being very low, but cannot be discounted. The presence of "Bora Creek" to the north-west of the investigation area and the bora/ceremonial ground on the ridge immediately north of Wilpinjong Creek (Mathews 1894) are noted.

Burials:

Human remains tended to be placed in hollow trees, caves, rock shelters or sand deposits. The location of burials may once have been marked by carved trees (eg. Etheridge 1918:85), although subsequent tree clearing and the long passage of time since the disruption of this practice has rendered these markers extremely rare. Pearson (1981:102-104) noted on the basis of recorded burials and ethnohistorical observations that burials in the region took place relatively close to encampments, due to the fact that most people unless killed by hunting accidents or in warfare tended to die in or close to camp, and movement of bodies over long distances by foot was problematic. A number of these observations (eg. by Reverend Gunther and Dr Curtis) identify burials within a mile of a campsite, in soft ground, with carved trees around.

Usually burials are only identified when eroding out of sand deposits or creek banks, or when disturbed by development. The probability of detecting burials during an archaeological survey is extremely low. The potential for burial sites to occur within the investigation area is assessed as being very low, but cannot be discounted.

Carved Trees:

Carved trees were still relatively common in NSW in the early 20th century (Etheridge 1918, refer also to Mathews 1894). They were commonly used as markers for ceremonial or symbolic areas, including burials.

Both vegetation removal, natural attrition (for example, bush fire) and the long passage of time since the practice of tree carving was prevalent have rendered this site type rare. Given these factors and the extent of recent land use impacts, the potential for carved trees to occur within the investigation area is considered to be low, but cannot be discounted where mature native trees remain.

Cultural Significant Sites or Areas:

Sites of cultural significance to Aboriginal people (excluding the contemporary significance attached to the other site types listed here) can take three forms:

- Sites or places associated with ceremonies, spiritual/mythological beliefs and traditional knowledge, which date from the pre-contact period and have persisted until the present time;
- Sites or places associated with historical associations, which date from the post-contact period and are remembered by people today (for example, plant and animal resource use areas and known camp sites); and
- Sites or places of contemporary significance (apart from those areas for which Aboriginal objects remain, which are discussed elsewhere here), for which the significance has been acquired in recent times.

Although these sites do not qualify as Aboriginal objects under the *National Parks and Wildlife Act 1974* they can be declared as Aboriginal places under the Act.

Mythological sites, or other sites of traditional, historical or contemporary significance to Aboriginal people, can occur in any location. Often natural landscape features may be related to important mythological stories. Consultation with the local Aboriginal community is essential to identify the presence of such cultural significant sites. Physical evidence of historical contact can occur in the form of artefacts manufactured from introduced materials (eg. porcelain or glass).

Grinding Grooves:

Grinding grooves are typically elongated narrow depressions in soft rocks (particularly sedimentary) and are generally associated with watercourses. The depressions are created by the shaping and sharpening of ground-edge hatchets and grinding of seeds and processing of other plant matter and animal foods.

Grinding grooves are typically located in sedimentary bedrock along watercourses, but also occur in the Ulan locality on open surfaces of sandstone in other contexts (eg. simple slopes) and on smaller sandstone slabs or surfaces in rock shelters. The potential for grinding groove sites to occur, both in rock shelters and in open contexts, is assessed as moderate.

Quarry Sites:

A lithic quarry is the location of an exploited stone source (Hiscock and Mitchell 1993:32). Sites will only be located where exposures of a stone type suitable for use in artefact manufacture occurs.

Geological mapping of the investigation area indicates that materials suitable for stone knapping are likely to be exposed, including quartz and tuff. As such, the potential for lithic quarry evidence within the investigation area is assessed as moderate.

Ochre quarry sites are an uncommon site type, however, several have been recorded in the locality. Ochre quarries take the form of circular depressions or tunnels and are frequently associated with artefacts utilised in the process of extracting ochre (Hiscock and Mitchell 1993:62). The potential for evidence of ochre quarries within the investigation area is assessed as low.

Rock Engravings:

Rock engravings include outlines or filled-in figures, created on rock surfaces (typically sedimentary stone) by pecking, hammering or scraping.

Rock engravings are more common on exposed sandstone bedrock on ridge and spur crests than in the bases of valleys or margins of steep slopes. Although rock engravings have not been recorded within the locality, suitable sandstone bedrock may be present in the investigation area and engravings are known to occur elsewhere in the region (Haglund 1985, Navin 1990). The potential for rock engravings is assessed as very low, but cannot be discounted.

Rock Shelters With Art, Deposits and/or Grinding Grooves:

Rock shelters include rock overhangs, shelters or caves which were used by Aboriginal people. Rock shelter sites may contain artefacts, deposits and/or rock art or grinding grooves. These sites will only occur where suitable geological formations are present.

Numerous rock shelter sites have been identified in the locality, many with artefacts and some with art and/or grinding grooves. Numerous other rock shelters have been noted with PADs. Although artefacts may not have been visible at the time of recording, these shelters have some probability of containing artefact deposits, which can be confirmed or refuted by test excavation. These sites have been recorded in isolated rock formations and along more extensive rock formations.

Rock shelter sites in the locality vary widely in terms of contents (eg. containing artefacts, potential deposits, painted art and/or grinding grooves), location (eg. topographic context, distance to watercourse, size/order of watercourse and aspect), nature (eg. size of shelter, extent of habitable floor area, number and types of artefacts and stone materials) and research potential (eg. depth and extent of potential artefact deposits). Stone artefacts would be the primary form of expected evidence within the rock shelters, in anything from very low to very high densities. Charcoal from fireplaces/hearths may also occur, as may bones and/or shell from fauna used by Aboriginal people for subsistence (or incorporated into the deposit by other means, such as animal activity or natural processes). The presence of other evidence, such as the remains of wooden implements, cannot be discounted, even though their occurrence has rarely been documented in the region.

Apart from several major sites such as the nearby "Hands on Rock" complex or the "Castle Rock" site (WCP72) in the Wilpinjong Coal Mine ML1573 boundary, rock art occurs relatively infrequently in the recorded shelters and tends to comprise red ochre hand stencils. Hand stencils were part of a complex form of communication and utilised in the representation of signatures, special occasions, individuals, messages, stories, myths and spiritual events.

Sandstone rock formations occur in the study area, including boulders and larger continuous rock formations, and as such the potential for rock shelter sites is assessed as high.

Scarred Trees:

Scarred trees contain scars caused by the removal of bark for use in manufacturing canoes, containers, shields or shelters. Mature trees, remnants of stands of the original vegetation, have the potential to contain scars.

Numerous scarred trees, many of uncertain (Aboriginal, non-indigenous or natural) origin, have been recorded in the Wilpinjong locality (Navin Officer 2005). Considering the long time period that has elapsed since this practice was prevalent and the extent of vegetation removal from within the investigation area, the potential for scarred tree sites to occur is assessed as relatively low, but cannot be discounted where mature native trees remain. The conclusion of Navin Officer (2005) that no 'definite' Aboriginal scarred trees occurred within the EIS project area is noted.

Stone Arrangements:

Stone arrangements include circles, mounds, lines or other patterns of stone arranged by Aboriginal people. Some were associated with bora grounds or ceremonial sites and others with mythological or sacred sites. Pearson (1981:106) noted that stone arrangements in the region typically occur as lines or cairns on bare, exposed hill crests in the plateau/isolated hill areas, or on bare areas of flat land where flatter land predominates. The stone arrangements on hill crests are noted as being often a considerable distance from water, and therefore not within close proximity of any camp sites.

Hill tops and ridge crests which contain stone outcrops or surface stone, and have been subject to minimal impacts from recent land use practices, are potential locations for stone arrangements. The potential for stone arrangements to occur is assessed as low.

Waterhole/wells:

Waterhole/wells are natural depressions in boulders or exposed bedrock, known as pan-holes or gnamma holes, which retain water, and as such may have represented a source utilised by Aboriginal people. There is no direct evidence of Aboriginal working or use of these waterholes.

Several waterhole/wells have been reported in the Wilpinjong locality and the potential for further features to occur is assessed as moderate.

4. ABORIGINAL COMMUNITY PARTICIPATION

The involvement of the Aboriginal community in the project has been guided by the Development Consent (SSD-6764) and approved ACHMP (WCPL 2017a).

The Aboriginal stakeholders identified for the Wilpinjong Mine through the Modification 5 and Extension Projects (Kuskie 2013c, 2015) include:

- Binjang Wellington Wiradjuri Heritage Survey (Binjang WWHS);
- Mudgee Local Aboriginal Land Council (Mudgee LALC);
- Murong Gialinga Aboriginal and Torres Strait Islanders Corporation (MGATSIC).
- North-East Wiradjuri Company Ltd (NEWCO);
- Warrabinga Native Title Claimants Aboriginal Corporation ('Warrabinga');
- Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC); and
- Mr Paul Brydon.

Through the operation of the *Native Title Act 1993* (NTA), an Ancillary Deed is maintained between WCPL and William Allen, Martin de Launey and Lynette Syme (Native Title Party) for Mining Lease Application (MLA) 259. The "Deed" (Government Party Deed) represents an agreement for the purposes of section 31(1)(b) of the NTA and was executed on 12 December 2005.

The ACHMP incorporates procedures such as:

- Establishment and operation of the Cultural Heritage Liaison Sub-Committee (CHLSC) with the Native Title Party (Section 2.4); and
- Protocols for ongoing consultation with other Aboriginal stakeholders (Section 2.5).

WCPL forwarded a copy of the draft methodology for the survey to all registered Aboriginal parties, with a request for comment. Input was provided by Mr Brad Bliss (WVWAC, refer to Appendix 5), who requested the survey be conducted by a single team, rather than two teams. This occurred on several days, while on other days the teams worked in close proximity to each other.

WCPL invited all registered Aboriginal parties to participate in the BOA survey. Representatives elected to participate as outlined in Table 2. Representatives of the Aboriginal stakeholders were involved on every day of the field investigation, with assistance provided by the following individuals:

- NEWCO – Kelli Whillock;
- MGATSIC - Larry Foley and Steven Flick;
- Mudgee LALC - Larry Foley; and
- WVWAC – Brad Bliss.

WCPL Native Title Officer Gail Ratcliffe also assisted the survey on two days.

Copies of this report will be provided to each of the registered Aboriginal parties, including those who elected not to attend the survey. A draft copy of this report will be provided with a request for comment.

Table 2: Summary of Aboriginal stakeholder participation in the field survey.

Date	Person	Organisation	Description
19/11/18	Kelli Whillock	NEWCO	Field survey
19/11/18	Steven Flick	MGATSIC	Field survey
19/11/18	Brad Bliss	WVWAC	Field survey
19/11/18	Gail Ratcliffe	WCPL	Field survey
20/11/18	Kelli Whillock	NEWCO	Field survey
20/11/18	Larry Foley	MGATSIC	Field survey
20/11/18	Brad Bliss	WVWAC	Field survey
20/11/18	Gail Ratcliffe	WCPL	Field survey
21/11/18	Kelli Whillock	NEWCO	Field survey
21/11/18	Larry Foley	MGATSIC	Field survey
21/11/18	Brad Bliss	WVWAC	Field survey
22/11/18	Kelli Whillock	NEWCO	Field survey
22/11/18	Steven Flick	MGATSIC	Field survey
22/11/18	Brad Bliss	WVWAC	Field survey
23/11/18	Larry Foley	MGATSIC	Field survey
23/11/18	Brad Bliss	WVWAC	Field survey
24/11/18	Larry Foley	MGATSIC	Field survey
24/11/18	Brad Bliss	WVWAC	Field survey
26/11/18	Kelli Whillock	NEWCO	Field survey
26/11/18	Steven Flick	MGATSIC	Field survey
26/11/18	Brad Bliss	WVWAC	Field survey
26/11/18	Larry Foley	MLALC	Field survey
27/11/18	Kelli Whillock	NEWCO	Field survey
27/11/18	Larry Foley	MGATSIC	Field survey
27/11/18	Brad Bliss	WVWAC	Field survey
28/11/18	Kelli Whillock	NEWCO	Field survey
28/11/18	Steven Flick	MGATSIC	Field survey
28/11/18	Brad Bliss	WVWAC	Field survey
29/11/18	Larry Foley	MGATSIC	Field survey
29/11/18	Brad Bliss	WVWAC	Field survey
30/11/18	Larry Foley	MGATSIC	Field survey
30/11/18	Brad Bliss	WVWAC	Field survey
1/12/18	Steven Flick	MGATSIC	Field survey

5. METHODOLOGY

During the initial stages of the investigation, research was conducted into the environmental, cultural and archaeological background of the investigation area, building on the substantial work already completed by South East Archaeology in the region. Searches (#361678, 361682 and 396393) were undertaken of the OEH Aboriginal Heritage Information Management System (refer to Section 3.1).

The purpose and scope of the Aboriginal cultural heritage investigation of Biodiversity Offset Areas 1-5 was to ensure compliance with and address the relevant requirements of Condition 46 of Schedule 3 of Development Consent (SSD-6764) and Section 5.6.2 of the approved ACHMP, including the key requirements and tasks outlined here in Section 1.

To address Condition 46(a) of Schedule 3 of Development Consent (SSD-6764), the investigation has been undertaken by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary of the DP&E (refer to Section 1 and Appendix 5). WCPL obtaining DP&E approval of the investigation team on 18 June 2018.

To address Condition 46(b) of Schedule 3 of Development Consent (SSD-6764), the investigation has been undertaken in consultation with the OEH and the RAPs, with copies of the draft methodology forwarded for review and comment to the OEH and all RAPs, invitations being extended to all RAPs to participate in the survey, copies of the draft report being forwarded for review and comment to each RAP, and copies of the final report to be forwarded to each RAP and the OEH (refer to Section 4 and Appendix 5).

To address Condition 46(c) of Schedule 3 of Development Consent (SSD-6764), the survey was focused on identifying areas of moderate to high significance, such as rock shelter/art sites (refer to methods below). It was also undertaken with reference to the OEH *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a) and knowledge of Aboriginal cultural heritage from previous investigations undertaken at the Mine and surrounds, as required under Section 5.6.2 of the ACHMP.

To address Condition 46(d) of Schedule 3 of Development Consent (SSD-6764), this detailed report of the findings has been prepared, and to address Section 5.6.2 of the ACHMP, this report will be forwarded to each RAP, including those who elected not to participate in the survey.

To address Condition 46(e) of Schedule 3 of Development Consent (SSD-6764), consideration of how the outcomes would be incorporated into the Biodiversity Management Plan and ACHMP are presented here in Section 10.

Field inspection of the BOA1-5 investigation area was undertaken over 12 days from 19 November to 1 December 2018 by archaeologists from South East Archaeology (Michael Marsh and Corey O'Driscoll), accompanied on every day by representatives of the RAPs (refer to Table 2).

The focus of the field survey was on the identification of sites of moderate to high heritage significance, such as rock shelter/art sites (Condition 46 of Schedule 3 of Development Consent SSD-6764). In general, other site types may also be of moderate to high heritage significance, where the evidence has values such as research potential, high integrity, representative value and/or cultural value.

The selection of a methodology (including a sampling strategy) is a process that involved (*cf*. Boismier 1991):

1) Identification of the specific environmental/cultural characteristics of the investigation area (refer to Sections 2 and 3);

2) Construction of a model of Aboriginal occupation for the locality (refer to Section 3.4);

3) Definition of the expected nature and distribution of evidence (predictive model) (refer to Section 3.5);

4) Formation of a methodology to retrieve the required data/evidence, in consideration of the expected nature and distribution of evidence; and

5) Analytical techniques for the evidence recovered that are appropriate to address the project objectives.

The survey involved physically inspection on foot of a sample from each of the Biodiversity Offset Areas and sampling of as much of the Biodiversity Offset Areas as feasible within a two week period. The survey was undertaken by two teams working in close proximity of each other, each comprising one qualified and experienced archaeologist, and representatives of the RAPs engaged by WCPL. At times all personnel worked together in a single team.

The survey teams were equipped with high resolution 1:3,000 scale mapping of the investigation area, with one or two metre contours (depending on data availability), a 100 metre MGA grid and an aerial photograph underlay. Along with the use of hand-held Global Positioning System (GPS) units (generally accurate to within five metres), these features assisted with accurately establishing the location of Aboriginal sites. It is noted that BOA 3 and 5 and the eastern portion of BOA4 are located within MGA Zone 56, whereas BOA 1 and 2 and the western portion of BOA4 are located within MGA Zone 55.

The survey was targeted towards contexts that may host evidence of moderate or high heritage significance, particularly rock formations that may host rock shelters and grinding grooves, mature trees that may host scars/carvings, environmental contexts such as hill crests that may host stone arrangements, and stone sources that may host lithic quarries.

Inspection was made widely for the obtrusive site types, such as rock shelters with deposit and/or art, grinding grooves and scarred trees, and inspection was also made for stone artefacts and other cultural evidence, focusing on areas with ground surface visibility. Detailed recording was undertaken of every site identified (refer to Appendix 3), apart from several larger artefact scatter sites for which only a sample of artefacts were recorded. Spatially separate locations of heritage evidence were recorded as separate site loci named sequentially after the BOA number (eg. BOA1/1, BOA1/2, etc, for the first sites in BOA1, and BOA2/1, BOA2/2 etc for the first sites in BOA2).

Aboriginal stakeholders were invited to share their cultural knowledge relevant to determining the cultural significance of any Aboriginal objects or places within the investigation area, for example, relating to:

- Sites or places associated with ceremonies, spiritual/mythological beliefs and traditional knowledge, which date from the pre-contact period and have persisted until the present time;

- Sites or places associated with historical associations, which date from the post-contact period and are remembered by people today (for example, plant and animal resource use areas and known camp sites); and

- Sites or places of contemporary significance (including areas for which Aboriginal objects remain), for which the significance has been acquired in recent times.

The results of the investigation are presented in Section 6. Photographs of the identified sites are presented in Appendix 3 and additional photographs of the general investigation area are presented in Appendix 4.

At the completion of the survey Aboriginal Site Recording Forms were completed and submitted to the OEH for all new Aboriginal sites identified.

6. RESULTS AND DISCUSSION

The heritage survey involved sampling across each of the Biodiversity Offset Areas. Tracks of members of the field survey team, recorded by hand-held GPS units, are shown on Figures 7 and 8.

Numerous rock formations are present within the investigation areas, particularly on the margins of the valleys. These formations included isolated boulders, low rock walls, larger scarps or cliffs, open bedrock surfaces and other surface outcrops, and were targeted for inspection during the survey, for rock shelter and grinding groove sites.

A number of mature native trees exist within the investigation area and where identified, these were inspected for evidence of Aboriginal scarring.

The survey resulted in the identification of 42 Aboriginal sites/PADs within or immediately adjacent to BOA1-5, comprising:

- 32 open artefact sites[1];
- Four rock shelters with PADs;
- Three rock shelters with artefacts;
- Two waterhole/wells; and
- One ochre source.

Descriptions of the newly identified sites/PADs recorded during the current survey are presented in Appendix 3. The locations of the individual sites/PADs are marked on Figures 9-13 and the sites are listed in Table 3.

The two previously recorded sites (refer to Appendix 2) were not relocated. OEH #36-3-0010, a rock shelter with art, is an early recording and described as being situated within Munghorn Gap Nature Reserve (the eastern boundary of which is 70 metres west of the BOA1 boundary). OEH #36-3-2688, a waterhole/well, was recorded by Kayandel (2006) during the Wilpinjong escarpment survey, for which numerous grid reference datum issues have previously been identified (refer to Kuskie 2015). It is possible that neither of these sites are located within BOA1, although this could not be confirmed during the present survey. The remaining discussion focuses on the sites identified within BOA1-5 during the present investigation.

Generally the open artefact sites were small, with low numbers of artefacts, but larger sites are present in the vicinity of the Goulburn River. Typically however "isolated finds" or "isolated artefacts" represent the only visible evidence of larger artefact scatters, in which low conditions of visibility have prevented the detection of further items. The term "open artefact site" encompasses those spatially discrete locations of visible artefact evidence in open contexts, that have been or can be referred to as "isolated artefacts" or "artefact scatters".

[1] For the purposes of this assessment, "artefact scatters" and "isolated finds" are typically assessed together in recognition that the occurrence of a single artefact often represents the only visible portion of a larger artefact resource within a broader site/survey area.

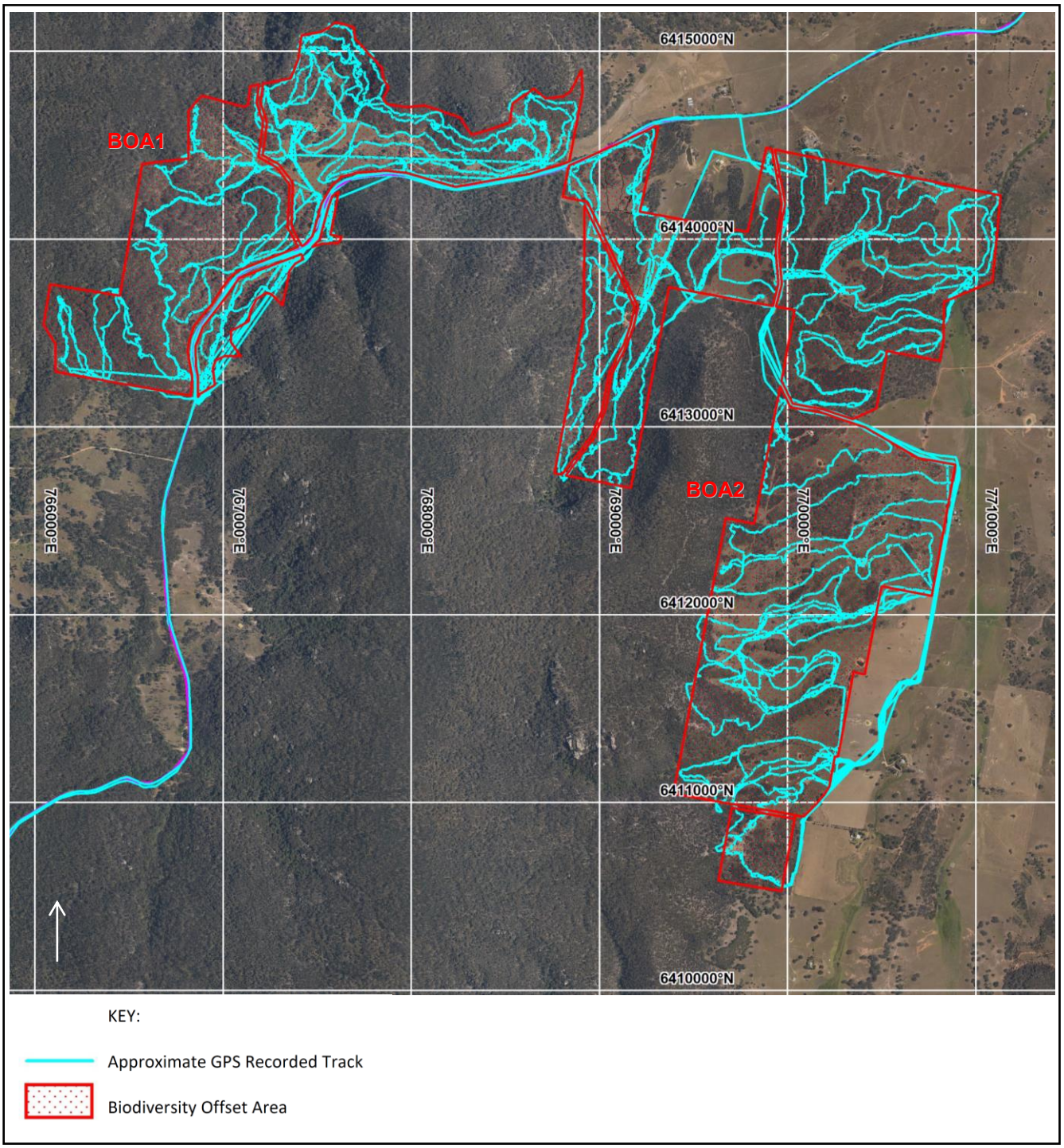

Figure 7: Approximate location of GPS recorded tracks within the BOA1 and BOA2 investigation areas (noting that some coverage outside of the areas relates to pedestrian or vehicle access; aerial photograph courtesy WCPL; one kilometre MGA Zone 55 grid).

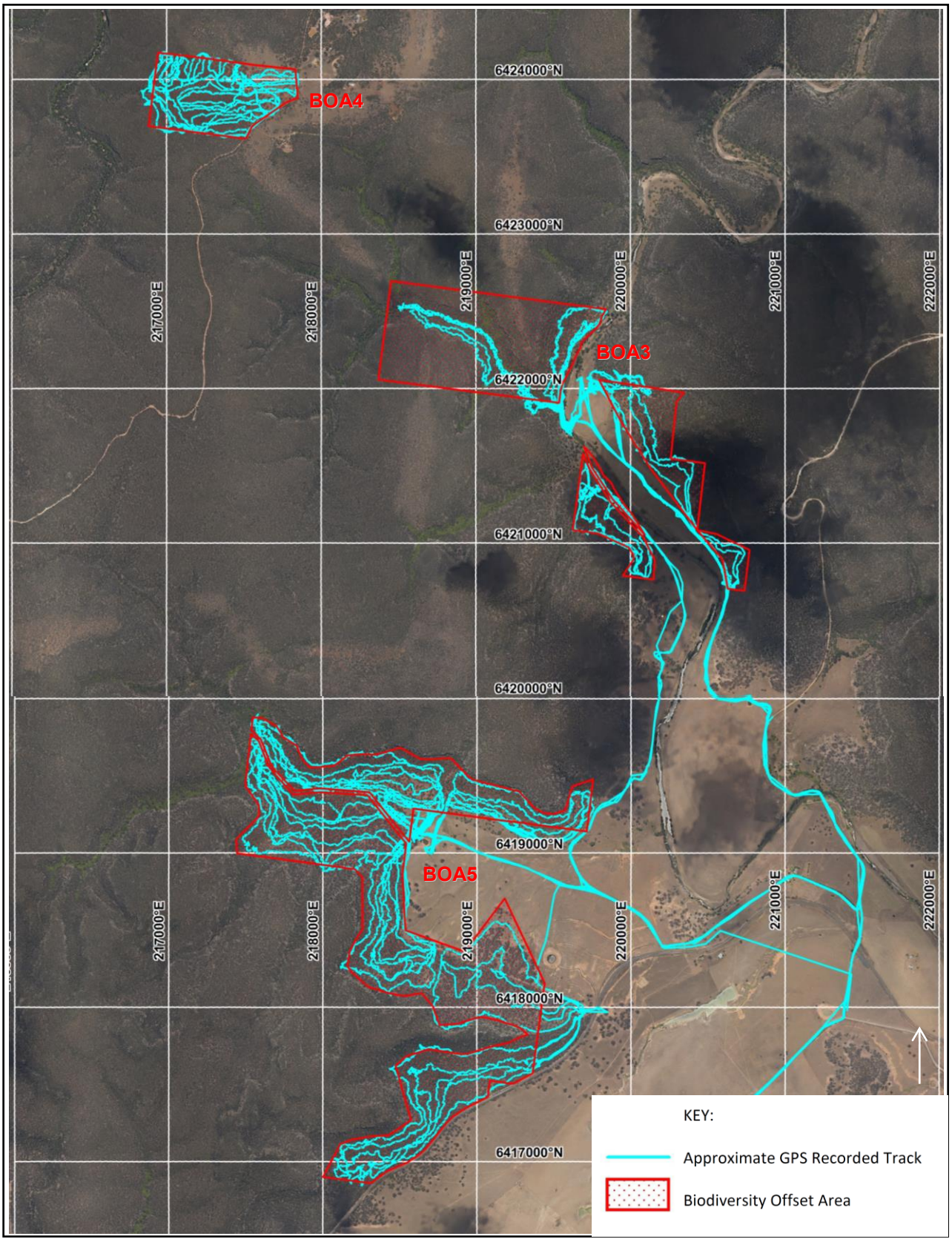

Figure 8: Approximate location of GPS recorded tracks within the BOA3, BOA4 and BOA5 investigation areas (noting that some coverage outside of the areas relates to pedestrian or vehicle access; aerial photograph courtesy WCPL; one kilometre MGA Zone 56 grid).

Table 3: Summary of Aboriginal sites identified during the present survey within or immediately adjacent to Biodiversity Offset Areas 1-5.

Site Name	Site Type	MGA Zone	MGA Easting	MGA Northing
BOA1/1	Open Artefact Site	55	768139	6414592
BOA1/2	Open Artefact Site	55	768545	6414498
BOA1/3	Rock Shelter with Artefacts	55	768698	6414609
BOA1/4	Waterhole/Well	55	768630	6414756
BOA1/5	Rock Shelter with PAD	55	767410	6415078
BOA1/6	Rock Shelter with PAD	55	767738	6415015
BOA1/7	Open Artefact Site	55	767922	6414410
BOA1/8	Open Artefact Site	55	767453	6414608
BOA1/9	Rock Shelter with PAD	55	766800	6414444
BOA1/10	Rock Shelter with Artefacts	55	766566	6413373
BOA2/1	Open Artefact Site	55	769721	6411077
BOA2/2	Open Artefact Site	55	769645	6411741
BOA2/3	Open Artefact Site	55	769281	6413736
BOA2/4	Open Artefact Site	55	770090	6411169
BOA2/5	Open Artefact Site	55	769122	6413231
BOA2/6	Open Artefact Site	55	768977	6412885
BOA2/7	Open Artefact Site	55	768972	6413254
BOA2/8	Open Artefact Site	55	769128	6413629
BOA2/9	Open Artefact Site	55	769908	6411188
BOA2/10	Open Artefact Site	55	769599	6411058
BOA2/11	Open Artefact Site	55	770389	6412278
BOA2/12	Rock Shelter with Artefacts	55	770946	6413745
BOA2/13	Open Artefact Site	55	770969	6413797
BOA2/14	Open Artefact Site	55	770963	6414174
BOA2/15	Open Artefact Site	55	769209	6414210
BOA2/16	Open Artefact Site	55	769218	6414169
BOA3/1	Open Artefact Site	56	220228	6421260
BOA3/2	Open Artefact Site	56	219823	6422025
BOA3/3	Open Artefact Site	56	219608	6422249
BOA3/4	Open Artefact Site	56	219692	6421316
BOA3/5	Open Artefact Site	56	219882	6421232
BOA3/6	Waterhole/Well	56	219149	6422186
BOA4/1	Rock Shelter with PAD	55	782069	6423970
BOA4/2	Open Artefact Site	56	217521	6424015
BOA5/1	Open Artefact Site	56	218672	6419280
BOA5/2	Open Artefact Site	56	218381	6419295
BOA5/3	Ochre Source	56	217812	6419536
BOA5/4	Open Artefact Site	56	218769	6419418
BOA5/5	Open Artefact Site	56	218626	6419129
BOA5/6	Open Artefact Site	56	218977	6419323
BOA5/7	Open Artefact Site	56	218626	6417443
BOA5/8	Open Artefact Site	56	219232	6417589

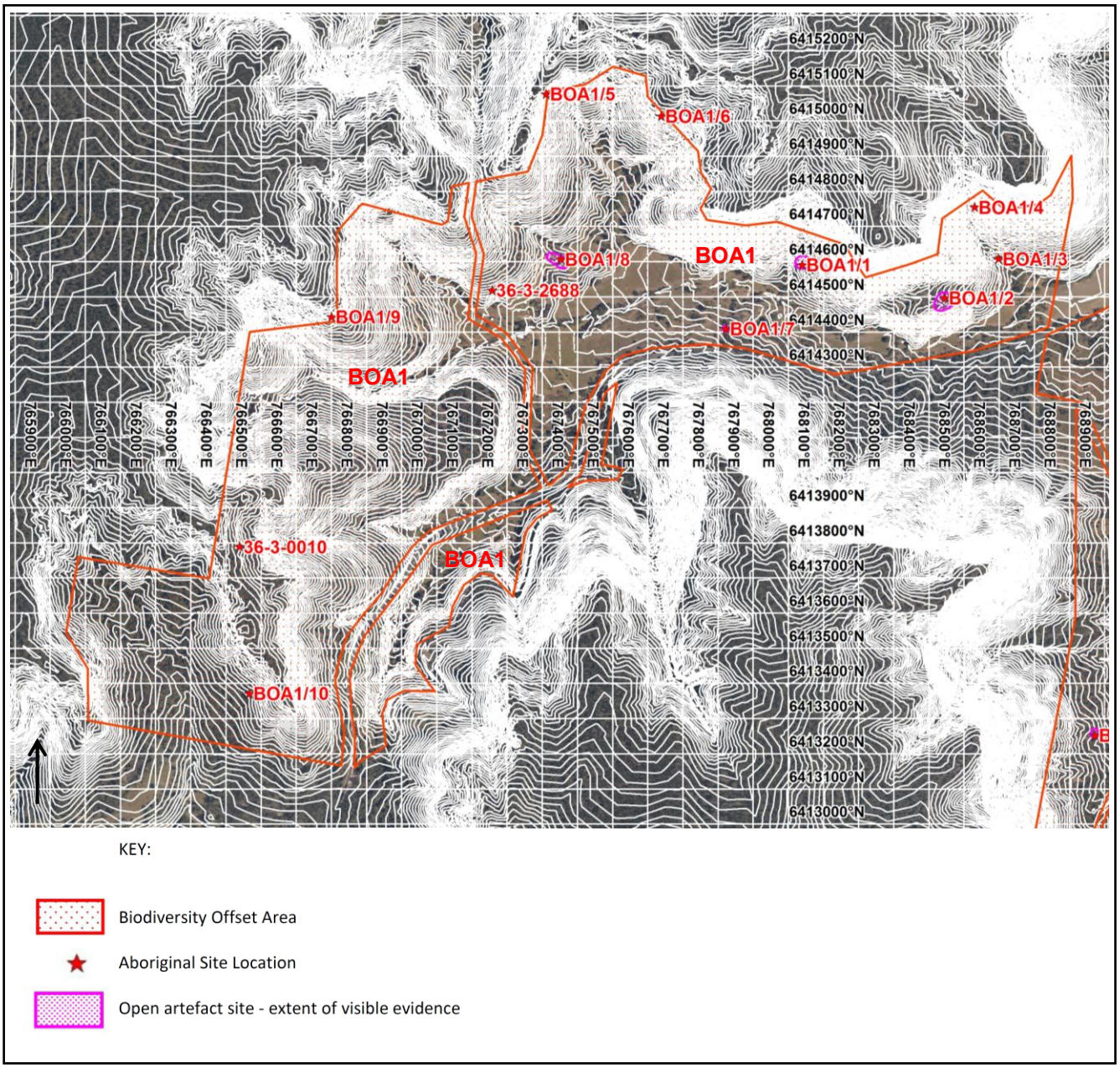

Figure 9: Location of identified Aboriginal sites within BOA1 (aerial photograph courtesy WCPL; two metre contours; 100 metre MGA Zone 55 grid).

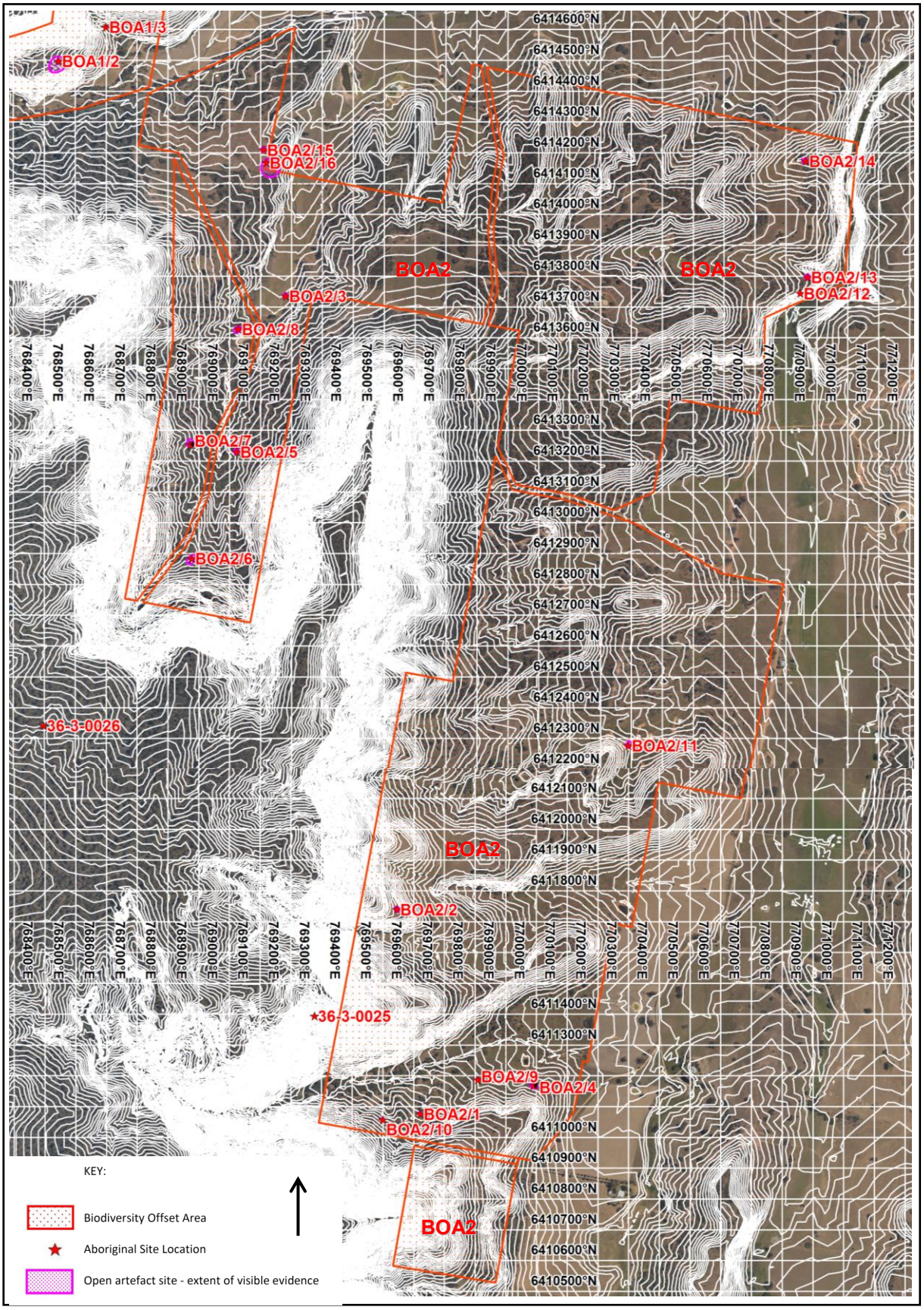

Figure 10: Location of identified Aboriginal sites within BOA2 (aerial photograph courtesy WCPL; two metre contours; 100 metre MGA Zone 55 grid).

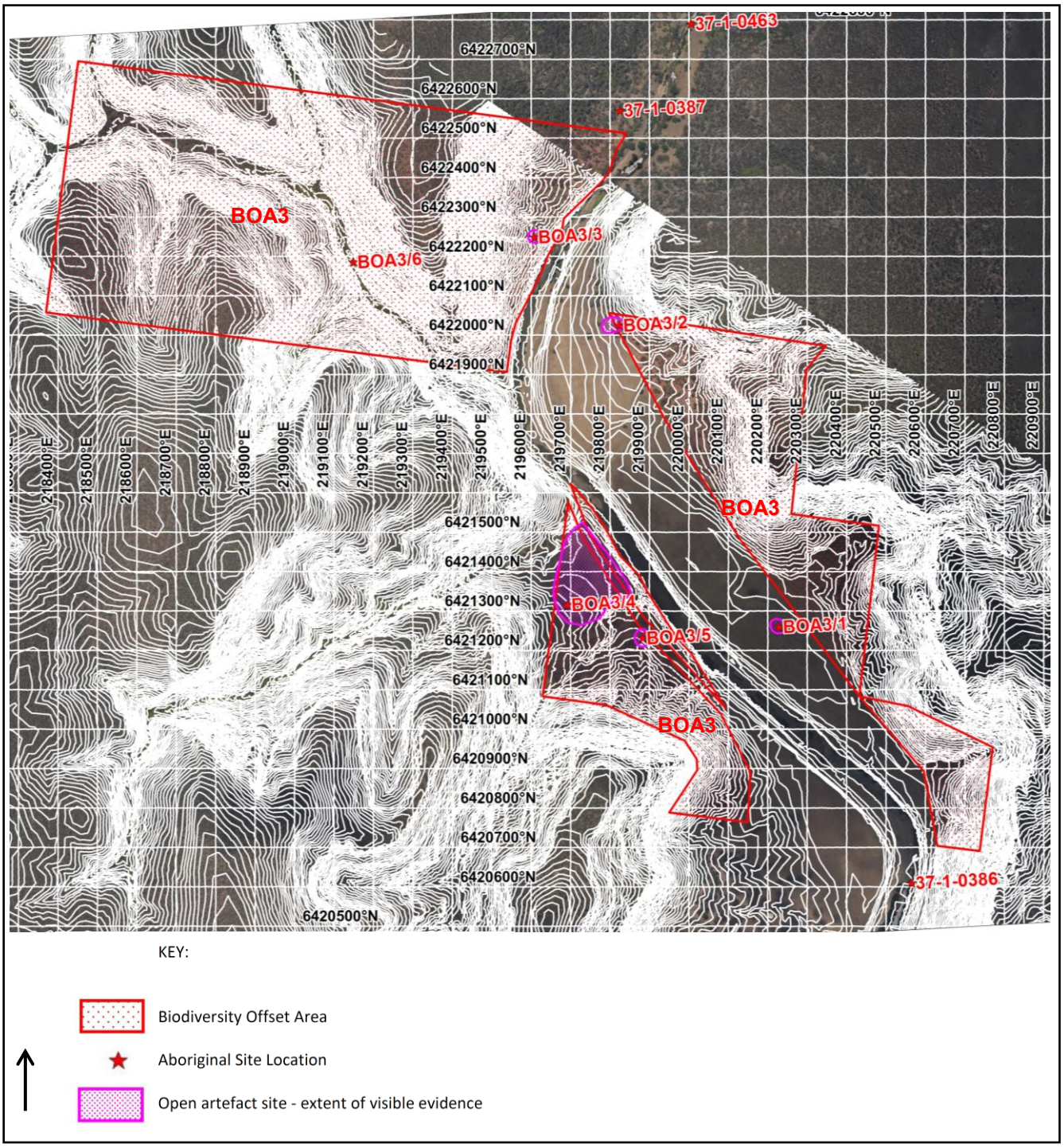

Figure 11: Location of identified Aboriginal sites within BOA3 (aerial photograph courtesy WCPL; two metre contours; 100 metre MGA Zone 56 grid).

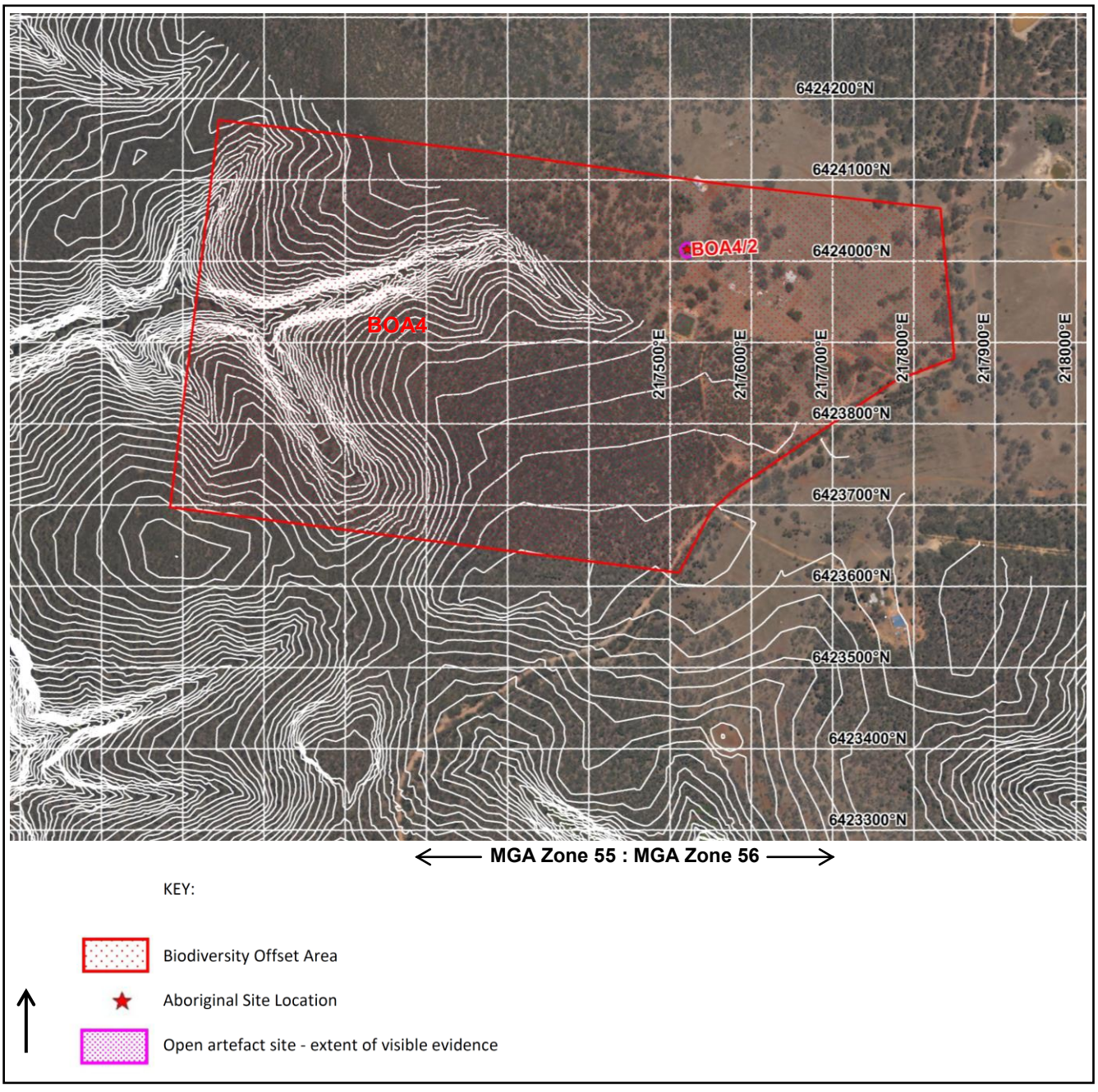

Figure 12: Location of identified Aboriginal sites within BOA4 (aerial photograph courtesy WCPL; two metre contours; 100 metre MGA Zone 55 / 56 grid).

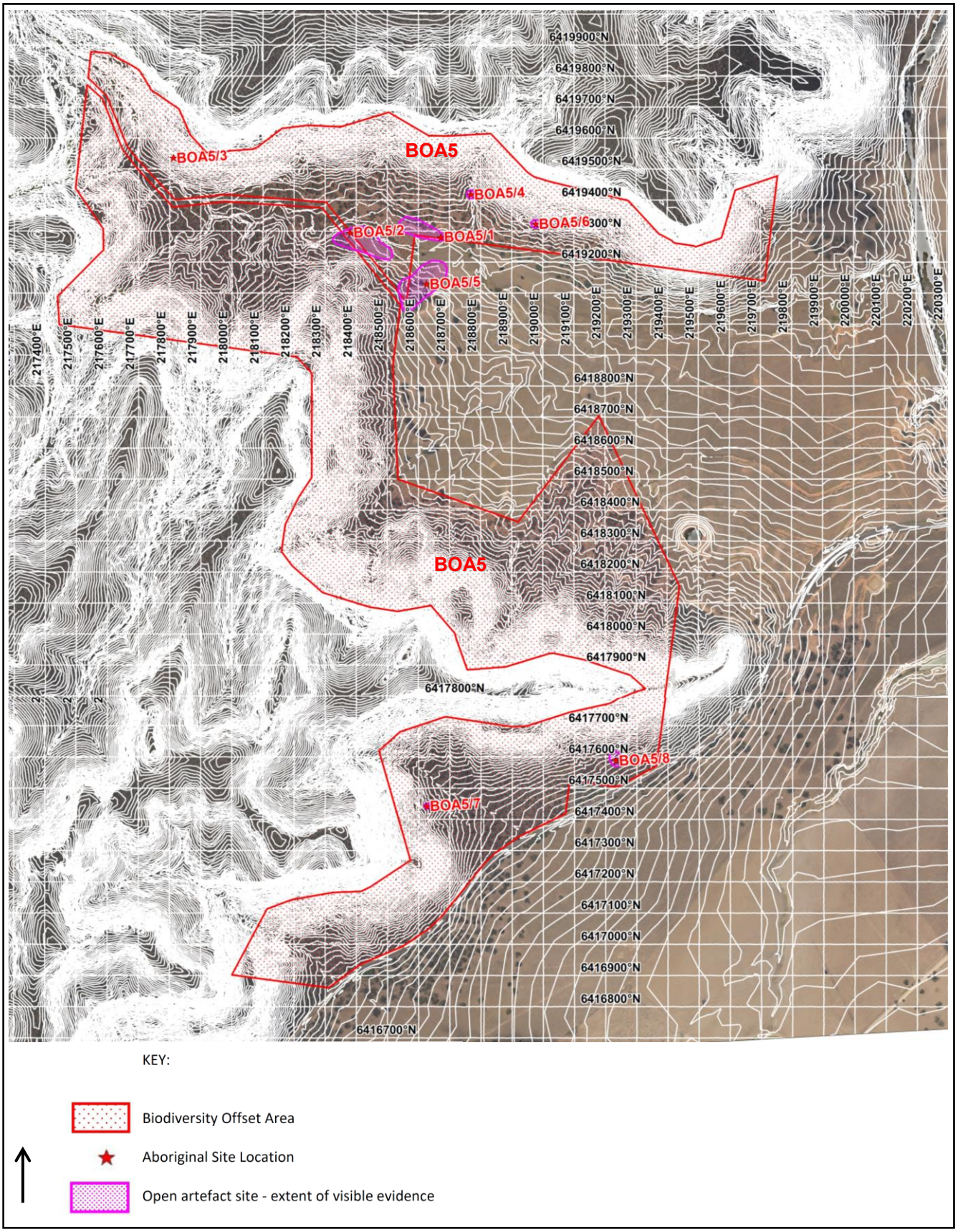

Figure 13: Location of identified Aboriginal sites within BOA5 (aerial photograph courtesy WCPL; two metre contours; 100 metre MGA Zone 56 grid).

The identified artefacts probably only represent a small fraction of the entire artefact resource that is present within the investigation area, because the vast majority of evidence is likely to be currently obscured by vegetation and soil. Substantial portions of the investigation area were not directly sampled for artefacts, and where the sample was obtained, conditions of surface visibility were typically low.

A total of 107 lithic items were recorded during the survey, primarily in open artefact sites, but also in several rock shelters. These items are listed for each site in Appendix 3 and summarised in Table 4.

Table 4: Summary of stone artefacts recorded during the present heritage survey within or immediately adjacent to Biodiversity Offset Areas 1-5.

	Stone Material				
Lithic Type	chert	quartz	tuff	volcanic	**Total**
core		2	6		**8**
core fragment		3			**3**
flake		24	4	1	**29**
flake - distal	1	8	3		**12**
flake - distal - utilised		1			**1**
flake - longitudinal		10	1		**11**
flake - medial		4			**4**
flake - proximal	1	9	3		**13**
geometric microlith		1			**1**
lithic fragment	1	15	2		**18**
pebble core				1	**1**
retouched flake		3	3		**6**
Total	**3**	**80**	**22**	**2**	**107**

The stone materials and lithic types are consistent with those recorded from assemblages in the locality (for example, the overall Ulan assemblage of Kuskie 2009 of over 9,000 artefacts). The combined assemblage is overwhelmingly dominated by quartz (75%), with lower frequencies of tuff (21%), chert (3%) and volcanics (2%). In terms of artefact types, consistent with assemblages from the locality, the combined assemblage is overwhelmingly dominated by flakes (27%), flake portions (37%), lithic fragments (17%), cores (7%) and core fragments (3%). These items may represent the fragmented debris of on-site knapping of primary flakes and/or microblades or other on-site fracture, such as accidental breakage, or accidental discard.

Four rock shelters with PADs (BOA 1/5, 1/6, 1/9 and 4/1) and three rock shelters with artefacts (BOA 1/3, 1/10 and 2/12) were identified. The rock shelters with PADs are not technically "Aboriginal objects" as defined under the NP&W Act, however excavation of any of these shelters may reveal stone artefacts and other cultural deposits (for example, charcoal from camp fires).

The research potential of these deposits (and the deposits with surface artefacts) can be assessed in relation to various criteria (refer to Section 7.2). Most of the PADs recorded during the present survey are small, but the general threshold for inclusion was that there had to be sufficient room and shelter for at least one adult to sit and some deposit (ie. shelters with only bare rock floors and no deposit were not recorded, although it is probable that such shelters may have been utilised by Aboriginal people on occasions). The reasons for the absence of visible evidence in these shelters probably varies, but in some cases may relate to limited archaeological visibility. However, a genuine absence of occupation (specifically, the resulting evidence thereof) may also be the explanation for a number of these shelters.

All of the shelters identified are of low research potential, due to their small size, small potential deposits, shallow deposits, low roof heights, sloping floors and/or high levels of ground disturbance. The sandstone and conglomerate rock formations in the investigation areas tended to form straight walls, in which shelters were rarely present.

Two waterhole/wells (BOA 1/4 and 3/6) were recorded. These are natural depressions in boulders or exposed bedrock, known as pan-holes or gnamma holes, which retain water, and as such may have represented a source utilised by Aboriginal people. There is no direct evidence of Aboriginal working or use of these waterholes.

One ochre source (BOA5/3) was recorded. White ochre (kaolin/pipeclay) nodules were observed eroding out of a large sandstone boulder on a slope. While there was no evidence of human modification or exploitation, this represents a potential source of the material.

While the above discussion focuses on Aboriginal objects and physical evidence of Aboriginal occupation, contemporary cultural values associated with the investigation area have been identified by the registered Aboriginal parties. These include:

- In general terms, the use of subsistence or other resources, with comments made about the presence of various native flora and fauna where observed. These comments were not of a historical nature (ie. did not relate to plant and animal resource use areas known from the post-contact period) but rather were general observations of the occurrence of particular species and their known traditional uses (eg. for food, medicine, tools, etc.); and

- In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri.

The possibility cannot be excluded that further Aboriginal values or associations may exist within the locality of the investigation area that were not divulged to South East Archaeology by the persons consulted.

In addition to these places, other archaeological sites (for example, artefact scatters and rock shelters) identified within the investigation area are of contemporary significance to the Aboriginal community, as they represent a tangible link with the traditional past and with the lifestyle and values of community ancestors (refer to Section 7).

Due to the nature of the sampling strategy, the inferences that can be made about the spatial distribution and nature of evidence, nature of occupation or predictive model are limited. The nature of the evidence from the investigation area is consistent with the results from other heritage assessments in the locality (eg. Kuskie 2013c, 2015, Navin Officer 2005). No specific aspects of the heritage evidence located within the investigation area are rare or unique within a local or regional context, however the kaolin/pipeclay ('white ochre') represents a less commonly reported example in the locality.

7. SIGNIFICANCE ASSESSMENT

7.1 Criteria

The significance of Aboriginal heritage evidence can be assessed along the following criteria, widely used in Aboriginal heritage management, derived from the relevant aspects of the International Council on Monuments and Sites (ICOMOS) *Burra Charter*:

I. Scientific (Archaeological) value;

II. Importance to Aboriginal people (Cultural value);

III. Educational value;

IV. Historic value; and

V. Aesthetic value.

Greater emphasis is generally placed on scientific and cultural criteria when assessing the significance of Aboriginal heritage evidence in Australia.

Scientific (Archaeological) Value:

Scientific value refers to the potential usefulness of heritage evidence to address further research questions, the representativeness of the evidence, the nature of the evidence and its state of preservation.

Research Potential:

Research potential refers to the potential for information derived from further investigation of the evidence to be used for answering current or future research questions. Research questions may relate to any number of issues concerning past human culture, human behaviour generally or the environment. Numerous locations of heritage evidence have research potential. The critical issue is the threshold level, at which the identification of research potential translates to significance/importance at a local, regional or national level.

Several key questions can be posed for each location of heritage evidence:

- Can the evidence contribute knowledge not available from any other resource?
- Can the evidence contribute knowledge, which no other such location of evidence can?
- Is this knowledge relevant to general questions about human history, past environment or other subjects?

Assessing research potential therefore relies on comparison with other evidence in local and regional contexts. The criteria used for assessing research potential include the:

a) Potential to address locally specific research questions;

b) Potential to address regional research questions;

c) Potential to address general methodological or theoretical questions;

d) Potential deposits; and

e) Potential to address future research questions.

In terms of meeting a threshold level to have significant research potential, the particular questions asked of the evidence should be able to contribute knowledge that is not available from other resources or evidence (either on a local or regional scale) and are relevant to general questions about human history, past environment or other subjects.

Representativeness:

Representativeness is generally assessed at local, regional and national levels. It is an important criterion, because the primary goal of cultural resource management is to afford greatest protection to a representative sample of Aboriginal heritage evidence throughout a region. The more unique or rare evidence is, the greater its value as being representative within a regional context.

The main criteria used for assessing representativeness include:

a) The extent to which the evidence occurs elsewhere in the region;

b) The extent to which this type of evidence is subject to existing or potential future impacts in the region;

c) The integrity of the evidence compared to that at other localities in the region;

d) Whether the evidence represents a prime example of its type within the region; and

e) Whether the evidence has greater potential for educational or demonstrative purposes than at other similar localities in the region.

Nature of Evidence:

The nature of the heritage evidence is related to representativeness and research potential. The less common the type of evidence is, the more likely it will have representative value. The nature of the evidence is directly related to its potential to be used in addressing present or future research questions. Criteria used in assessing the nature of the evidence include the:

a) Presence, range and frequency of stone materials;

b) Presence, range and frequency of artefact types; and

c) Presence and types of other features.

A broader range of stone and artefact types generally equates to the potential for information to address a broader range of research questions. The presence of non-microlith and microlith tool types also equates to higher potential to address relevant research questions. The presence and frequency of particular stone or artefact types or other features also has relevance to the issue of representativeness (for example, a rare type may be present).

Integrity:

The state of preservation of the evidence (integrity) is also related to representativeness and research potential. The higher the integrity of evidence, the greater the level of scientific information likely to be obtained from its further study. This translates to greater importance for the evidence within a local or regional context, as it may be a suitable example for preservation within a sample representative of the entire cultural resources of a region.

The criteria used in assessing integrity include:

a) Horizontal and vertical spatial distribution of artefacts;

b) Preservation of intact features such as midden deposits, hearths or knapping floors;

c) Preservation of site contents such as charcoal and shell which may enable accurate direct dating or other analysis; and

d) Preservation of artefacts which may enable use-wear/residue analysis.

Generally, many of these criteria can only be applied to evidence obtained by controlled excavation. High levels of ground disturbance limit the possibility that the evidence would surpass the threshold of significance on the basis of integrity (ie. the area would be unlikely to possess intact spatial distributions, intact features, *in situ* charcoal or shell, etc).

Aboriginal (Cultural) Significance:

Aboriginal (cultural) significance refers to the value placed upon Aboriginal heritage evidence by the local Aboriginal community.

All heritage evidence tends to have some contemporary significance to Aboriginal people, because it represents an important tangible link to their past and to the landscape. Heritage evidence may be part of contemporary Aboriginal culture or be significant because of its connection to spiritual beliefs or as a part of recent Aboriginal history.

Consultation with the local Aboriginal community is essential to identify the level of Aboriginal significance.

Educational Value:

Educational value refers to the potential of heritage evidence to be used as an educational resource for groups within the community.

Historic Value:

Historic value refers to the importance of heritage evidence in relation to the location of an historic event, phase, figure or activity.

Aesthetic Value:

Aesthetic value includes all aspects of sensory perception. This criterion is mainly applied to art sites or mythological sites.

7.2 Significance of Heritage Evidence Within Biodiversity Offset Areas 1-5

The significance of the Aboriginal heritage sites and potential deposits within BOA1-5 can be assessed on a preliminary basis in relation to the criteria presented in Section 7.1. The preliminary significance assessment is presented in Table 5.

It is noted that all Aboriginal heritage is of interest and contemporary value to the Aboriginal community. Aboriginal heritage evidence represents a tangible link with the traditional past and with the lifestyle and values of community ancestors. The Aboriginal community themselves are in the best position to identify the levels of cultural significance and the stakeholders have been invited throughout the course of the assessment to provide input into the cultural significance of the specific sites and areas.

Table 5: Summary of preliminary significance assessment for each site recorded during the heritage survey within or immediately adjacent to Biodiversity Offset Areas 1-5.

Site Name	Site Type	Significance	Key Criteria
BOA1/1	Open Artefact Site	Low	Common; low research potential; low integrity
BOA1/2	Open Artefact Site	Low	Common; low research potential; relatively low integrity
BOA1/3	Rock Shelter with Artefacts	Low	Low research potential; small shelter and PAD; low integrity
BOA1/4	Waterhole/Well	Low	Natural feature, no evidence of use
BOA1/5	Rock Shelter with PAD	Low	Low research potential; small PAD; shallow deposit; sloping floor
BOA1/6	Rock Shelter with PAD	Low	Low research potential; small PAD; low integrity
BOA1/7	Open Artefact Site	Low	Common; low research potential; relatively low integrity
BOA1/8	Open Artefact Site	Low	Common; low research potential; low integrity
BOA1/9	Rock Shelter with PAD	Low	Low research potential; small PAD; low roof height; moderate disturbance
BOA1/10	Rock Shelter with Artefacts	Low	Low research potential; small PAD; shallow deposit; low integrity
BOA2/1	Open Artefact Site	Low – possibly moderate	Low to possibly moderate research potential; common
BOA2/2	Open Artefact Site	Low	Common; low research potential
BOA2/3	Open Artefact Site	Low	Common; low research potential
BOA2/4	Open Artefact Site	Low	Common; low research potential; relatively low integrity
BOA2/5	Open Artefact Site	Low	Common; low research potential
BOA2/6	Open Artefact Site	Low	Common; low research potential
BOA2/7	Open Artefact Site	Low	Common; low research potential
BOA2/8	Open Artefact Site	Low	Common; low research potential; relatively low integrity
BOA2/9	Open Artefact Site	Low	Common; relatively low research potential
BOA2/10	Open Artefact Site	Low	Common; low research potential
BOA2/11	Open Artefact Site	Low	Common; low research potential; low integrity
BOA2/12	Rock Shelter with Artefacts	Low	Low research potential; very small shelter and PAD
BOA2/13	Open Artefact Site	Low	Common; low research potential
BOA2/14	Open Artefact Site	Low	Common; low research potential; relatively low integrity
BOA2/15	Open Artefact Site	Low	Common; low research potential
BOA2/16	Open Artefact Site	Low – possibly moderate	Detailed recording and further assessment required
BOA3/1	Open Artefact Site	Low – possibly moderate	Detailed recording and further assessment required
BOA3/2	Open Artefact Site	Low	Common; relatively low research potential
BOA3/3	Open Artefact Site	Possibly moderate	Detailed recording and further assessment required
BOA3/4	Open Artefact Site	Moderate to possibly high	Detailed recording and further assessment required
BOA3/5	Open Artefact Site	Possibly moderate	Detailed recording and further assessment required
BOA3/6	Waterhole/Well	Low	Natural feature, no evidence of use

Table 5 (continued):

Site Name	Site Type	Significance	Key Criteria
BOA4/1	Rock Shelter with PAD	Low	Relatively large shelter but sloping floor; moderate disturbance; relatively low research potential
BOA4/2	Open Artefact Site	Low	Common; low research potential; relatively low integrity
BOA5/1	Open Artefact Site	Possibly moderate	Detailed recording and further assessment required
BOA5/2	Open Artefact Site	Possibly moderate	Detailed recording and further assessment required
BOA5/3	Ochre Source	Low	Natural feature; no evidence of use; small source
BOA5/4	Open Artefact Site	Low	Common; low research potential
BOA5/5	Open Artefact Site	Possibly moderate	Detailed recording and further assessment required
BOA5/6	Open Artefact Site	Low	Common; relatively low research potential
BOA5/7	Open Artefact Site	Low	Common; low research potential
BOA5/8	Open Artefact Site	Low	Common; low research potential; relatively low integrity

Open Artefact Sites

Artefact scatters and isolated artefacts are common occurrences throughout the region and are therefore generally of low representative value. The sites tended to be of lower significance if levels of ground disturbance were moderate to high (and therefore the integrity of any evidence low), there was a limited range and nature of artefact evidence, and/or the potential for deposits of research value was low. Many of the open artefact sites contained low numbers of artefacts, with a consequent limited range of contents, and were located outside of primary or secondary resource zones in areas of low potential for deposits of research value.

Research potential relates to the probability that the sites contain sub-surface deposits that may yield evidence useful in addressing locally relevant research questions, such as those relating to occupation patterns or stone technology. This can be assessed in relation to a model of occupation (refer to Section 3.4) and thus assumes that deposits of higher research potential will generally be located where more focused occupation has occurred, such as in the primary and secondary resource zones.

The artefact sites tended to be of 'low to possibly moderate' or 'possibly moderate' or 'moderate to possibly high' significance where there was potential for deposits of research value. These sites tended to be located close to the Goulburn River or higher order tributaries, extended (or had potential) to extend over large areas, and typically require further investigation (detailed survey and recording, and potentially test excavation) to ascertain the nature of the deposits and their significance.

Rock Shelters

The research potential and significance of rock shelter sites/PADs can be assessed with reference to various criteria, including:

1) Size of the habitable floor area: A larger habitable floor area (the floor area of a rock shelter where the ceiling height is about one metre or more) equates to higher potential, as family groups may have been accommodated, a broader range of activities performed, and overnight camps and stays of longer duration been more feasible. Conversely, a small floor area limits the potential to short-duration/low-intensity activities such as people having sought temporary shelter from adverse weather;

2) Internal roof height: A low internal roof height (eg. less than standing height) is inferred to have reduced the attractiveness of a shelter for occupation of any more intensity than temporary shelter from adverse weather;

3) Nature of artefacts (count, density, range, specific types): As with artefact sites, a broader range and nature of evidence, including less common or rare items, is an indicator of higher potential and significance. However, due to site formation processes and factors influencing the visibility of items on the current shelter floors, the absence of evidence or a limited range of visible evidence is not taken to be a factor that lowers the level of significance;

4) Depth of deposit: The deeper the deposit within a rock shelter, the higher the potential for stratification and spatially (vertically) separate evidence of discrete episodes of occupation from different time periods. Hence, a deeper deposit equates to higher potential and a shallower deposit equates to lower potential[2];

5) Extent of potential deposit: A larger PAD, including often in areas marginally forward of the dripline, equates to higher potential, whereas a smaller PAD equates to lower potential;

6) Complexity (presence of grooves and/or art): The presence of grooves and/or art adds to the range of activities performed in a shelter and equates to higher significance and possibly research potential;

7) Proximity to potable water: The topographic context of each shelter was considered, particularly proximity to potable water, especially higher order watercourses (refer to the model of occupation in Section 3.4, which assumes that deposits of higher research potential will generally be located where more focused occupation has occurred, such as in the primary and secondary resource zones); and

8) Potential integrity: Although problematic to assess in the absence of controlled hand excavation, where low integrity was inferred (typically due to shallow deposits and clear evidence of extensive animal activity, such as wombat burrows, and/or erosion) this typically negates most other criteria and equates to low research potential and low significance.

The research potential of rock shelters is typically one of the primary criteria used in assessing their significance, as there can be stratified deposits with datable cultural evidence (potentially extending back many thousands or even tens of thousands of years) and typically, due to sedimentation processes or other visibility constraints, any evidence visible on the surface of the shelter floor does not necessarily provide an accurate indication of the nature of the buried deposits.

[2] Noting however, that methods of estimating depth, such as probing with a stake flag, can be unreliable in compact soil or deposits with abundant gravel/rock (Kuskie 2012), and therefore depth was often too problematic to reliably estimate during the survey.

Rock shelter sites/PADs of low significance typically have small habitable floor areas and/or potential deposits, occasionally with shallow deposits, sloping floors and/or low internal roof heights. Consequently they have low research potential. These shelters also tend to be situated outside of the primary or secondary resource zones. Such shelters may not even have been used by Aboriginal people (in the case of PADs where evidence is not visible), or if occupied, may only have been for short-duration/low-intensity activities, such as the seeking of temporary shelter from adverse weather. However, without excavation of a sample from a shelter, where artefacts are not visible it cannot be stated that the shelter was not occupied by Aboriginal people, nor can the nature and resulting evidence of any occupation be known with certainty.

Waterhole/Well, Ochre Source

The waterhole/wells and ochre source are assessed as being of low heritage significance. These are natural features with no evidence of Aboriginal modification or use.

Cultural Places/Values

No sites or places associated with ceremonies, spiritual/mythological beliefs or traditional knowledge, which date from the pre-contact period and have persisted until the present time, or places associated with historical associations which date from the post-contact period and are remembered by people today, were identified within the investigation area.

However, as documented above, the physical manifestations of evidence of past occupation (Aboriginal objects or archaeological/heritage sites) are generally of contemporary significance to the Aboriginal community, as they represent a tangible link with the traditional past and with the lifestyle and values of community ancestors.

The representatives also disclosed a number of associations with the investigation area of contemporary cultural significance, including:

- In general terms, the use of subsistence or other resources, with comments made about the presence of various native flora and fauna where observed. These comments were not of a historical nature (ie. did not relate to plant and animal resource use areas known from the post-contact period) but rather were general observations of the occurrence of particular species and their known traditional uses (eg. for food, medicine, tools, etc.); and

- In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the investigation area by the north-eastern Wiradjuri.

In general terms, the attachment of the north-eastern Wiradjuri people to the landscape and continuing strong cultural connections with the locality of the study area was evident. As noted by Goulding (2002:63), land is a fundamental part of Aboriginal culture and such cultural connections are integral to the health and wellbeing of Aboriginal people, which can be complex and is not always obvious to others.

8. STATUTORY OBLIGATIONS

The *National Parks and Wildlife Act 1974* (NP&W Act) provides the primary basis for the legal protection and management of Aboriginal heritage within NSW. Implementation of the Aboriginal heritage provisions of this Act is the responsibility of the OEH. The rationale behind the Act is to prevent unnecessary or unwarranted destruction of Aboriginal objects and to protect and conserve objects where such action is considered warranted (DECCW 2009a, 2009b).

With the exception of some artefacts in collections, the Act generally defines all Aboriginal objects to be the property of the Crown. The Act then provides various controls for the protection, management and destruction of these objects. An 'Aboriginal object' is defined as

> *'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains' [Section 5(1)].*

In practice, archaeologists generally subdivide the legal category of 'object' into different site types, which relate to the way Aboriginal heritage evidence is found within the landscape. The archaeological definition of a 'site' may vary according to survey objectives, however it should be noted that even single and isolated artefacts are protected as objects under the Act.

Under the terms of the *National Parks and Wildlife Act 1974*, it is an offence for a person to:

- Harm or desecrate an object that the person knows is an Aboriginal object;
- Harm an Aboriginal object ('strict liability offence').

Penalties for infringement of the Act vary in relation to the nature of the offence but include up to 5000 penalty units or imprisonment for two years, or both.

Consents regarding harm to Aboriginal objects are managed through the OEH Aboriginal Heritage Impact Permit (AHIP) system. AHIPs are typically required (apart from Part 3A Major Projects and Part 4 Division 4.1 State Significant Developments) to allow any impacts to an Aboriginal object or Aboriginal place.

The Wilpinjong Mine was initially approved under Part 3A (PA 05-0021) and subsequently under Part 4 Division 4.1 (Development Consent SSD-6764). As such, Aboriginal heritage within the Development Application Area is managed under the approved ACHMP (WCPL 2017a), *in lieu* of under a Section 90 AHIP under the NP&W Act.

Although the Biodiversity Offset Areas are approved under the Development Consent, they are outside of the Development Application Area and area covered by the ACHMP (WCPL 2017a). As such, any impacts to Aboriginal objects within the Biodiversity Offset Areas may not be covered by the Part 4 Division 4.1 exemptions to the NP&W Act and may require an AHIP from the OEH.

Under Section 89A of the NP&W Act, a person who is aware of the location of an Aboriginal object that is the property of the Crown or, not being the property of the Crown, is real property, and does not, in the prescribed manner, notify the Director-General thereof within a reasonable time after the person first becomes aware of that location is guilty of an offence against this Act unless the person believes on reasonable grounds that the Director-General is aware of the location of that Aboriginal object.

Under Section 85A of the NP&W Act, the Director-General may "dispose" of Aboriginal objects that are the property of the crown:

a) by returning the Aboriginal objects to an Aboriginal owner or Aboriginal owners entitled to, and willing to accept possession, custody or control of the Aboriginal objects in accordance with Aboriginal tradition, or

b) by otherwise dealing with the Aboriginal objects in accordance with any reasonable directions of an Aboriginal owner or Aboriginal owners referred to in paragraph (a), or

c) if there is or are no such Aboriginal owner or Aboriginal owners - by transferring the Aboriginal objects to a person, or a person of a class, prescribed by the regulations for safekeeping (commonly known as a Care Agreement that is implemented between OEH and the Aboriginal person or community organisation).

Under Section 85A(3) of the NP&W Act, the regulations may make provision as to the manner in which any dispute concerning the entitlement of an Aboriginal owner or Aboriginal owners to possession, custody or control of Aboriginal objects for the purposes of this section is to be resolved.

9. POTENTIAL IMPACTS

As a condition of Development Consent (SSD-6764), WCPL augmented its existing Biodiversity Offset Strategy to compensate for additional biodiversity impacts of the Extension Project. Five additional Biodiversity Offset Areas (BOA 1-5) were established for conservation and management in perpetuity via the NPWS estate (refer to Figure 3).

The *Wilpinjong Coal Biodiversity Management Plan* (WCPL 2017b) was prepared to manage these Biodiversity Offset Areas and other aspects of the biodiversity strategy (such as Rehabilition Areas). Condition 42 of Schedule 3 of Development Consent (SSD-6764) required the preparation of the Biodiversity Management Plan, including to:

> (d) manage any potential conflicts between the proposed enhancement works in the biodiversity offset strategy areas and any Aboriginal heritage values (both cultural and archaeological) in these areas, as informed by the Aboriginal cultural heritage survey required under condition 46 of this schedule.

It is noted that the Biodiversity Management Plan would not apply to the offset areas if they are transferred into the National Park Estate, in accordance with Conditions 34 and 35 of Schedule 3.

Section 5.1.1 and Table A6-1 of the Biodiversity Management Plan (WCPL 2017b) specify a number of potential management actions within the Biodiversity Offset Areas which have potential to cause impacts to identified and potential Aboriginal heritage resources and cultural values:

- Removal of internal fencing;
- Demolition and removal of any houses and/or buildings not required by the NPWS;
- General weed and pest control;
- Survey of boundaries;
- Fauna monitoring;
- Decommissioning and rehabilitation of unnecessary access tracks;
- Maintenance of necessary access tracks;
- Removal of waste;
- Identification and management of high-risk sediment and soil erosion areas;
- Management of stock, including potentially allowing livestock as a rehabilitation management tool and developing a fence repair and replacement program;
- Habitat augmentation; and
- Bushfire management.

To date, potential impacts on Aboriginal heritage within the Biodiversity Offset Areas have been managed through implementation of WCPL's Ground Disturbance Permit process and the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010b).

10. POTENTIAL MITIGATION AND MANAGEMENT STRATEGIES

Strategies that are typically available for the management of identified and potential Aboriginal heritage resources include further investigation (for example, sub-surface test excavation), unmitigated impact, mitigated impact, conservation and/or monitoring.

Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NP&W Act) and impacts are not permitted to occur to them in the absence of a Section 90 AHIP or approval of an ACHMP under Part 3A or Division 4.1, Part 4 of the EP&A Act. Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object ('strict liability offence').

Although the Biodiversity Offset Areas are approved under the Division 4.1, Part 4 Development Consent, they are outside of the Development Application Area and area covered by the ACHMP (WCPL 2017a). As such, any impacts to Aboriginal objects within the Biodiversity Offset Areas may not be covered by the Part 4 Division 4.1 exemptions to the NP&W Act and may require approval of an AHIP by the OEH.

To date, potential impacts on Aboriginal heritage within the Biodiversity Offset Areas have been managed through implementation of WCPL's Ground Disturbance Permit (GDP) process and the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010b) as set out in Section 7.4.1 and Table A6-1 of the Biodiversity Management Plan (WCPL 2017b). Impacts could arise from any of the management works described in Section 9 (and Section 5.1.1 and Table A6-1 of the Biodiversity Management Plan; WCPL 2017b) that cause ground disturbance.

Section 7.4.1 and Table A6-1 of the Biodiversity Management Plan (WCPL 2017b) specify that after the present heritage survey of the Biodiversity Offset Areas, WCPL will manage cultural heritage items in BOA1-5 in accordance with the NP&W Act, with the GDP process being the primary tool to identify potential heritage requirements and appropriate management actions. In relation to cultural heritage management, Table A6-1 specifies the 'Objectives' as:

- "Identification of cultural heritage sites within the Biodiversity Offset Areas to avoid potential harm"; and
- "Cultural heritage items within the approved disturbance area, ECAs, Regeneration and Rehabilitation Areas are managed in accordance with the WCPL ACHMP (within DA boundaries) and *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* for areas elsewhere".

Table A6-1 specifies the management strategies as:

- "Undertake Due Diligence cultural heritage surveys in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* within areas of proposed disturbance of the Biodiversity Offset Areas to identify cultural heritage sites";
- "Provide awareness training to all personnel engaged to undertake works in the Biodiversity Offset Areas, ECAs and Regeneration Areas on the use of WCPL's GDP process"; and
- "Continue implementation of WCPL's ACHMP, *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* and WCPL's GDP process".

The current management process, as outlined in the Biodiversity Management Plan (WCPL 2017b) is assessed as largely suitable because:

- Through the Ground Disturbance Permit process, the effects of each management activity within BOA1-5, including the potential impacts on Aboriginal heritage, are considered prior to the activity occurring;
- Where ground disturbance may occur, the process allows for the conduct of a due diligence assessment (including survey) of the potential effects on Aboriginal heritage, following the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010b); and
- These processes facilitate the identification of and consequent avoidance of impacts to known Aboriginal heritage sites.

However, there is the opportunity for more detail to be included in the Biodiversity Management Plan (WCPL 2017b) to clarify the steps required after implementation of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010b) and in the event that any new heritage evidence is identified during management works within the Biodiversity Offset Areas. This is particularly relevant as the approved ACHMP (WCPL 2017a) applies to the SSD approval area rather than the Biodiversity Offset Areas, and the procedures in the ACHMP are primarily intended for management within the SSD approval area, rather than in other areas (such as BOA1-5) in which the SSD approval (and exemptions under Section 90 of the NP&W Act) are not applicable.

Details (similar to Sections 5.2.2 and 5.2.3 of the ACHMP) could include, for example, that if any Aboriginal heritage evidence is identified in the Biodiversity Offset Area during a Due Diligence survey or during the conduct of management works:

- Impacts must be avoided to the identified Aboriginal heritage evidence and any work that may cause impacts to the Aboriginal heritage evidence must immediately cease and the Environment and Community Manager (ECM) and RAPs be notified. In the event that skeletal remains are detected, the finds would also need to be reported to the Police and the OEH;
- Appropriate precautionary measures, such as informing relevant personnel of the nature and location of the identified Aboriginal heritage evidence and the need to avoid impacts, along with temporary protective fencing and/or marking of the site location and signage should be implemented as deemed necessary by the ECM to ensure that inadvertent impacts do not occur; and
- If impacts cannot be avoided to the identified Aboriginal heritage evidence, a Section 90 AHIP would be required to be obtained from the OEH prior to any impacts occurring. Prior to the AHIP application being lodged, an assessment and community consultation consistent with the OEH (2011) *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, including the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a) and Aboriginal community consultation in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (DECCW 2010c) would be required.

11. RECOMMENDATIONS

This Aboriginal cultural heritage investigation of Biodiversity Offset Areas 1-5 has been undertaken to ensure compliance with and address the relevant requirements of Condition 46 of Schedule 3 of Development Consent (SSD-6764) and Section 5.6.2 of the ACHMP (WCPL 2017a).

The heritage survey involved sampling across each of the Biodiversity Offset Areas and resulted in the identification of 42 Aboriginal sites/PADs within or immediately adjacent to BOA1-5, comprising 32 open artefact sites, four rock shelters with PADs, three rock shelters with artefacts, two waterhole/wells and one ochre source. Two previously recorded sites could not be relocated.

Section 5.1.1 and Table A6-1 of the Biodiversity Management Plan (WCPL 2017b) specify a number of potential management actions within the Biodiversity Offset Areas which have potential to cause impacts to identified and potential Aboriginal heritage resources and cultural values.

To date, potential impacts on Aboriginal heritage within the Biodiversity Offset Areas have been managed through implementation of WCPL's Ground Disturbance Permit process and the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010b), as set out in Section 7.4.1 and Table A6-1 of the Biodiversity Management Plan. These current management processes have been assessed here as being suitable. However, there is the opportunity for more detail to be included in the Biodiversity Management Plan to clarify the steps required after implementation of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* and in the event that any new heritage evidence is identified during management works within the Biodiversity Offset Areas.

As such, it is recommended that the Biodiversity Management Plan is updated to include that if any Aboriginal heritage evidence is identified in the Biodiversity Offset Areas during a Due Diligence survey or during the conduct of management works:

- Impacts must be avoided to the identified Aboriginal heritage evidence and any work that may cause impacts to the Aboriginal heritage evidence must immediately cease and the ECM and RAPs be notified. In the event that skeletal remains are detected, the finds would also need to be reported to the Police and the OEH;

- Appropriate precautionary measures, such as informing relevant personnel of the nature and location of the identified Aboriginal heritage evidence and the need to avoid impacts, along with temporary protective fencing and/or marking of the site location and signage should be implemented as deemed necessary by the ECM to ensure that inadvertent impacts do not occur; and

- If impacts cannot be avoided to the identified Aboriginal heritage evidence, a Section 90 AHIP would be required to be obtained from the OEH prior to any impacts occurring. Prior to the AHIP application being lodged, an assessment and community consultation consistent with the OEH (2011) *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, including the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a) and Aboriginal community consultation in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (DECCW 2010c) would be required.

The following recommendations are also made:

1) Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object ('strict liability offence'). Therefore, no activities or work should be undertaken within the Aboriginal site areas as described in this report and marked on Figures 9-13 without approval under Division 4.1 of Part 4 of the EP&A Act (or *in lieu* a valid Section 90 AHIP) and subsequent implementation of any relevant approval conditions;

2) Single copies of this report should be forwarded for review and comment to the RAPs, with a minimum 28 days allowed for comment; and

3) After revision of the draft report to include and address the responses of the RAPs, copies of the final report should be forwarded to each organisation and the DP&E and the OEH prior to 31 March 2019.

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ACKNOWLEDGMENTS

- Ian Flood, Kieren Bennetts, James Heesterman, Clark Potter, Gail Ratcliffe and staff, Wilpinjong Coal; and
- Lyn Syme, Kelli Whillock, Aleshia Lonsdale, Tony Lonsdale, Larry Foley, Steven Flick, Debbie Foley, Brad Bliss and the members of the registered Aboriginal parties.

DISCLAIMER

The information contained within this report is based on sources believed to be reliable. Every effort has been made to ensure accuracy by using the best possible data and standards available. The accuracy of information generated during the course of this field investigation is the responsibility of the consultant.

However, as no independent verification is necessarily available, South East Archaeology provides no guarantee that the base data (eg. the OEH AHIMS) or information from informants (obtained in previous studies or during the course of this investigation) is necessarily correct, and accepts no responsibility for any resultant errors contained therein and any damage or loss which may follow to any person or party. Nevertheless this study has been completed to the highest professional standards.

Activity - the nature of behaviour that resulted in the discard of a lithic item. Categories include *non-specific stone flaking*, *bipolar flaking*, *microblade production*, *microlith production*, *loss or intentional discard of microliths* and *loss or discard of non-microlith tools*.

Activity area - a single location in which one or more *activity events* has resulted in the discard of items that constitute archaeological evidence. For example, an *activity area* may represent a single *activity* such as *microblade production*. However, this activity is comprised of numerous *activity events* (eg. each blow to the core can be described as an *activity event*), which result in multiple discarded items, each from different *activity events*.

Activity event (discard event) - the discard of lithic item(s) resulting from a single action performed during an *activity*. For example, a single blow to a core during a *non-specific stone flaking* event may result in the detachment of several flakes.

Archaeological site - any location that contains evidence of human activity.

Archaeological visibility - a mean estimate of the percentage of visible ground surface within a *sample area* or *site* that has potential to contain evidence of Aboriginal heritage.

Artefact - an object, normally portable, made or modified by the human hand (refer also to *stone artefact*).

Artefact density per square metre of effective survey coverage - mean number of artefacts within each square metre of visible ground surface with potential to contain Aboriginal artefacts that is physically inspected. Calculated by dividing the *number of artefacts* by *effective survey coverage*.

Artefact scatter - a locality that contains evidence of Aboriginal occupation in the form of stone artefacts. For the purposes of the assessment, artefact scatter sites were defined as the presence of one or more stone artefacts within a *survey area* (*cf*. Kuskie 2000). The survey areas are based on discrete, repeated *environmental contexts* or *archaeological terrain units*. Each spatially discrete location of evidence within a survey area is defined as a site locus, with the boundaries of the site locus defined by the visible extent of artefacts (ie. Aboriginal objects protected under the *National Parks & Wildlife Act 1974*). However, it is assumed that there is a similar probability for comparable evidence to occur elsewhere within the same survey area. Hence, while the visible site loci boundaries are defined by the extent of visible evidence, across the entire survey area in which a site is identified there exists a *potential resource* of comparable evidence.

Associated - where artefacts are identified to be in context with other material. Two main forms of association are where artefacts are identified to be of the same stone material and potentially belonging to the same reduction event, and where artefacts are associated with another feature such as a hearth.

Backed artefact - a retouched flake with one or more margins retouched at a steep angle, and that margin is opposite a sharp edge. The steep margin is formed by bipolar or hammer and anvil knapping. This type of artefact is subdivided into asymmetrical (Bondi) and symmetrically (geometric) shaped backed artefacts.

Backed blade - refer to *backed artefact* or *microlith*.

Background scatter (*background discard*) - manuports and artefactual material that are insufficient either in number or in association with other material to suggest focused activity in a particular location.

Backing (*retouch*) - abruptly angled flaking (retouch) which has shaped a thick back part to an implement such as an elouera or a microlith. The process of flaking varies from bipolar impact (on some eloueras) to delicate application of pressure with a small stone ('chimbling' used to make microliths).

Bondi point - a sub-type of microlith or *backed artefact* with abruptly angled backing retouch along one lateral margin (and often the butt end) so that it has an asymmetrical plan shape similar to a pen knife blade. This microlith type is commonly found east of the Great Divide as far north as Great Keppel Island.

Bondi point preform - a microblade or flake that has been partially backed by abruptly angled retouch scars along one lateral margin for the purpose of making a bondi point.

Bulb of force (bulb of percussion) - the rounded outwards swelling of the inside surface of a conchoidal flake beginning just below the partial or complete Hertzian cone. This swelling is caused by the uniform change of direction of the fracture front as the outward bending component of the applied force decays and is overtaken by the compressive component of the force.

Chert - a highly siliceous rock type formed biogenically from the compaction and precipitation of the silica skeletons of diatoms. Normally there is a high percentage of cryptocrystalline quartz. This rock type breaks by the process of conchoidal fracture and provides flakes that have sharp, durable edges.

Chord - the cutting edge of a microlith.

Cobble - waterworn stones of diameter greater than 64 mm and less than 256 mm. Archaeologists often refer to cobbles as pebbles (refer also to *pebble*).

Conjoin analysis - refitting or 'conjoining' artefacts assists with reconstructing prehistoric events (such as tool manufacture, tool use activities and cutting-edge rejuvenation) and determining chronology and assessing site integrity.

Core (synonymous with *nucleus*) - a piece of stone, often a cobble or pebble, but also quarried stone, which has been used for striking flakes. These flakes are called 'primary flakes' and may be further shaped by finer flaking, called 'retouch'. The term 'nucleus' refers to cores and flakes or cores that have been retouched.

Core fragment - a portion of a core, typically retaining one or more flake scars but not the platform.

Cortex - the weathered surface of a piece of stone altered by chemical and/or physical means. Pebble cortex is topographically smooth and occurs with a continuous curve.

Cortex amount - amount of the original weathered surface of the stone material, expressed as a percentage of the item's dorsal surface for flakes or total surface for other items.

Cortex type - nature of the original weathered surface of the stone material. Three types are identified: waterworn/pebble (rounded waterworn surface), tabular (smooth tabular shaped surface, may be waterworn) and terrestrial (rough cortex not consistent with tabular or waterworn surface).

Cortical initiation surface - an initiation surface on a pebble or cobble (refer to 'cortex' and 'initiation surface/platform').

Crystal quartz - a typically clear or translucent macrocrystalline form of quartz.

Debitage - commonly used term for the discarded debris from stone flaking. Usually there is a large quantity of flaking refuse or 'debitage' for every finished stone implement.

Detection limiting factors - factors that act to reduce *surface visibility* and *archaeological visibility.*

Discard - in relation to lithic scatters, discard means the incidental, intended or accidental placement of a lithic item on the ground surface.

Distal portion or end - the end of a flake or microblade (opposite to point of fracture origin on the ventral surface).

Dorsal face/facet - the outside surface(s) of a flake, opposite the inside (bulbar or ventral) surface, created during the formation of the flake (refer also to *ventral face*).

Drainage depression - landform element that typically comprises a shallow open depression with smoothly concave cross-section, rising to moderately inclined side slopes, eroded or aggraded by sheetwash (after McDonald *et al* 1984). For the purposes here, this unit also includes gullies (drainage depressions subjected to gully erosion), along with ground approximately 50 metres either side of the centre of the drainage depression.

Dripline - the outline of the furthest projection of the roof of a rock shelter.

Edge rounding - rounding wear along the cutting edge of a stone tool resulting from its use. This use-wear can be described as continuous or discontinuous and moderate or pronounced (refer also to *use-wear*).

Effective survey coverage - a measure of the quantity of visible ground surface physically inspected within a *sample area*, with potential to contain Aboriginal heritage evidence. Calculated by multiplying the *total sample area* of a *survey area* with the percentage of *archaeological visibility*. For a *total sample area* that includes multiple exposures, the *effective survey coverage* of each exposure was calculated separately and added to produce the reported figure.

Elongated flake - a flake at least twice as long as it is broad (by percussion axis).

Environmental context - discrete, recurring areas of land in which the same combination of landform element and class of slope are present.

Environmental/cultural context - a specific context that exists (generally within an individual archaeological terrain unit), that may host a different range of evidence (reflecting different types and frequencies of activities) than other locations within the same archaeological terrain unit or environmental context. For example, a particular spur crest may lead from a ridgeline used for transitory movement to a camp site bordering a food resource, whereas another spur crest may lead to a stone material source. Individual survey areas on these spur crests may host different types and proportions of evidence, reflecting different ways in which these landforms were utilised.

Exposure type - identification during the field survey of exposed soil units; eg. A horizon, A and B horizons or B horizon.

Feather termination - a normal ending to a flake, in which the fracture turns slightly to meet the fresh surface of the core at a very low angle, as in the ending of a feather.

Flake - a complete or substantially complete piece of lithic material detached from a core (nucleus), usually with evidence of hard indenter initiation, or occasionally bending initiation. The flake's primary fracture surface (ventral or inside surface) exhibits features such as fracture initiation, bulb of force, and undulations and lances. Very occasionally a conchoidal flake comprises only a bulb of force.

Flake - distal - a flake portion without its area of fracture initiation but with general shape characteristics and/or fracture surface attributes (usually conchoidal markings) indicating its status as an artefact fragment.

Flake - longitudinal - a flake longitudinally fractured from its proximal to its distal end. The breakage may be slightly tangential but are mostly axial in orientation. Such breakages tend to occur during knapping (such as longitudinal cone splits) rather than through post-depositional processes.

Flake - medial - a mid portion of a flake, without the proximal or distal ends.

Flake - proximal - the proximal portion of a flake retaining its area of primary fracture initiation, including 'step terminated flakes'.

Flake - utilised - refer to '*utilised flake or piece*'.

Flaked piece - refer to *'lithic fragment'*.

Flat - landform element that is neither a crest nor a depression and is level or very gently inclined (after McDonald *et al* 1984).

Focused initiation surface - an initiation surface area defined by a complete or partial Hertzian cone, sometimes with lateral extensions forming a narrow platform which is less than twice the area of the ring crack.

Freehand percussion - striking a core held in one hand with a hammer (usually stone) held in the other.

Geometric microlith - a group of microliths distinguished by their various geometric plan-shapes such as triangle, trapeze and rectangle.

Grinding grooves - elongated narrow depressions in soft rocks (particularly sedimentary), generally associated with watercourses. The shaping and sharpening of edge ground hatchets creates the depressions.

Ground disturbance - an estimate of the extent of recent human impacts and impacts of natural processes, noted in low, moderate or high categories, modified after McDonald *et al* (1984:69). The low category includes no effective disturbance, minor vegetation removal and low intensity grazing and minimal erosion. The moderate category includes extensive vegetation removal, improved pasture grasses and moderate levels of erosion. The high category includes complete vegetation removal and cultivation, extensive erosion and areas where the A horizon soil has been removed.

Habitable floor area - the floor area of a rock shelter where the ceiling height is about one metre or more.

Hammerstone - a piece of stone used as a hammer to detach flakes from a core or in applying controlled pressure when retouching a tool's edge. Stone hammers are often quartzite or a volcanic stone, round or oval in shape, with concentrated hammer impact damage on at least one side or end. The presence of use-wear often is the only diagnostic attribute of this tool type.

Hertzian cone - similar in shape to the neck of a milk bottle with the top of the cone being the initiation of the circular fracture. On a flake surface the cone is not fully formed and is represented by one side, because the fracture-initiating force was applied from above at an angle of about forty-five degrees, not ninety degrees.

Hertzian initiation - a Hertzian cone initiation which leads to the formation of a conchoidal flake (refer to 'Hertzian cone').

Hinge termination - when the end of the flake or fracture continuously turns at ninety degrees to the surface of the core or outside surface of the flake (refer also to 'retroflexed hinge termination').

Implement (of stone) - synonym for a *stone tool*, usually denoting a tool that has been shaped by flaking (retouch).

Indurated mudstone - refer to *tuff*.

Indurated rhyolitic tuff - refer to *tuff*.

Initiation surface/platform - the surface of a stone that is struck with a hammerstone at a low angle, for the purpose of detaching a flake. This surface is where a flake-forming crack commences; commonly part of it is retained on the flake. The load applied to this surface may be delivered by a hammerstone or by continuous increasing pressure with a length of dense wood or bone.

Knapping floor - a series of flaking events (refer to *knapping event*) that are generally defined as involving a single stone core (but sometimes multiple cores of the same or different materials) and resulting in the deposition of stone flaking debris that may be later recorded in discrete areas or be mixed by post-depositional processes.

Knapping event - a single act of flaking a piece of stone, resulting in the *in-situ* deposition of stone flaking debris. Such an event may occur as part of a series of events (refer to *knapping floor*).

Landform element - specific type of topographical feature, following the definitions of McDonald *et al* (1984).

Lateral margin - the thin sides of a flake or microblade.

Lithic - in an archaeological context, items of a hard, usually siliceous, stone of a type selected by Aborigines for tool making. These items are often nondescript fragments, but some are finely shaped implements.

Lithic assemblage (of stone) - a collection of whole and fragmentary stone artefacts and manuports obtained from an archaeological site, either by collecting items scattered on the present ground surface (refer to *artefact scatter*) or by controlled excavation (refer also to *stone artefact*).

Lithic fragment - (or *flaked piece*) - a flaked piece of stone which lacks sufficient morphological attributes to identify it as a flake (a positive scar) or a core (only negative flake scars) or other specific type.

Lithic item - a piece of stone exhibiting fracture surfaces and not identified as a natural piece of stone.

Lithic item type - formal category of an artefact (including lithic fragments).

Lithic quarry - a site of stone procurement, typically used in the specific sense to refer to outcrops of bedrock, where there is clear evidence of procurement activity such as pits, discarded hammerstones and large deposits of primary flaking debris.

Loss or discard of non-microlith tools - activity category comprising the loss or intentional discard after use or caching for future use of implements other than microliths.

Loss or intentional discard of microliths - activity category comprising the discard of microlithic implements either during manufacture, after use or unintentionally.

Mean archaeological visibility of site - an estimate of the mean visible ground surface within a *site* that has potential to contain evidence of Aboriginal heritage (expressed as a percentage of the *visible site area*).

Mean artefact density - the average number of surface artefacts recorded within each square metre of visible ground surface with potential to contain Aboriginal artefacts that is physically inspected within a sample area (eg. a site locus or a survey area). Obtained by dividing the *number of artefacts* by the *effective sample area* and expressed as a number of artefacts per square metre of effective sample area. Alternatively, the average number of artefacts located within a volume of excavated deposit, per unit of volume (eg. cubic metre). *Conflated* artefact density refers to the number of artefacts located within a volume of excavated deposit, expressed as a mean of the surface area of the excavation (eg. # artefacts per square metre). This measure is designed to reduce the impact of sediment volume on density comparisons (eg. geomorpohological processes will result in lower slopes having a deeper A unit soil than upper slopes).

Mean surface visibility - an estimate of the mean visible ground surface within a *sample area.*

Microblade production - activity category describing a method of making small implements (eg. bondi points, geometric microliths) from regular blades struck from a small core.

Microlith - (synonymous with *backed blade*) - a variety of small, delicately retouched implements of various shapes, such as asymmetric (bondi) point, segment, crescent, triangle, trapeze, rectangle and oblique ended. These implements probably functioned as spear barbs.

Microlith production- backing retouch of microliths.

Multiple scars fracture initiation surface - an initiation surface which comprises more than one flake scar (refer also to 'initiation surface'). Includes fracture surfaces that are faceted.

Negative - a scar on an artefact (usually concave) caused by the removal of a flake.

Non-specific stone flaking - activity category of general or non-specific knapping activity. Artefacts do not identify a more specific activity. Includes debitage from primary flaking and from making flake tools.

Ochre - a clay containing sufficient iron oxide to enable it to be used as a pigment. Ochre occurs in red (haematite), yellow and brown (limonite and goethite) colours and may be a friable sediment or a hard metallic stone. Ochre paints vary in depth, richness and shade of colour, and in ease of grinding and staining ability, depending on the particular geological source of the raw ochre.

Outrepassé termination - (also 'plunging') a flake with a thick ending caused by the flake-forming fracture turning inwards within the core. This occurs when the fracture front approaches the bottom of a core.

Overhang - in relation to rock shelters, a form of shelter in which a rock wall is inclined in such a manner to provide some shelter from the elements, but is typically not eroded in the same manner as a rock shelter.

Pebble - a waterworn stone less than 64 mm in diameter. Refer also to *cobble*.

Pebble (waterworn) cortex - the topographically smooth weathered surface of a stone, which occurs with a continuous curve.

Plain fracture initiation surface - an initiation surface which comprises a single flake scar or continuous cortex surface (refer also to 'initiation surface').

Potential resource - archaeological evidence predicted to occur through application of a predictive model of site location.

Provenance - the location of a lithic item.

Proximal - the top part of a flake, beginning with the initiation surface or ridge. Likewise for an implement (or tool). The opposite end of the flake is termed the distal end.

Quarry (lithic quarry, stone procurement site) - a general term for the location of an exploited stone source (Hiscock and Mitchell 1993:32). Often in archaeological studies it is used in a more specific sense, to refer to places where stone was obtained by excavation from a bedrock source (*lithic quarry*).

Quartz - a mineral composed of crystalline silica (SiO2). Quartz is a very stable mineral that does not alter chemically during weathering or metamorphism. It is hard, usually colourless or white ('milky'). In its massive form quartz occurs as geodes or veins, from which pebbles are formed by weathering. Despite the often unpredictable nature of fracture in quartz, the flakes tend to have sharp edges. Flakes made from quartz were widely used in Australia as convenient light-duty cutting tools.

Residues on stone tools - residue analysis concerns the identification of tool use activities from preserved organic and inorganic residues of worked materials. These residues may be compacted into small flake scars on the edges of utilised artefacts or adhere strongly to their surfaces.

Retouch or *retouching* - an area of flake scars on an artefact resulting from intentional shaping or resharpening of a stone tool. In resharpening a cutting edge, the retouch is invariably found only on one side.

Retouched flake - an artefact or portion of an artefact from which flakes have been removed after the manufacture of the original flake.

Ridge crest - landform element that stands above most or all of the surrounding points in the adjacent terrain, typically smoothly convex upwards and with a length greater than the width of the landform element (after McDonald *et al* 1984).

Rock shelter - a shallow, cave-like opening in a sedimentary (typically sandstone) rock wall, generally large enough to have allowed human occupancy.

Sandstone - a cemented or compacted rock consisting of detrital grains, which range in size from 1/16 mm to 2 mm in diameter. Quartz typically comprises the majority of grains. The grains can be bound together by a cement of silica, carbonate or other minerals, or a matrix of clay minerals. The nature of the cement is denoted by terms such as argillaceous (clayey), calcareous, ferruginous and tuffaceous sandstone.

Scarp - a laterally extensive steep to precipitous maximal slope eroded by gravity, water-aided mass movement or sheet flow.

Shelter floor area - the gross area of the floor of a rock shelter or overhang.

Simple slope - slope landform element adjacent below a crest or flat and adjacent above a flat or depression (after McDonald *et al* 1984). For the purposes here, this unit also includes *upper slopes*, *mid-slopes* and *lower slopes* as these become problematic to differentiate on the surface or on base mapping.

Site - location of evidence of Aboriginal occupation.

Site integrity - the extent to which the distribution of site contents corresponds to their spatial relationships at the time of deposition. Subsequent to deposition, a range of post-depositional processes affect the spatial relationships of items, and therefore site integrity.

Size class - artefact size as the maximum measurement in any direction, in units of 10 mm. For example, class '1' equals items with a maximum dimension of up to 10 mm and size class '2' equals items with a maximum dimension of between 10 and 20 mm.

Slope (class of slope) - gradient delineated after McDonald *et al* (1984):

Class 1 (level/very gentle) - level to very gently inclined slopes <1°45´;
Class 2 (gentle) - gently inclined slopes >1°45´ and <5°45´; and
Class 3 (moderate) - moderately inclined slopes >5°45´ and <18°.
Class 4 (steep) - steeply inclined slopes >18°.

Spur crest - landform element comprising a *ridge crest* that descends from a dominant or main ridge crest to adjacent lower lying terrain.

Step termination - when the end of the flake turns sharply at ninety degrees to the surface of the core or outside surface of the flake.

Stone artefact - a piece of stone with evidence of intentional human modification.

Stone material - the geological type of stone from which an artefact is made. Synonymous with 'lithic material', 'stone type' and 'raw material', the latter of which is a less specific but commonly used term.

Stone procurement site (quarry) - a general term for the location of an exploited stone source. Sources can vary from alluvial gravels (where there may be little or no archaeological evidence of human activity) to extensively quarried outcrops of bedrock, where there is clear evidence of procurement activity such as pits, discarded hammerstones and large deposits of primary flaking debris (refer also to *quarry, lithic quarry*).

Stone tool - a piece of flaked or ground stone used in an activity or fashioned for use as a tool. A synonym of stone tool is *implement*, which is more often used to describe a flake tool fashioned by more delicate flaking (retouch).

Sub-surface deposit - identified or predicted deposits of artefacts buried under the surface, both in open contexts and within rock shelters.

Surface visibility - a mean estimate of the percentage of visible ground surface within a *total sample area* or a *site*. Where a single component's *sample area* is comprised of multiple exposures, the surface visibility was recorded separately and the range of the surface visibility percentages noted in the database.

Survey area - an area sampled during the present survey, consisting of a single archaeological terrain unit or *environmental context* that is bounded on all sides by different archaeological terrain units.

Tabular cortex (*abbr. = tab*) - weathered surface of a tabular shaped cobble.

Terrace - a former flood plain on which erosion and aggradation by channelled and over-bank stream flow is barely active or inactive because deepening or enlargement of the stream channel has lowered the level of flooding (after McDonald *et al* 1984).

Terrestrial cortex (rough and weathered cortex; abbr. = terr) - a cortical surface which has developed by weathering of a fractured surface. Includes surfaces which have been weathered after natural fracturing along faults and exfoliation. Indicative of a terrestrial, not an alluvial source. The topographically rough weathered surface of a stone differs from that of *waterworn (pebble)* or *tabular* cortex.

Total sample area - the quantity of ground surface within a survey area physically inspected in such a manner as to reliably enable the detection of heritage evidence.

Tuff - lithified volcanic ash with a chemical composition of rhyolite. This stone has been commonly misidentified as *indurated mudstone* and *chert*. Tuff is composed of fine ash which has been hurled from the vent of a volcano during a violent explosive eruption. The tuff is rhyolitic in chemical composition, being comprised of quartz and potassium-feldspar, sometimes with layer silicates. After settling to the land, or more likely ponded water, the tuff undergoes recrystallisation at low pressures. This 'indurated' rhyolitic tuff exhibits conchoidal fractures. Colour is predominantly grey but variation occurs when mineral bearing solutions pass through the rock and some minerals (eg. goethite) precipitate out. Some tuff deposits show graded bedding, not unlike that of some sedimentary rocks. Lateral sorting also tends to occur, with coarser material settling closer to the volcanic vent and finer material further away.

Use-wear - microscopic and macroscopic damage to the surfaces of a stone implement resulting from its use. Examination for use-wear is aided by low-magnification microscopy. Major use-wear forms are edge fractures, use-polish and smoothing, abrasion, and edge rounding and bevelling.

Utilised flake or piece - a flake or lithic fragment displaying utilisation wear along one or more edges from use as a hand-held tool or as part of a composite wood and stone implement or weapon. The wear may be edge-rounding, surface polish, abrasive smoothing or abrasion such pitting and scratching ('striations').

Ventral face - the inside surface of a flake created during the flake's formation. The speed of the fracture ranges from about 200 metres to over 1000 metres per second (refer also to *dorsal face*).

Visible extent of artefacts - for each *site*, the approximate dimensions of the area in which artefacts are visible.

Visible extent of surface exposures - the approximate dimensions of a surface exposure in which a *site* has been identified.

Volcanic - rocks produced from the discharge of volcanic matter. Includes crystalline rock, such as granite, formed by the consolidation of magma, and fine-grained igneous rocks that result from more rapid cooling (eg. basalt).

Waterworn (pebble) cortex - the topographically smooth weathered surface of a stone, which occurs with a continuous curve.

APPENDIX 2.

RELEVANT PREVIOUSLY RECORDED ABORIGINAL SITE RECORDS[1]

[1] Source OEH AHIMS. Includes sites within or immediately adjacent to Biodiversity Offset Areas 1-5, known prior to conduct of the present heritage survey. Refer to Appendix 3 for details of sites recorded during the present investigation.

(S) (II) 8833 SI/55-4 DUBBO- SI/55-4 DUBBO 36-3-10
MUNGHORN GAP NATURE RESERVE/White Munghorn ● CAVE PAINTINGS

Military map/other reference 149°50' 32°23', Parish of Cumbo, County of Phillip
Dubbo 1:250,000 c.2798-9955
Pastoral or other property, park Munghorn Gap Nature Reserve.

Description of site Sandstone cave shelter, in gully, not far from old homestead, 23 miles from (E) Mudgee on Mudgee - Wollar Rd.
C-1299

Length of site 12 feet
Direction site faces N.E. Width 5 feet Height 4 feet
Dimensions of decorated areas as above, most of sandstone shelter.
Estimated number of figures c. 10 L'stencils + some crosses
Nearest water supply ¼ mile to Moolarben Creek

Site B on map on File No. A3465

Styles of painting
Techniques dry pigment paint - red ochre
Subjects about 8 numerous hand stencils, some possibly made by children, as the hands are small. With emu tracks (or crosses?).
Colours Red
Superimpositions

36-3-10

Nature of floor
Are implements visible on surface

Associated with
rock engravings
axe grooves
campsite
carved trees
quarry
other relics
stone arrangements
burials

Has site been excavated and by whom
Natural defacement

36-3-0010

Animal defacement
Human defacement

G. Mumford, Woolarben Stn. = possible informant, other sites in this area.

Photo record by Where deposited
Scale chart by Where deposited
History

Aboriginal meaning and name
M. PEARSON (1978) SEEN THROUGH DIFFERENT EYES → Unpub. Ph.D. Thesis Site no. 76. p 601.
site card prepared by Ranger A.K. Morris

Published reference NPWS A 3445 Map on file.

OEH #36-3-2688 (WE83, WCP371)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION					
Site name	WE83			**NPWS Site Number**	
Owner/manager	Wilpinjong Coal Mine				
Owner Address	Wollar Rd, Wilpinjong, NSW				
LOCATION					
Location					
How to get to the site					
1:250,000 map name				**NPWS map code**	
AMG Zone	56	**AMG Easting**	767257	**AMG Northing**	6414520
Method for grid reference	Topographic map	**Map scale (if method = map)**	1:25,000	**Map name**	Wollar 8833-2-N
NPWS District				**NPWS Zone**	
Portion no.				**Parish**	
SITE DESCRIPTION					
Site type(s)	Waterhole			**Site type code (NPWS use only)**	

Description of site and contents
CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock.
DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types.
ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination.
BURIALS: number & condition of bone, position, age, sex, associated artefacts.
TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth.
QUARRIES: rock type, debris, recognisable artefacts, percentage quarried

Dimensions (cm)		
L	W	D
100	60	25

Attach photographs and sketches, eg. plan & section of shelter.
Do NOT dig, disturb or damage site or contents.

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT						
Land form	**Break of slope**			**Aspect**		**Slope**
Mark position of the site						
Local rock type				**Land use/effect**		
Distance from drinking water				**Source**		
Resource zone (eg. estuarine, river, forest)	Escarpment			**Vegetation**	**Open Woodland (4-10m high)**	
Edible plants				**Faunal resources** (include shellfish)		
Other exploitable resources (eg. ochre)						
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Rockshelters, Open artefact Scatters, Isolated Finds, Waterholes, Scarred Tree	

SITE MANAGEMENT			
Site condition	Poor	**Low visitor/landuse impact** **Moderate natural impact: Erosion and animal activity**	
Management recommendations			
Have artefacts been removed from site	No	**When**	
By whom		**Deposited at**	
Consent applied for	☒	**Consent issued**	☐
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING			
Reason for investigation	Supplemental survey of escarpment areas to identify additional Indigenous heritage resources		
Were local Aborigines contacted or present for the recording	☐ Not contacted ☒ Contacted and present ☐ Contacted but not present	**Names and addresses**	Kevin Williams: Murong Gialinga ATSIC Stephen Flick, Geoff Murray and Ben Mobbs: Mudgee LALC Emma Syme and Lynette Syme: North East Wiradjuri NTC Robyn Williams: Warrabinga NTC.
Is the site important to local Aborigines	Not Significant		
Verbal/written reference sources		**ASR report number(s)**	C- C-
Photographs taken	No	**No of Photos attached**	
Site recorded by	Tessa Boer-Mah	**Date of recording**	21/06/06
Address/institution	Kayandel Archaeological Services PO Box 440 Picton NSW 2571		

Version: June 1998	Data entered by:	Date entered:

APPENDIX 3.

ABORIGINAL HERITAGE SITE DESCRIPTIONS[1]

[1] For new sites identified and recording during the Biodiversity Offset Areas 1-5 survey. Refer to Appendix 2 for additional information on previously recorded sites.

SITE NAME: BOA1/1

Site Type:	*Open artefact site*	MGA Grid Reference:	*768139:6414592*
Date Recorded:	*20/11/18*	Topographic Map:	*Wollar 8833-2N*
Recorder:	*Michael Marsh*		
Landform Element:	*Drainage depression*	Vegetation:	*Forest/bush/regrowth*
Slope:	*Moderate to steep*	Ground Disturbance:	*Moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	20	10	200	5%	5%	10	7	0.7	possible

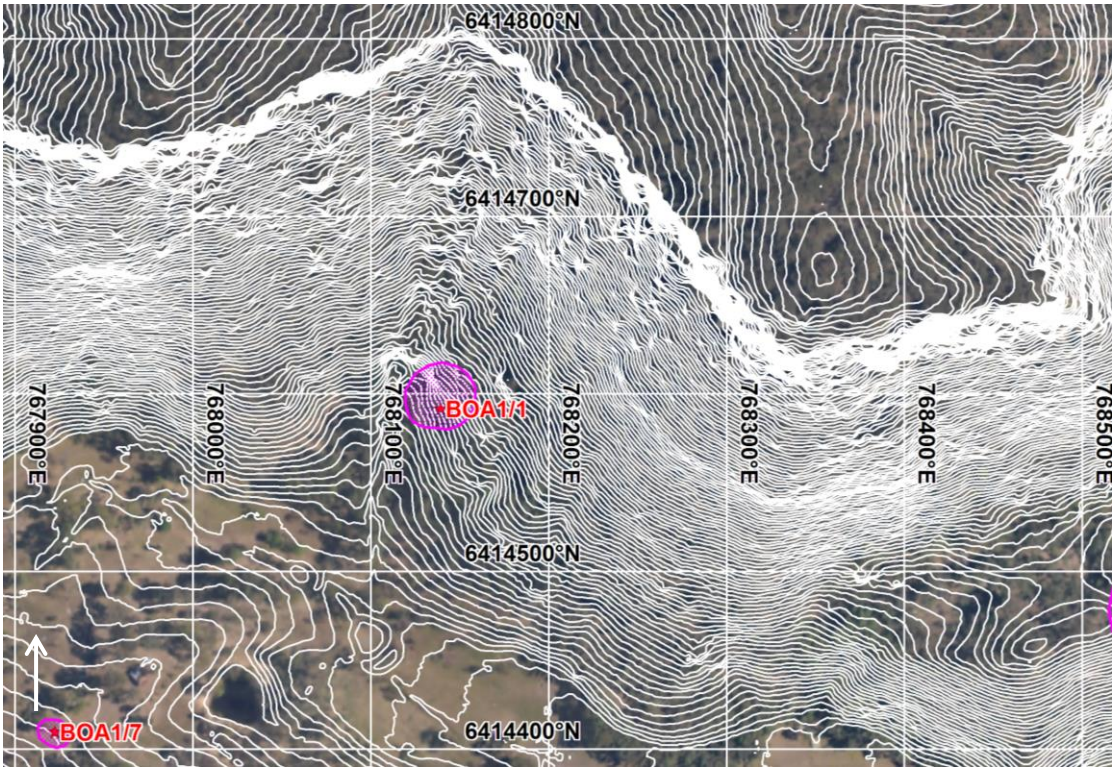
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - proximal	2		768139	6414592
2	white	quartz	flake - medial	3		768139	6414592
3	white	quartz	lithic fragment	1		768139	6414592
4	white	quartz	core fragment	3	one incomplete negative scar	768139	6414592
5	white	quartz	lithic fragment	3		768141	6414603
6	white	quartz	flake	3		768131	6414590
7	white	quartz	flake	1		768131	6414590

Additional Comments:

- Low integrity - moderate disturbance from soil re-deposition by erosion, animal burrows;
- Mixed gums with scrub understorey;
- Very steep drainage line with conglomerate boulders and overhangs;
- Low research potential.

Site Location: BOA1/1 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/1

Photograph: BOA1/1

Photograph: BOA1/1 - artefacts #1-3 (left), #4 (top right) and #6-7 (below right)

SITE NAME: BOA1/2

Site Type:	*Open artefact site*	MGA Grid Reference:	*768545:6414498*
Date Recorded:	*20/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Ridge crest*	Vegetation:	*Forest/bush/regrowth*
Slope:	*Moderate*	Ground Disturbance:	*Moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
-	-	10	7	70	10%	10%	7	3	0.4	unlikely

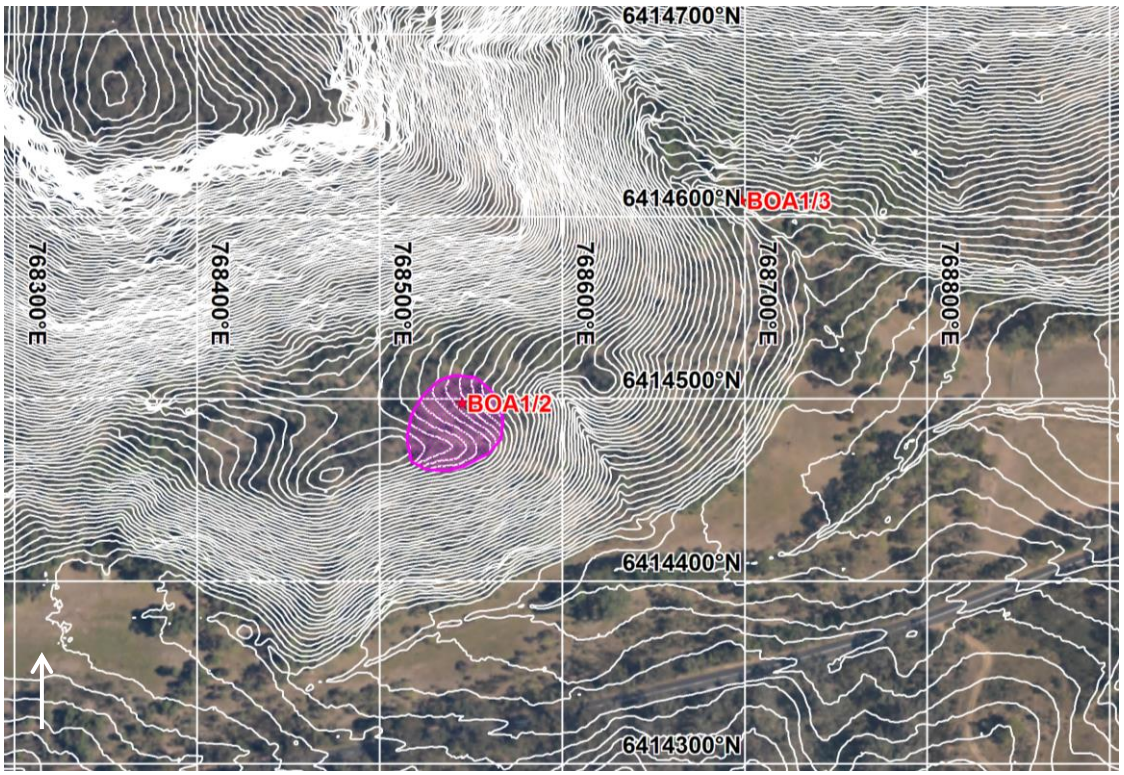
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake	3		768532	6414477
2	white	quartz	flake	3		768545	6414498
3	white	quartz	lithic fragment	2		768550	6414481

Additional Comments:

- Moderate ground disturbance - sheet wash erosion, B unit exposed;
- Mixed gums;
- Small crest with conglomerate sandstone outcrops;
- Low research potential.

Site Location: BOA1/2 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/2

Photograph: BOA1/2

Photograph: BOA1/2 artefact #1 (left), #2 (centre) and #3 (right)

SITE NAME: BOA1/3

Site Type:	*Rock shelter with artefacts*	MGA Grid Reference:	*768698:6414609*
Date Recorded:	*20/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Drainage depression*	Vegetation:	*Forest/bush*
Slope:	*Steep*	Ground Disturbance:	*Low*
Distance to Water:	*<50*		

Rock Outcrop Material:	*Conglomerate*
Outcrop Type:	*Rock shelter*
Outcrop Form:	*Boulder*
Aspect:	*West*
Erosion:	*Exfoliation, cavernous*
Surface Condition:	*Exfoliating*
Soil:	*Silt, sand, gravel*
Disturbance to Deposit:	*High*
Causes of Disturbance:	*Animal burrows, stock*

Possible Extent of Potential Archaeological Deposit:	*4 x 2 metres*
Possible Depth of Potential Archaeological Deposit:	*>0.5 metres*
# of Artefacts:	*1*
Archaeological Visibility:	*10%*
Shelter Floor Area:	*5 x 2.5 metres*
Habitable Shelter Area (roof 1+ metres above floor):	*4 x 2 metres*

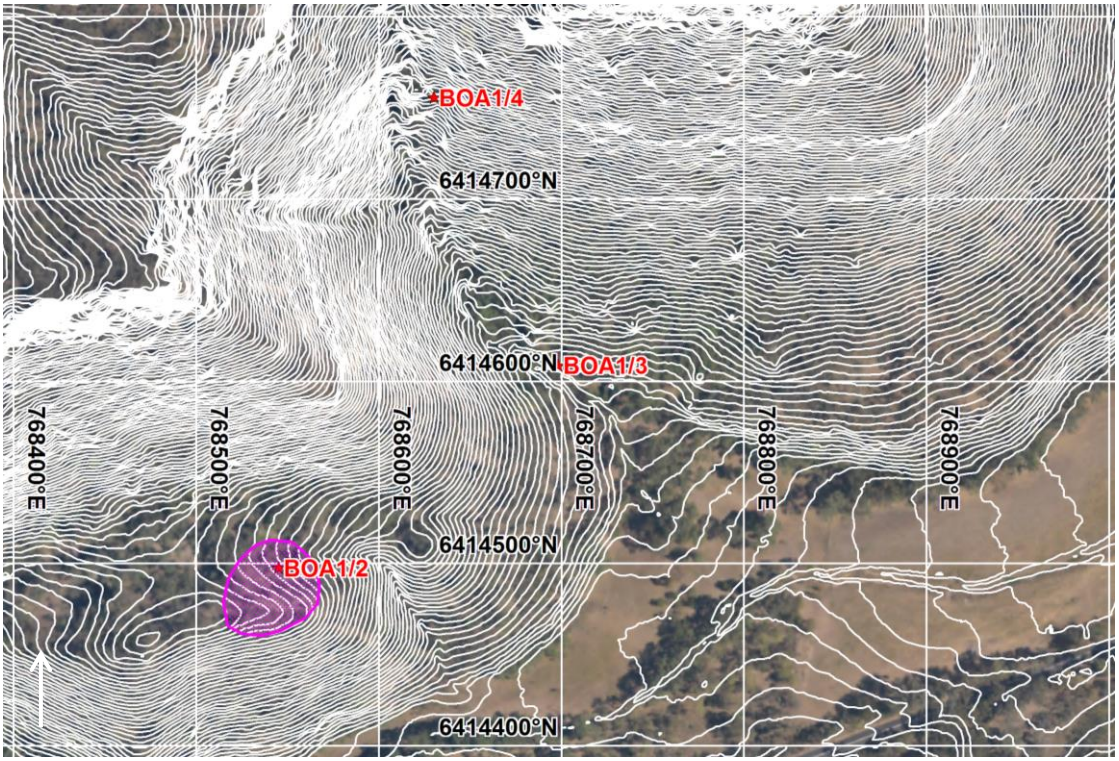
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake	3		768698	6414609

Additional Comments:

- Low research potential – small potential deposit and low integrity due to high disturbance levels.

Site Location: BOA1/3 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/3

Photograph: BOA1/3

Photograph: BOA1/3 – artefact #1

SITE NAME: BOA1/4

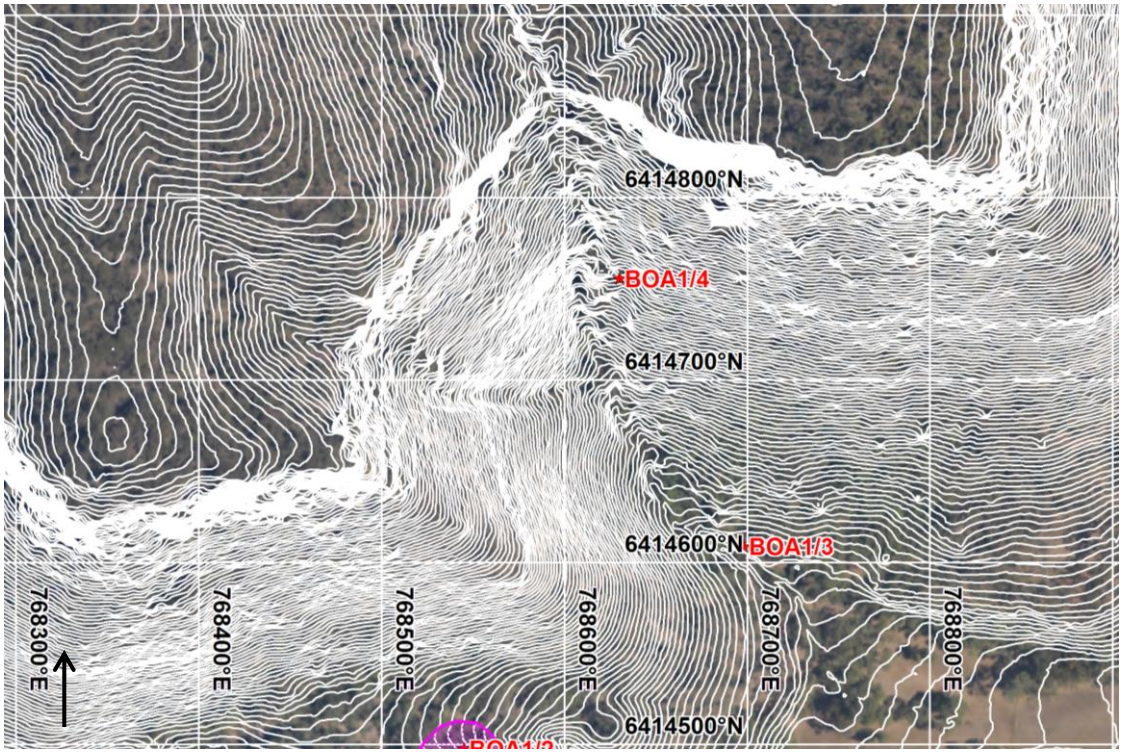
Site Type:	*Waterhole/well*	MGA Grid Reference:	*768630:6414756*
Date Recorded:	*20/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Drainage depression*	Vegetation:	*Forest/bush*
Slope:	*Steep*	Ground Disturbance:	*Low*
Distance to Water:	*<50*		

Rock Outcrop Material:	*Conglomerate*
Outcrop Form:	*Boulder*
Waterhole/well size:	*2 metre diameter*
Depth of Waterhole/well	*1.5 metres deep*

Additional Comments:

- Waterhole occurs in large boulder;
- No evidence of human modification, but a potential water source.

Site Location: BOA1/4 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/4

Photograph: BOA1/4

SITE NAME: BOA1/5

Site Type:	*Rock shelter with PAD*	MGA Grid Reference:	*767410:6415078*
Date Recorded:	*20/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Scarp*	Vegetation:	*Forest/bush*
Slope:	*Steep*	Ground Disturbance:	*Low*
Distance to Water:	*>50*		

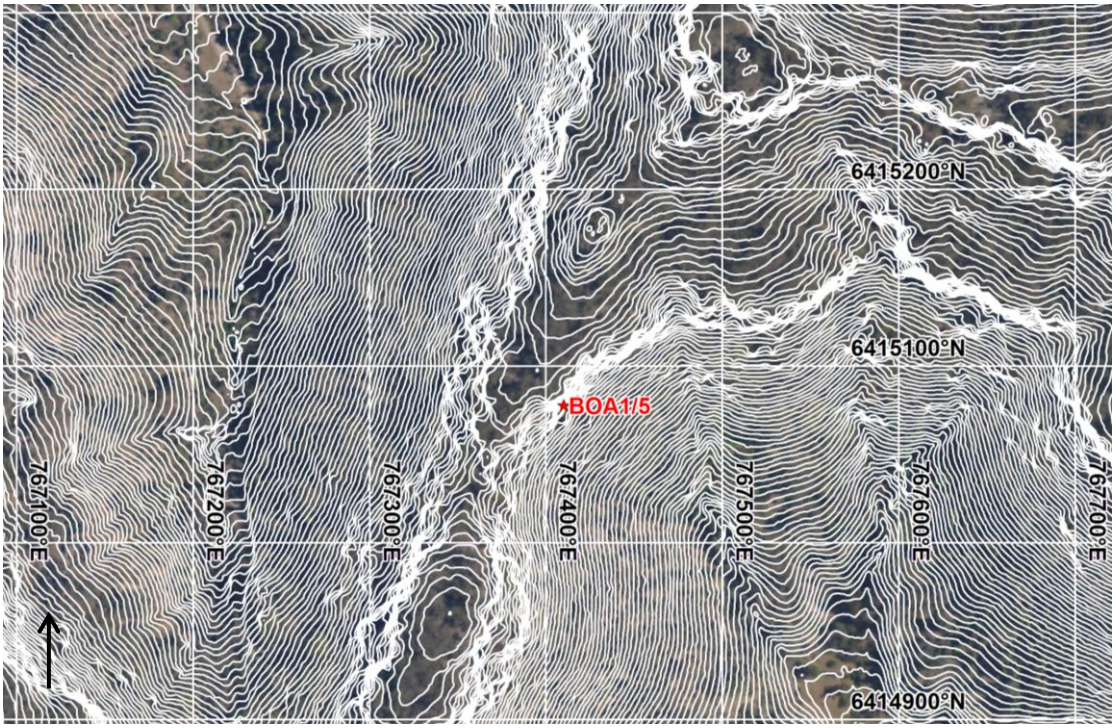
Rock Outcrop Material:	*Sandstone*
Outcrop Type:	*Rock shelter*
Outcrop Form:	*Scarp*
Aspect:	*South*
Erosion:	*Exfoliation, honeycomb*
Surface Condition:	*Exfoliating*
Soil:	*Silt, gravel*
Disturbance to Deposit:	*Low*
Causes of Disturbance:	

Possible Extent of Potential Archaeological Deposit:	*4 x 4 metres*
Possible Depth of Potential Archaeological Deposit:	*0.3 metres*
# of Artefacts:	*Nil*
Archaeological Visibility:	*50%*
Shelter Floor Area:	*5 x 4 metres*
Habitable Shelter Area (roof 1+ metres above floor):	*4 x 4 metres*

Additional Comments:

- Fresh powder on surface;
- Large boulder, part of scarp;
- Low research potential – small potential deposit, relatively shallow and sloping floor.

Site Location: BOA1/5 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/5

Photographs: BOA1/5

SITE NAME: BOA1/6

Site Type:	*Rock shelter with PAD*	MGA Grid Reference:	*767738:6415015*
Date Recorded:	*20/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Scarp*	Vegetation:	*Forest/bush*
Slope:	*Steep*	Ground Disturbance:	*Low*
Distance to Water:	*>50*		

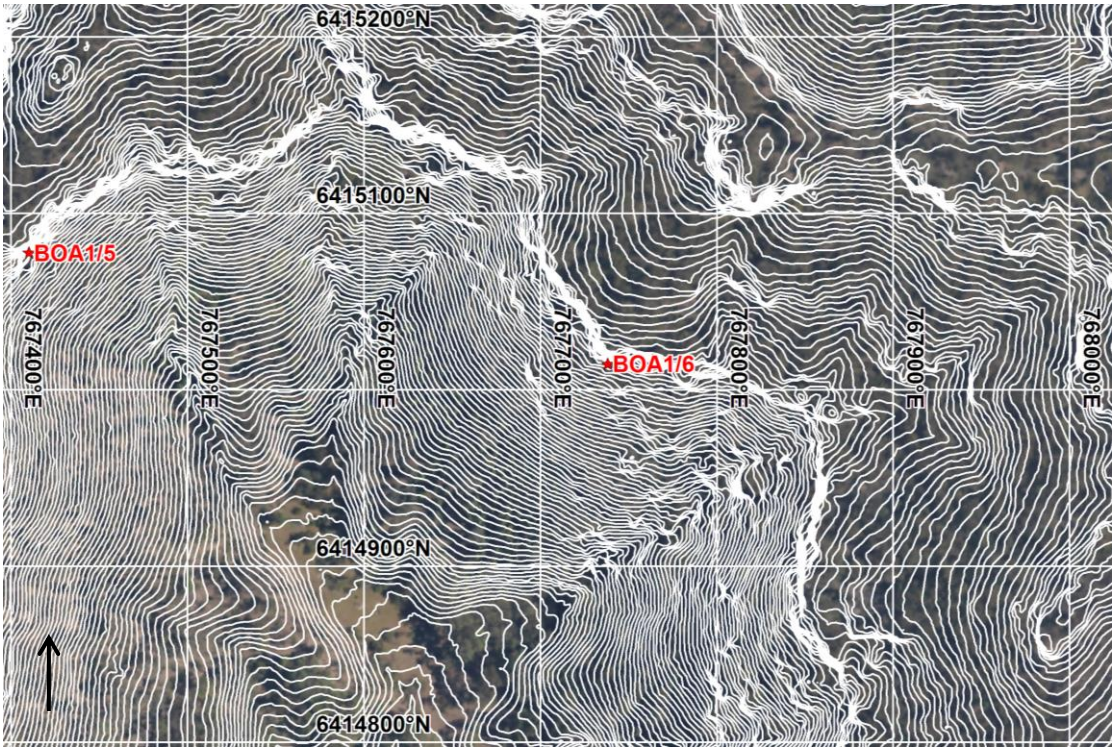
Rock Outcrop Material:	*Conglomerate*
Outcrop Type:	*Rock shelter*
Outcrop Form:	*Scarp, boulder*
Aspect:	*South*
Erosion:	*Exfoliation, cavernous*
Surface Condition:	*Exfoliating, exposed/weathered*
Soil:	*Rocky, silt, sand, gravel*
Disturbance to Deposit:	*High*
Causes of Disturbance:	*Erosion, animal burrows*

Possible Extent of Potential Archaeological Deposit:	*4 x 3 metres*
Possible Depth of Potential Archaeological Deposit:	*0.4 metres*
# of Artefacts:	*Nil*
Archaeological Visibility:	*50%*
Shelter Floor Area:	*5 x 4 metres*
Habitable Shelter Area (roof 1+ metres above floor):	*5 x 4 metres*

Additional Comments:

- Potential deposit largely removed by erosion;
- Four large cracks present through which water has seeped;
- Low research potential – relatively small potential deposit and low integrity.

Site Location: BOA1/6 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/6

Photographs: BOA1/6

SITE NAME: BOA1/7

Site Type:	*Open artefact site*	MGA Grid Reference:	*767922:6414410*
Date Recorded:	*20/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Simple slope*	Vegetation:	*Cleared/grass*
Slope:	*Gentle*	Ground Disturbance:	*Moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
20	3	1	1	1	80%	60%	0.6	4	6.67	possible

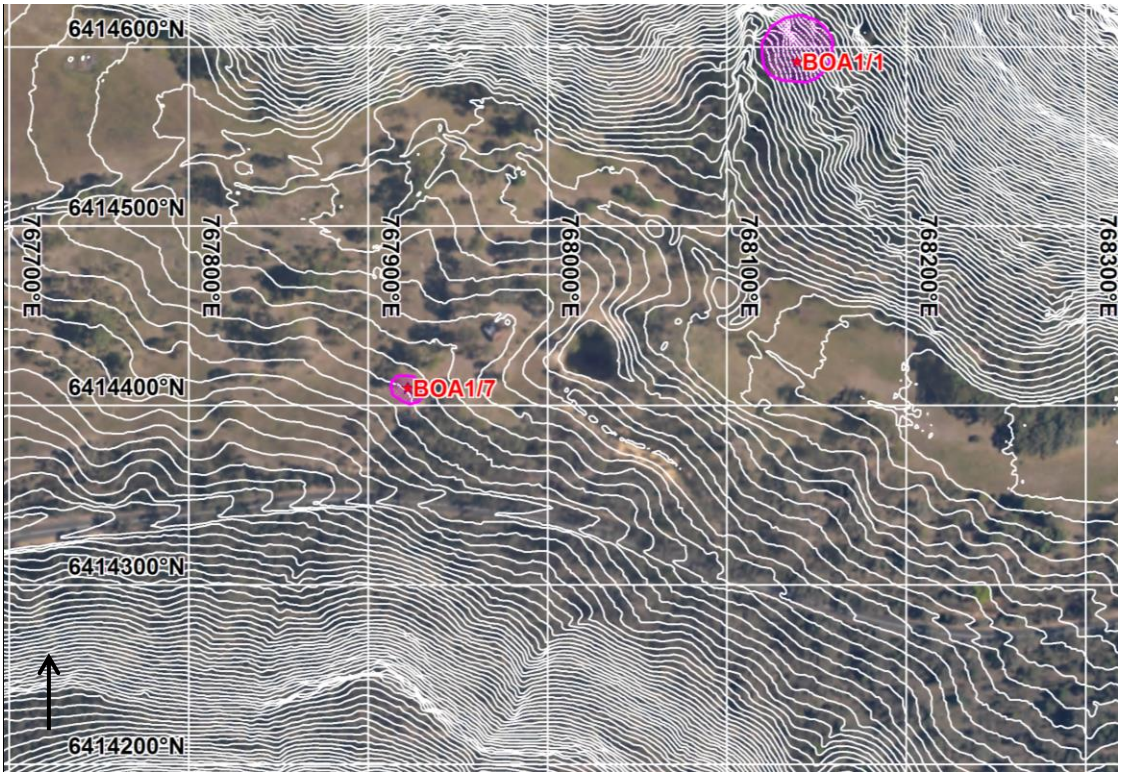
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - longitudinal	17x10x3		767922	6414410
2	white	quartz	lithic fragment	37x24x12		767922	6414410
3	white	quartz	flake	18x14x5		767922	6414410
4	white	quartz	lithic fragment	20x15x8		767922	6414410

Additional Comments:

- Unformed vehicle track, largely overgrown;
- Moderate ground disturbance from vegetation removal and vehicle track;
- Low research potential.

Site Location: BOA1/7 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/7

Photograph: BOA1/7

Photograph: BOA1/7 - artefacts #1-4

SITE NAME: BOA1/8

Site Type:	*Open artefact site*	MGA Grid Reference:	*767453:6414608*
Date Recorded:	*21/11/18*	Topographic Map:	*Wollar 8833-2N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Spur crest*	Vegetation:	*Cleared*
Slope:	*Gentle*	Ground Disturbance:	*High*
Distance to Water:	*>50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	10	5	50	60	30	15	5	0.33	possible

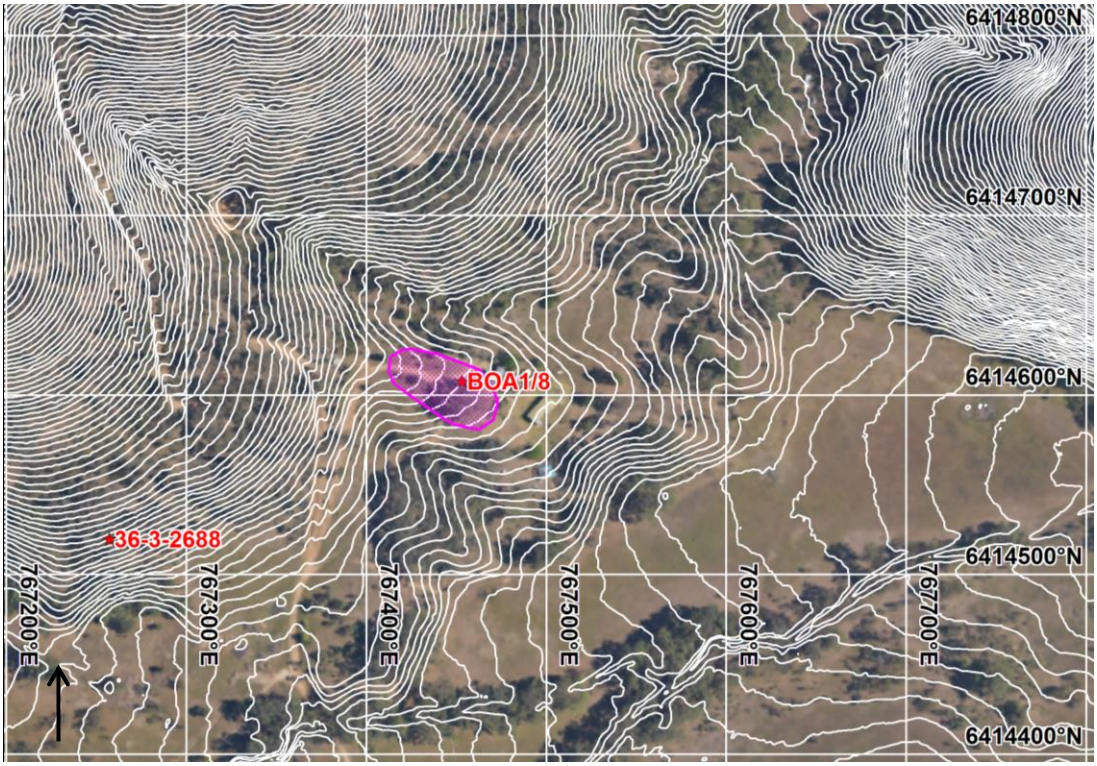
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - medial	21x12x3		767453	6414608
2	white	quartz	lithic fragment	22x14x8		767450	6414612
3	white	quartz	lithic fragment	22x14x4		767445	6414607
4	white	quartz	lithic fragment	12x6x3		767441	6414611
5	white	quartz	flake - longitudinal	20x13x7		767424	6414616

Additional Comments:

- High disturbance from vegetation removal and well formed vehicle track leading to demolished house;
- Quartz available in locality;
- Low research potential.

Site Location: BOA1/8 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/8

SITE NAME: BOA1/9

Site Type:	*Rock shelter with PAD*	MGA Grid Reference:	*766800:6414444*
Date Recorded:	*22/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Scarp*	Vegetation:	*Forest/bush*
Slope:	*Steep*	Ground Disturbance:	*Low*
Distance to Water:	*>50*		

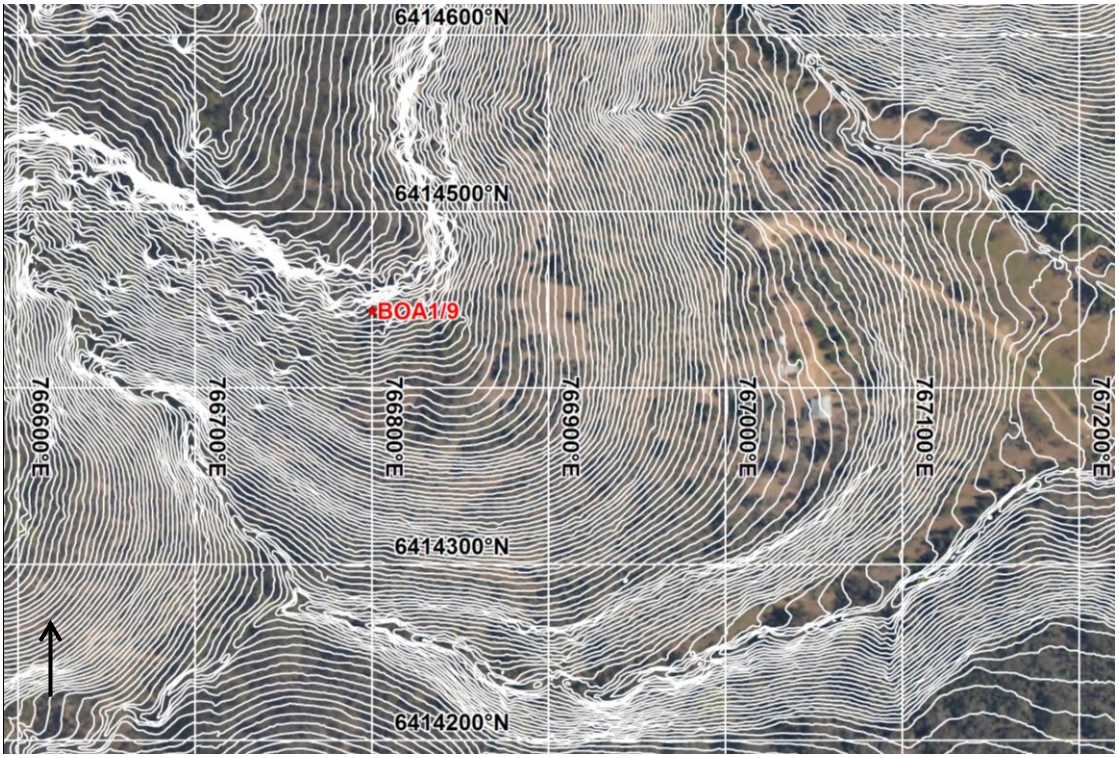
Rock Outcrop Material:	*Conglomerate*
Outcrop Type:	*Rock shelter*
Outcrop Form:	*Scarp*
Aspect:	*East*
Erosion:	*Exfoliation, cavernous*
Surface Condition:	*Exfoliating*
Soil:	*Sand, gravel*
Disturbance to Deposit:	*Moderate*
Causes of Disturbance:	*Animal burrows*

Possible Extent of Potential Archaeological Deposit:	*5 x 4 metres*
Possible Depth of Potential Archaeological Deposit:	*>0.3 metres*
# of Artefacts:	*Nil*
Archaeological Visibility:	*50%*
Shelter Floor Area:	*5 x 4 metres*
Habitable Shelter Area (roof 1+ metres above floor):	*5 x 4 metres*

Additional Comments:

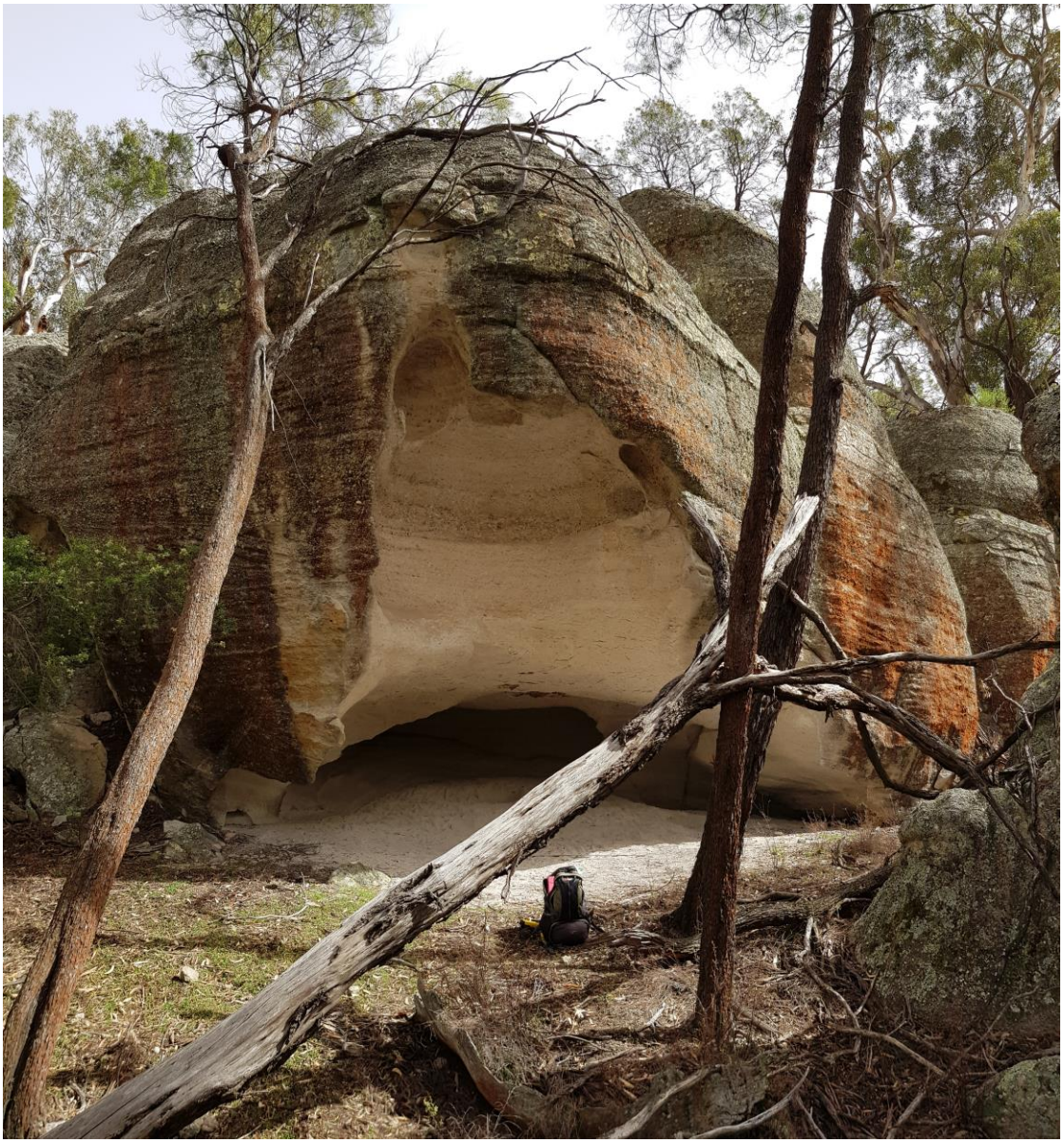
- Low roof and slightly sloping floor;
- Several cracks in wall;
- Soft, fresh powdery sediment;
- Wombat burrows, kangaroo impacts;
- Low research potential – moderate disturbance, relatively low roof and small deposit.

Site Location: BOA1/9 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/9

Photograph: BOA1/9



SITE NAME: BOA1/10

Site Type:	*Rock shelter with artefacts*	MGA Grid Reference:	*766566:6413373*
Date Recorded:	*22/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Simple slope*	Vegetation:	*Forest/bush*
Slope:	*Moderate*	Ground Disturbance:	*Low*
Distance to Water:	*>50*		

Rock Outcrop Material:	*Conglomerate*
Outcrop Type:	*Overhang*
Outcrop Form:	*Boulder*
Aspect:	*East*
Erosion:	*Exfoliation*
Surface Condition:	*Exposed/weathered*
Soil:	*Gravel*
Disturbance to Deposit:	*High*
Causes of Disturbance:	*Erosion, animal burrows*

Possible Extent of Potential Archaeological Deposit:	*7 x 1 metres*
Possible Depth of Potential Archaeological Deposit:	*<0.1 metres*
# of Artefacts:	*2*
Archaeological Visibility:	*40%*
Shelter Floor Area:	*7 x 2 metres*
Habitable Shelter Area (roof 1+ metres above floor):	*7 x 1 metres*

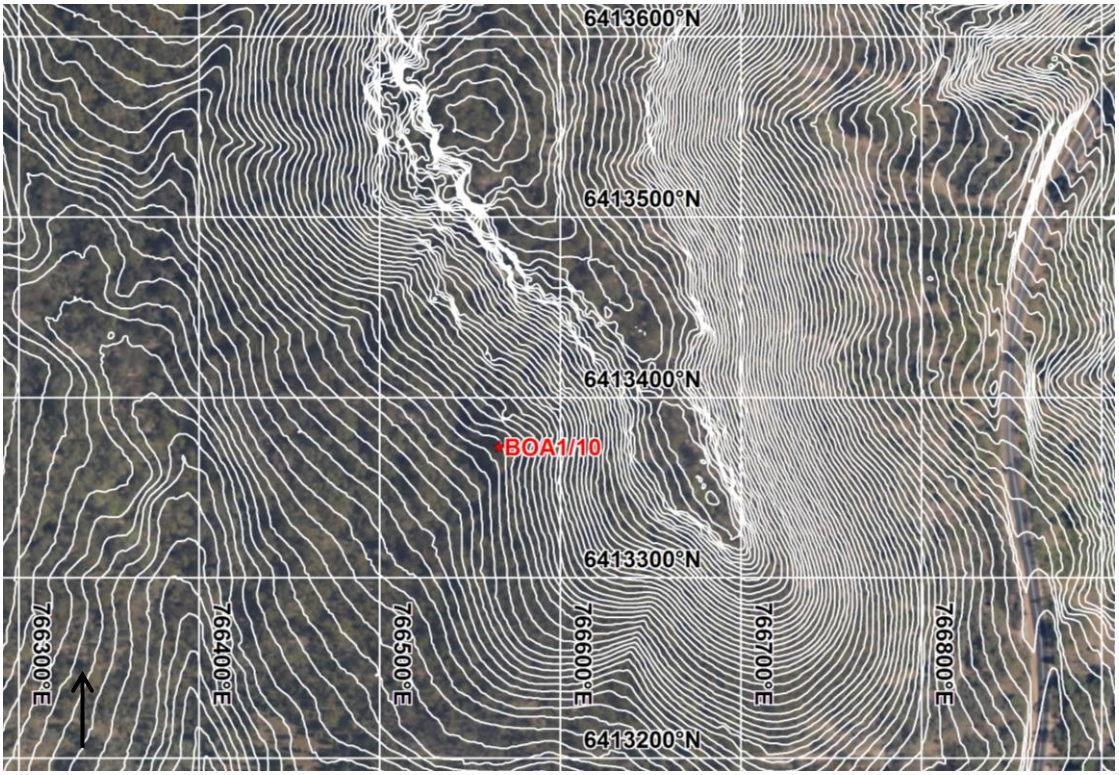
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - longitudinal	3		766566	6413373
2	brown	chert	flake - distal	3		766566	6413373

Additional Comments:

- Very shallow deposit, highly disturbed by erosion and animals;
- Artefacts in front of dripline;
- Low research potential.

Site Location: BOA1/10 (100 metre MGA Zone 55 grid, 1 metre contours)



Photograph: BOA1/10

Photograph: BOA1/10

Photograph: BOA1/10 – artefacts #1 (left) and #2 (right)

SITE NAME: BOA2/1

Site Type:	*Open artefact site*	MGA Grid Reference:	*769721:6411077*
Date Recorded:	*21/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Spur crest*	Vegetation:	*Forest/bush/regrowth*
Slope:	*Moderate to steep*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
-	-	1	1	1	2%	2%	0.02	1	50	probable

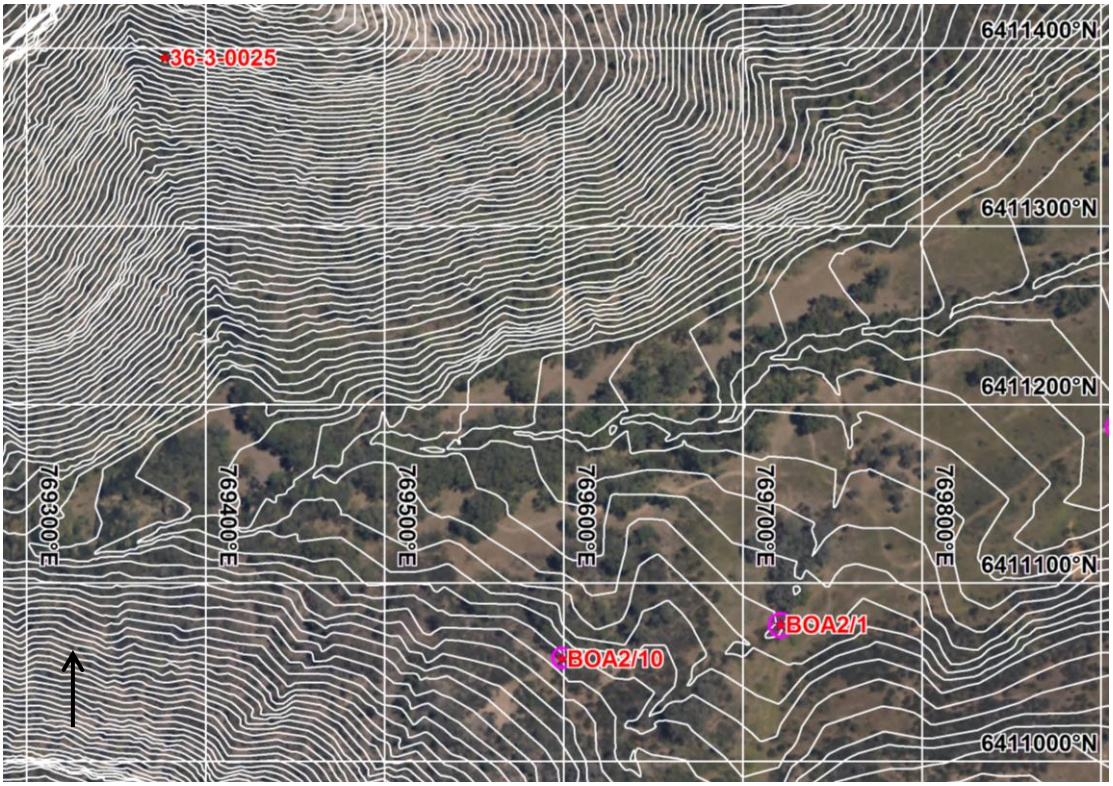
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - medial	2	grassy slope	769721	6411077

Additional Comments:

- Single quartz artefact on grassed slope adjacent to drainage channel;
- Grass results in low visibility;
- Low disturbance - animal burrows;
- Stone materials available – cobbles, pebbles in drainage;
- Low to possibly moderate research potential, depth probably greater than 0.5 metres.

Site Location: BOA2/1 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/1

Photograph: BOA2/1

Photograph: BOA2/1 - artefact #1

SITE NAME: BOA2/2

Site Type:	*Open artefact site*	MGA Grid Reference:	*769645:6411741*
Date Recorded:	*21/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Ridge crest*	Vegetation:	*Cleared/grass*
Slope:	*Level - very gentle*	Ground Disturbance:	*Moderate*
Distance to Water:	*>50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
-	-	1	1	1	2%	2%	0.02	2	100	unlikely

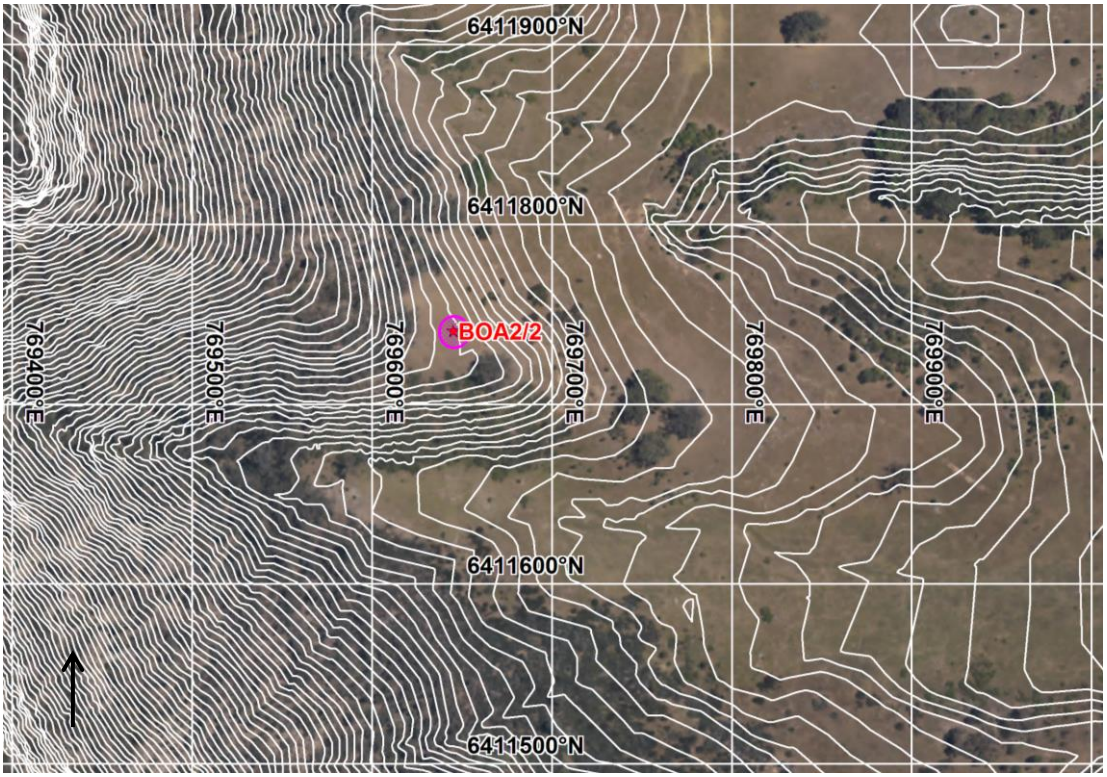
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - proximal	3	conjoined artefact with #2	769645	6411741
2	white	quartz	flake - distal	2	conjoined artefact with #1	769645	6411741

Additional Comments:

- Crest with views;
- Disturbance from vegetation removal and erosion;
- Low research potential.

Site Location: BOA2/2 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/2

Photograph: BOA2/2

Photograph: BOA2/2 - artefacts #1-2

SITE NAME: BOA2/3

Site Type:	*Open artefact site*	MGA Grid Reference:	*769281:6413736*
Date Recorded:	*24/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Drainage depression*	Vegetation:	*Cleared/grass*
Slope:	*Level - very gentle*	Ground Disturbance:	*Low - moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	1	1	1	20%	20%	0.2	2	10	possible

Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	brown	tuff	core	26x22x10	2 platforms, 9 scars; rotated	769281	6413736
2	white	quartz	flake – proximal	10x7x2		769281	6413736

Additional Comments:

- Artefacts located on vehicle track;
- Low to moderate disturbance from vegetation removal and track;
- Low research potential.

Site Location: BOA2/3 (100 metre MGA Zone 55 grid, 2 metre contours)

Photograph: BOA2/3 (inset – artefact #1)

SITE NAME: BOA2/4

Site Type:	*Open artefact site*	MGA Grid Reference:	*770095:6411168*
Date Recorded:	*23/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Spur crest*	Vegetation:	*Cleared/grass*
Slope:	*Gentle*	Ground Disturbance:	*Low moderate*
Distance to Water:	*>50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
15	15	7	2	14	90%	80%	11.2	8	1.4	possible

Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - longitudinal	3		770095	6411168
2	white	quartz	flake	4		770095	6411168
3	white	quartz	flake - distal	1		770095	6411168
4	white	quartz	flake - proximal	2		770095	6411168
5	white	quartz	flake	2		770095	6411168
6	white	quartz	flake - distal	3		770095	6411168
7	grey	tuff	flake - proximal	2		770085	6411171
8	grey	tuff	flake - distal	3		770085	6411171

Additional Comments:

- Artefacts in exposure on crest;
- Ground disturbance low to moderate from vegetation removal and erosion;
- Low research potential.

Site Location: BOA2/4 (100 metre MGA Zone 55 grid, 2 metre contours)

Photograph: BOA2/4

Photograph: BOA2/4

Photograph: BOA2/4 - artefact #2 (left) and #7-8 (right)

SITE NAME: BOA2/5

Site Type:	*Open artefact site*	MGA Grid Reference:	*769122:6413231*
Date Recorded:	*24/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Spur crest*	Vegetation:	*Forest/bush/regrowth*
Slope:	*Level very gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
-	-	1	1	1	1%	1%	0.01	1	100	probable

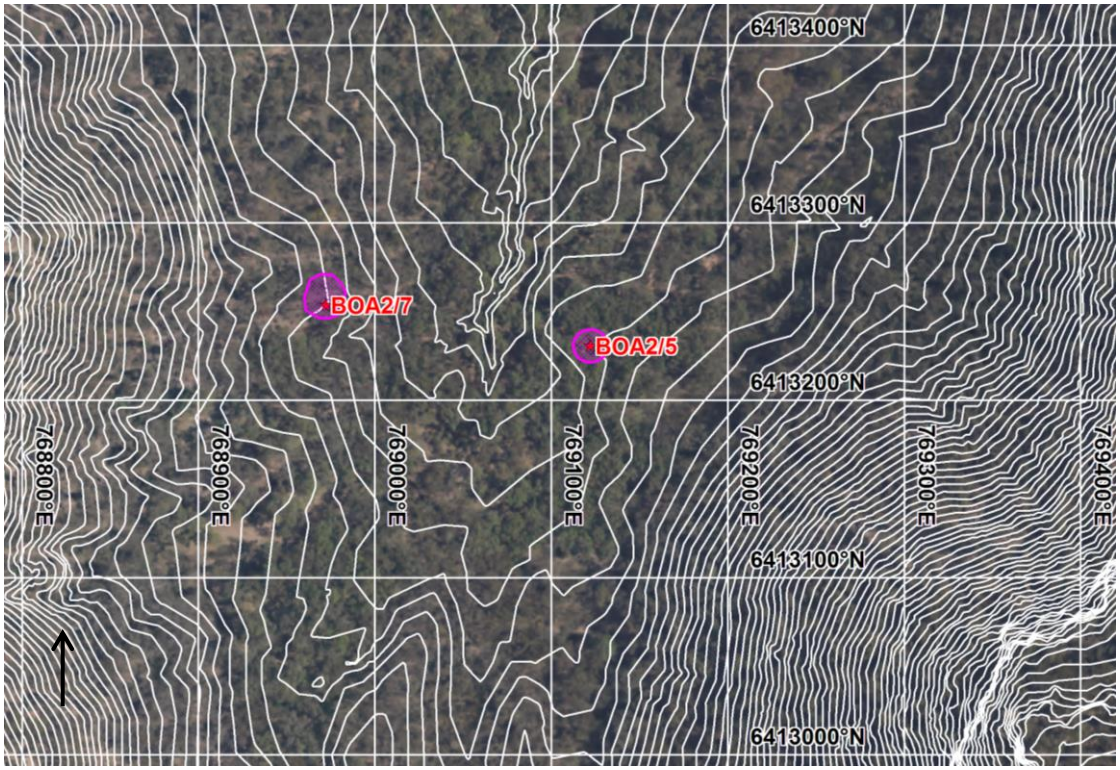
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - proximal	2		769122	6413231

Additional Comments:

- Apple Box vegetation;
- Ground disturbance low, from sheet erosion;
- Small knoll overlooking drainage;
- Leaf litter reduces visibility;
- Low research potential.

Site Location: BOA2/5 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/5 (inset – artefact #1)

SITE NAME: BOA2/6

Site Type:	*Open artefact site*	MGA Grid Reference:	*768977:6412885*
Date Recorded:	*24/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Spur crest*	Vegetation:	*Forest/bush/regrowth*
Slope:	*Gentle*	Ground Disturbance:	*Low to moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
5	3	5	1	5	5%	5%	0.25	2	8	possible

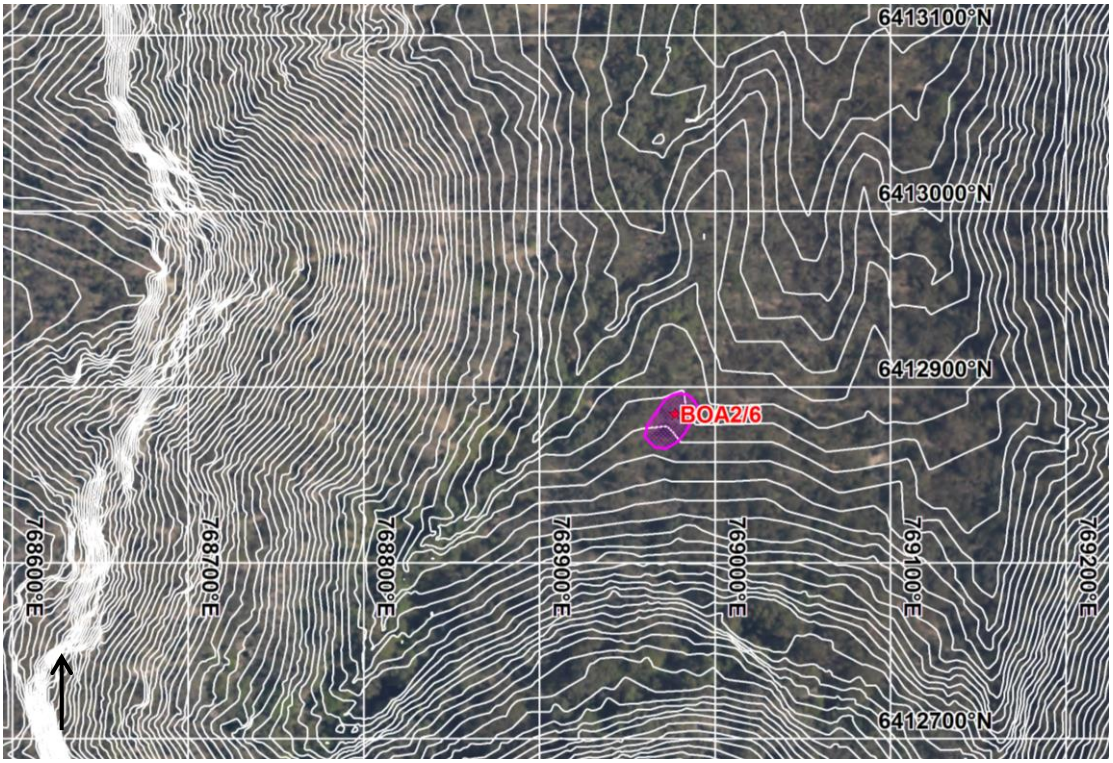
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	core fragment	3		768977	6412885
2	white	quartz	flake	3		768971	6412875

Additional Comments:

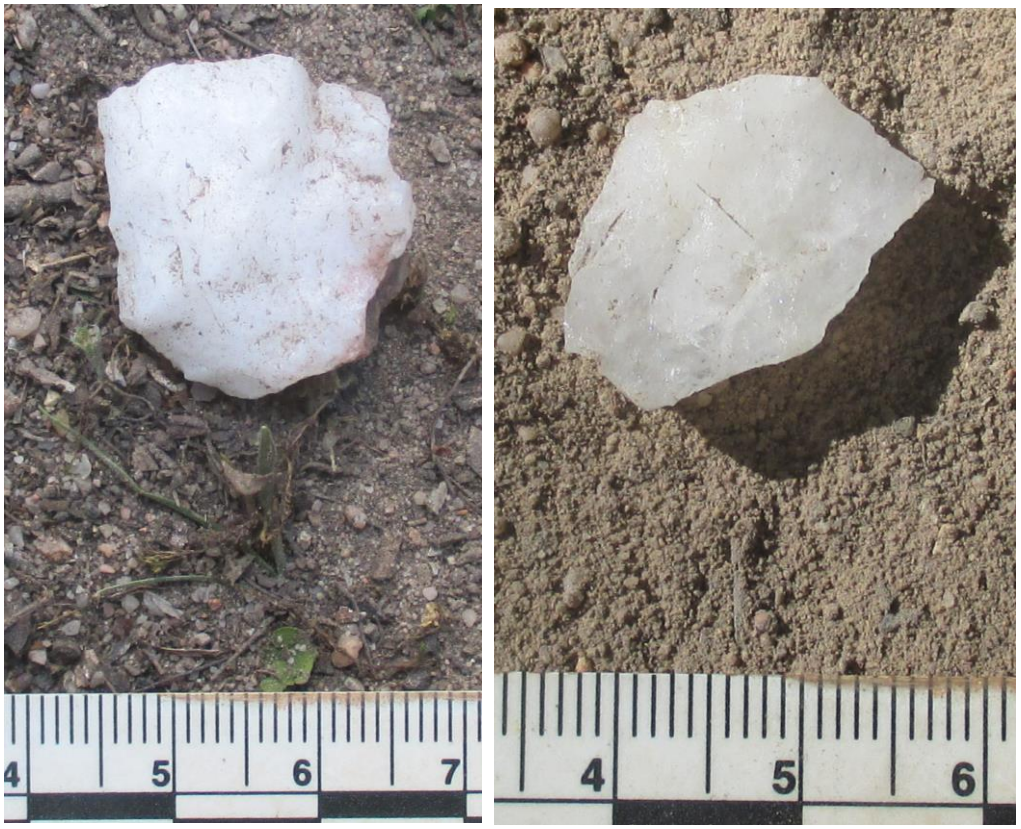
- Box regrowth vegetation;
- Ground disturbance from sheet erosion and animals;
- Low research potential.

Site Location: BOA2/6 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/6

Photograph: BOA2/6 - artefact #1 (left) and #2 (right)



SITE NAME: BOA2/7

Site Type:	*Open artefact site*	MGA Grid Reference:	*768972:6413254*
Date Recorded:	*24/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Spur crest*	Vegetation:	*Forest/bush/regrowth*
Slope:	*Gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
10	10	5	5	25	5%	5%	1.25	3	2.4	possible

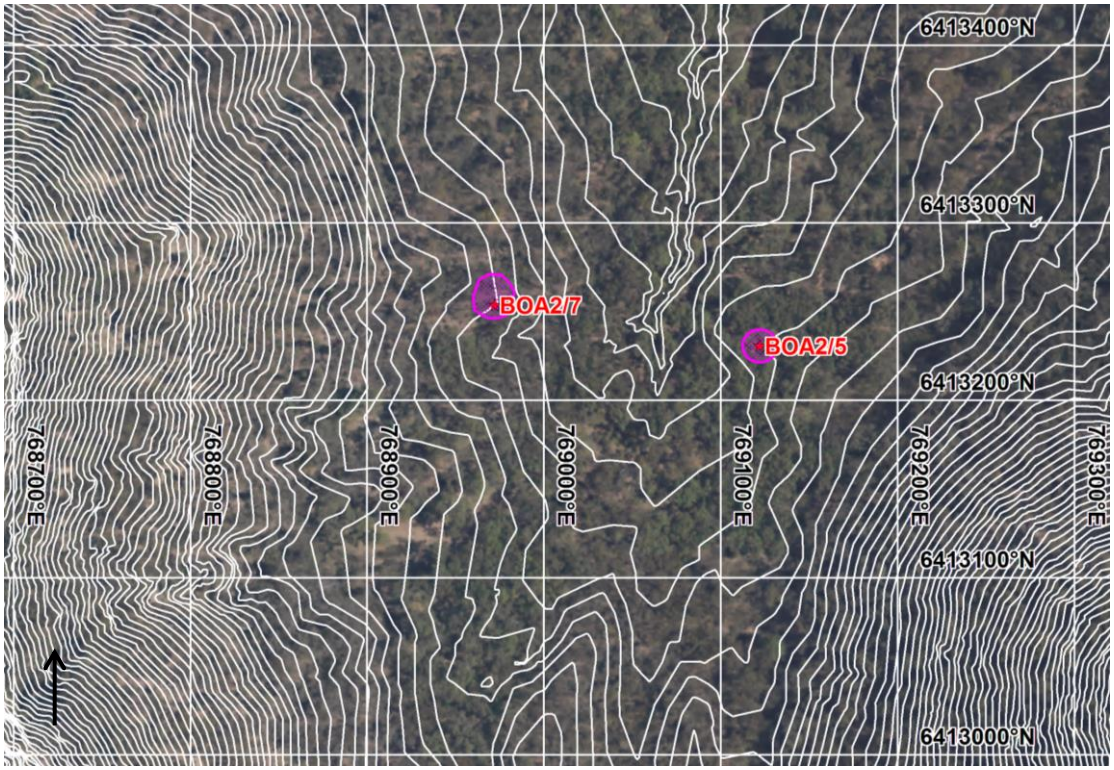
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake	3		768972	6413254
2	white	quartz	geometric microlith	2		768969	6413262
3	white	quartz	lithic fragment	2		768971	6413262

Additional Comments:

- Relatively low ground disturbance from erosion and animals;
- Small spur above drainage lines;
- Low research potential.

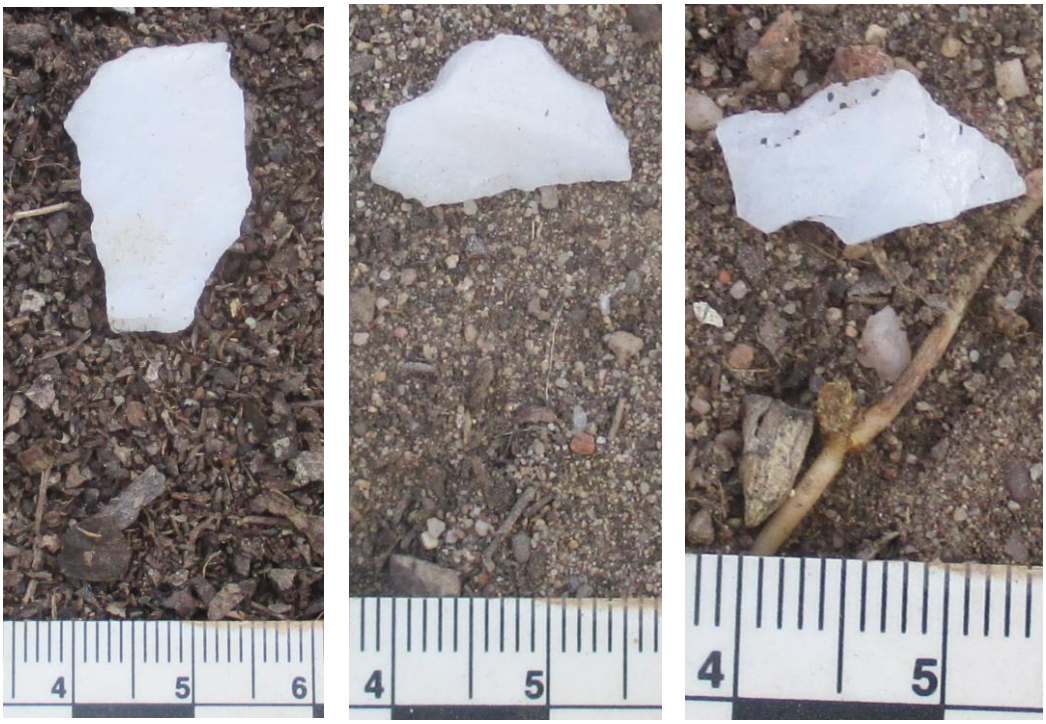
Site Location: BOA2/7 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/7

Photograph: BOA2/7

Photograph: BOA2/7 - artefact #1 (left), #2 (centre) and #3 (right)



SITE NAME: BOA2/8

Site Type:	*Open artefact site*	MGA Grid Reference:	*769128:6413629*
Date Recorded:	*24/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Michael Marsh*		
Landform Element:	*Spur crest*	Vegetation:	*Forest/bush/regrowth*
Slope:	*Level very gentle*	Ground Disturbance:	*Moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
10	7	5	3	15	40%	30%	4.5	5	0.9	possible

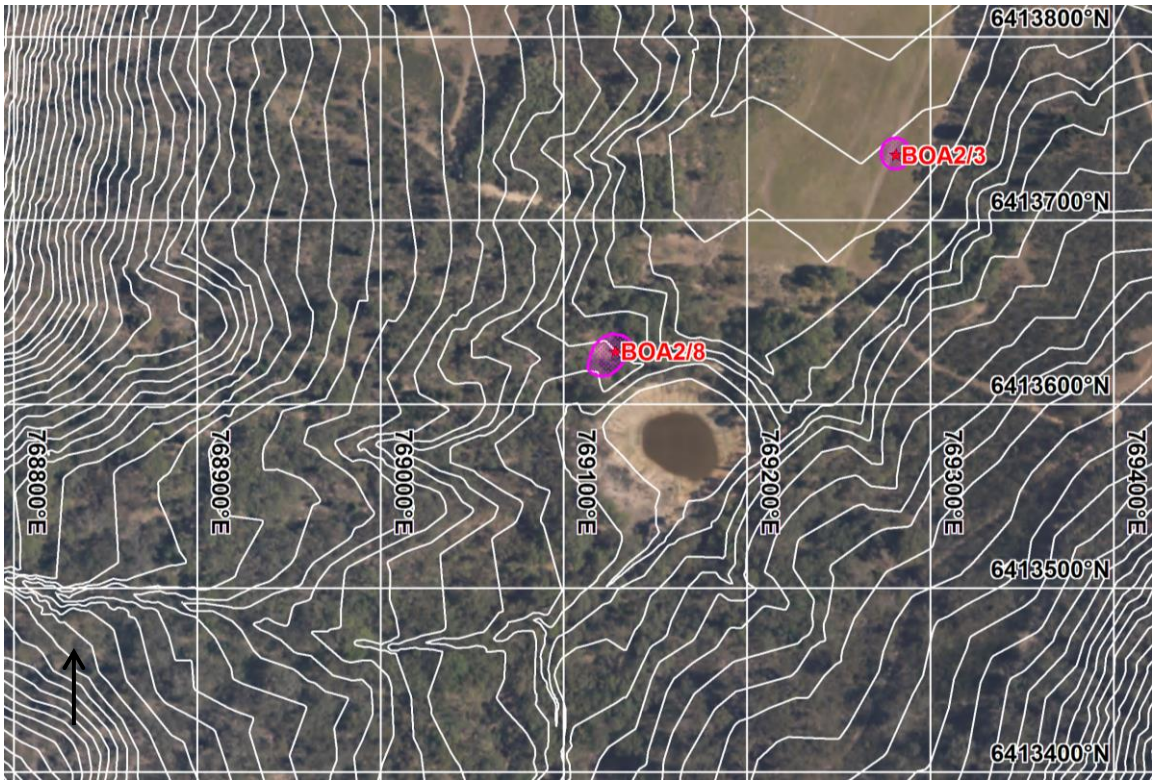
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	lithic fragment	2		769120	6413623
2	white	quartz	core fragment	3		769123	6413627
3	white	quartz	flake	1		769128	6413629
4	white	quartz	flake	1		769128	6413629
5	white	quartz	flake	2		769128	6413629

Additional Comments:

- Ground disturbance from vegetation removal, erosion and animals;
- Low research potential.

Site Location: BOA2/8 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/8 (inset – artefact #2)

SITE NAME: BOA2/9

Site Type:	*Open artefact site*	MGA Grid Reference:	*769908:6411188*
Date Recorded:	*21/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Drainage depression*	Vegetation:	*Cleared/regrowth*
Slope:	*Gentle*	Ground Disturbance:	*Moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
7	2	1	1	1	100	100	1	2	2	possible

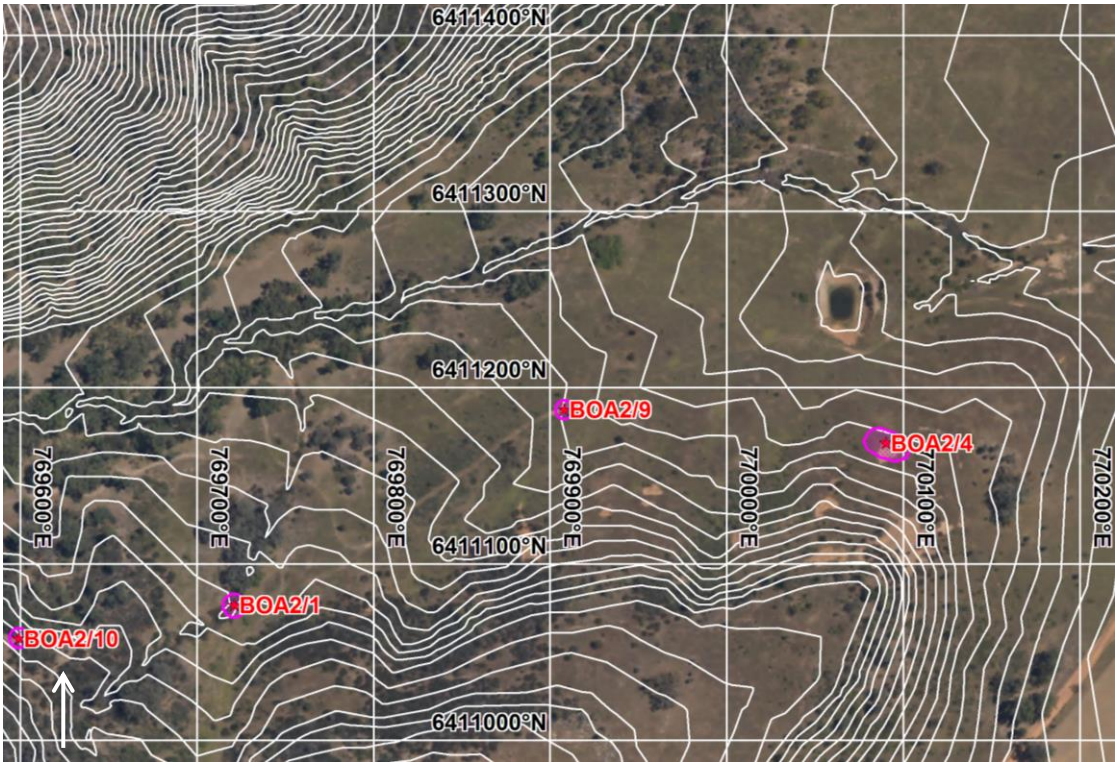
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake	30x16x6	faceted platform	769908	6411188
2	white	quartz	flake	17x11x7		769908	6411188

Additional Comments:

- Site is located on an unformed vehicle track on a minor spur above the confluence of drainage depressions;
- Small shrubs and weeds present;
- Moderate ground disturbance from vegetation removal, pastoral use and vehicle track;
- Relatively low research potential.

Site Location: BOA2/9 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/9

Photograph: BOA2/9

Photograph: BOA2/9 - artefact #1

SITE NAME: BOA2/10

Site Type:	*Open artefact site*	MGA Grid Reference:	*769599:6411058*
Date Recorded:	*21/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Simple slope*	Vegetation:	*Regrowth*
Slope:	*Moderate*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	1	1	1	5	5	0.05	1	20	unlikely

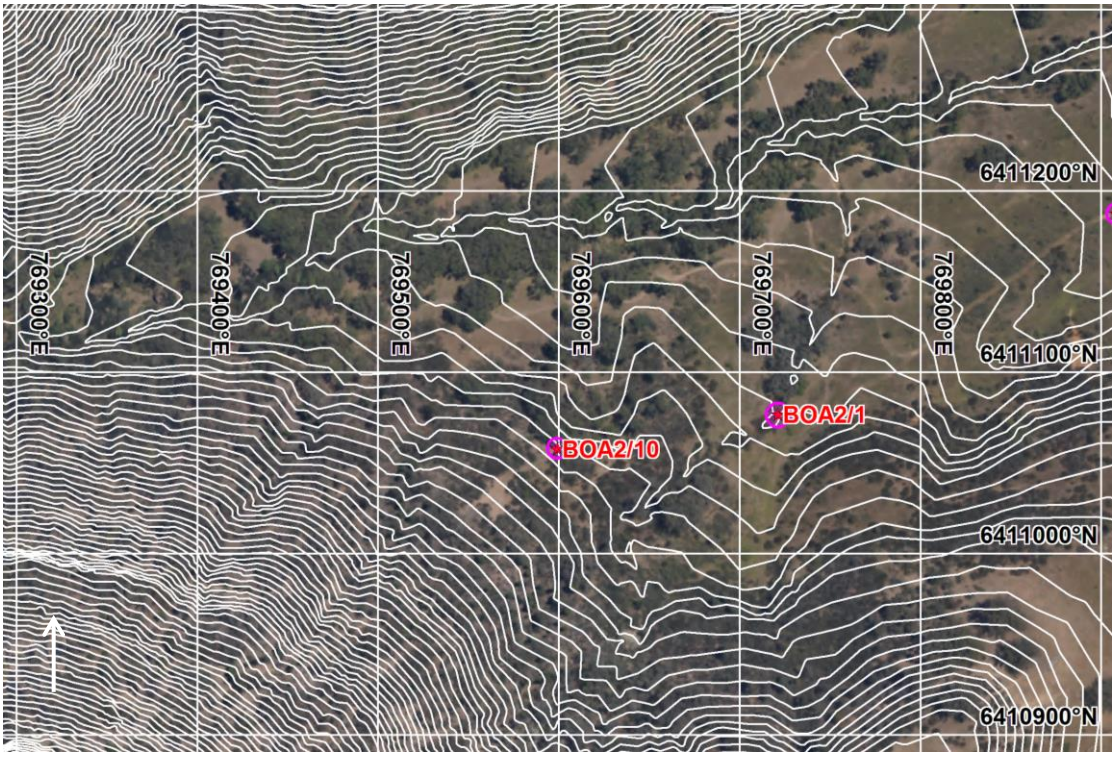
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	core	32x26x18	crushing on one platform; progressing towards microblade core; two platforms opposed; five scars	769599	6411058

Additional Comments:

- Shrubs and Eucalyptus regrowth;
- Slope above drainage;
- Quartz available in locality;
- Low research potential.

Site Location: BOA2/10 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/10

Photograph: BOA2/10

Photograph: BOA2/10 - artefact #1

SITE NAME: BOA2/11

Site Type:	*Open artefact site*	MGA Grid Reference:	*770389:6412278*
Date Recorded:	*21/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Simple slope*	Vegetation:	*Cleared*
Slope:	*Moderate*	Ground Disturbance:	*High*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
70	50	3	2	6	100	20	1.2	2	1.7	unlikely

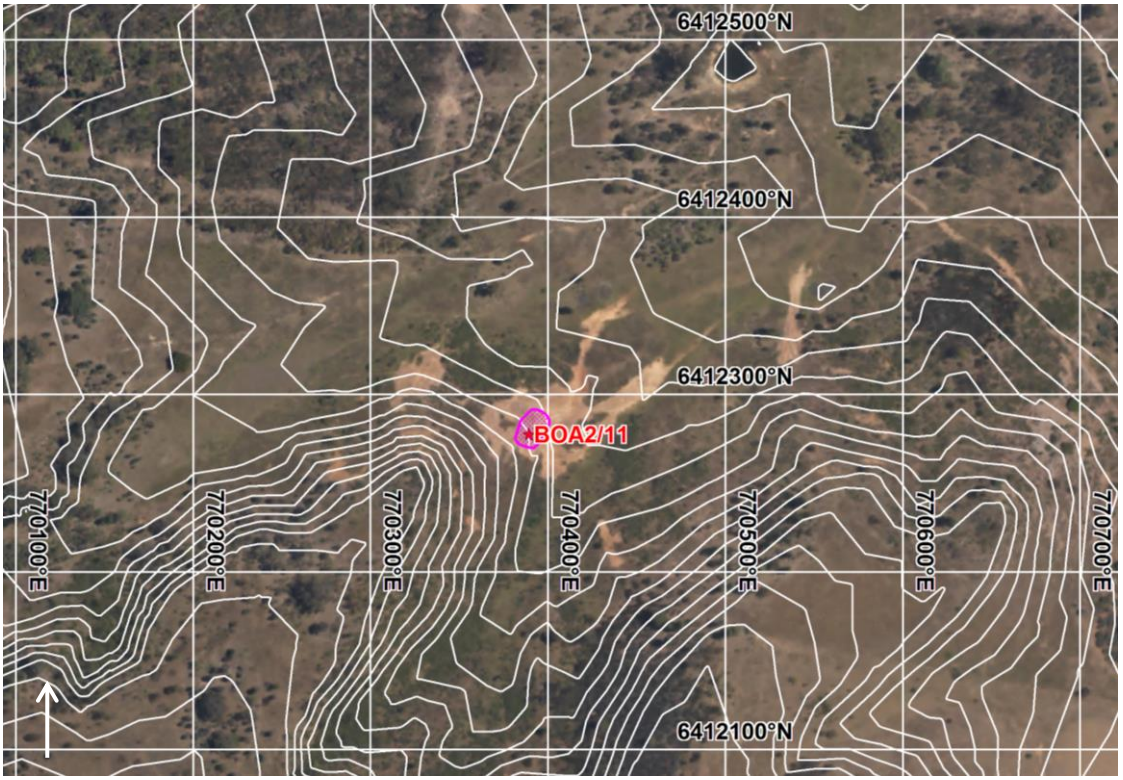
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake – distal - utilised	26x16x6	some use-wear; possibly retouched	770389	6412278
2	white	quartz	flake - proximal	32x22x5	70% tabular cortex	770392	6412283

Additional Comments:

- Large erosion scour over 70 x 50 metres on side of hill and small spur;
- More artefacts probably present, only small sample recorded;
- High disturbance from vegetation removal and erosion;
- Low research potential.

Site Location: BOA2/11 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/11

Photograph: BOA2/11

Photograph: BOA2/11

SITE NAME: BOA2/12

Site Type:	*Rock shelter with artefacts*	MGA Grid Reference:	*770946:6413745*
Date Recorded:	*21/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Scarp*	Vegetation:	*Regrowth*
Slope:	*Steep*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Rock Outcrop Material:	*Sandstone*
Outcrop Type:	*Overhang*
Outcrop Form:	*Scarp*
Aspect:	*South*
Erosion:	*Exfoliation*
Surface Condition:	*Exposed/weathered*
Soil:	*Sand, gravel*
Disturbance to Deposit:	*Moderate*
Causes of Disturbance:	*Animal burrows, erosion*

Possible Extent of Potential Archaeological Deposit:	*3 x 1 metres*
Possible Depth of Potential Archaeological Deposit:	*>0.1 metres*
# of Artefacts:	*1*
Archaeological Visibility:	*80%*
Shelter Floor Area:	*3 x 1 metres*
Habitable Shelter Area (roof 1+ metres above floor):	*3 x 1 metres*

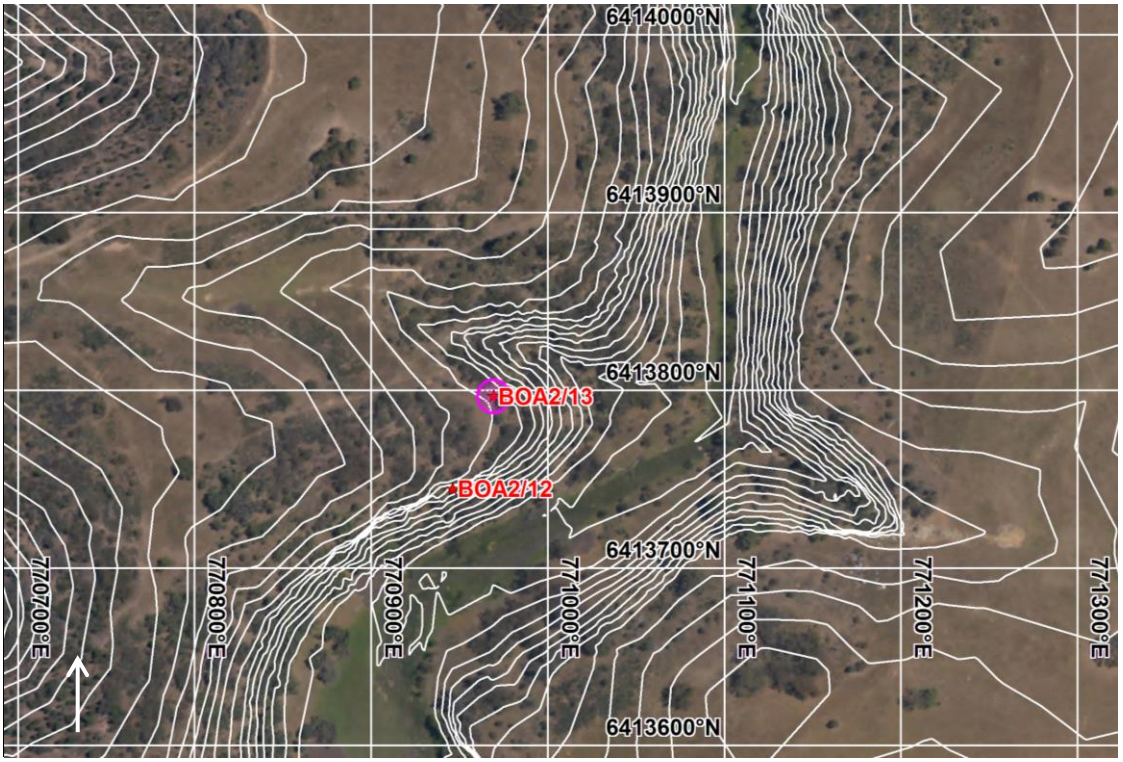
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	retouched flake	60x29x11	25% terrestrial cortex; at front of overhang, to left of boulder when facing south; denticulate-like with two large, simple notches on the distal right lateral margin and scraper-like retouch on the proximal right lateral margin	770946	6413751

Additional Comments:

- Small overhang with limited depth;
- Used by kangaroos;
- Erosion removed part of potential deposit;
- Low research potential.

Site Location: BOA2/12 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/12

Photographs: BOA2/12

Photograph: BOA2/12 - artefact #1

SITE NAME: BOA2/13

Site Type:	*Open artefact site*	MGA Grid Reference:	*770969:6413797*
Date Recorded:	*23/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Spur crest*	Vegetation:	*Cleared*
Slope:	*Gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	3	1	3	80	60	1.8	2	1.1	possible

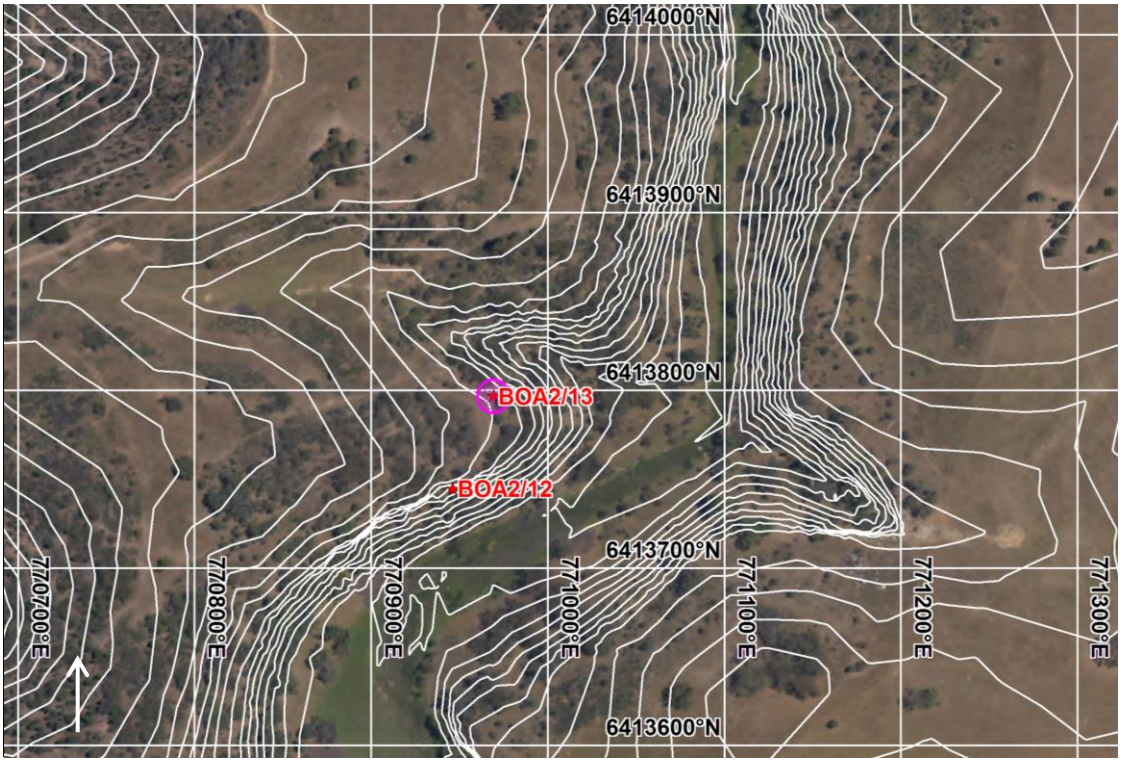
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake – distal	22x17x10		770969	6413797
2	brown	tuff	flake	26x22x8	minor edge damage; 15% tabular cortex	770968	6413792

Additional Comments:

- Gentle portion of spur crest above steep drop into drainage;
- Exposed sandstone bedrock;
- Low research potential.

Site Location: BOA2/13 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/13

SITE NAME: BOA2/14

Site Type:	*Open artefact site*	MGA Grid Reference:	*770963:6414174*
Date Recorded:	*23/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Drainage depression*	Vegetation:	*Cleared*
Slope:	*Moderate*	Ground Disturbance:	*Moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
25	10	2	1	2	80	80	1.6	2	1.25	unlikely

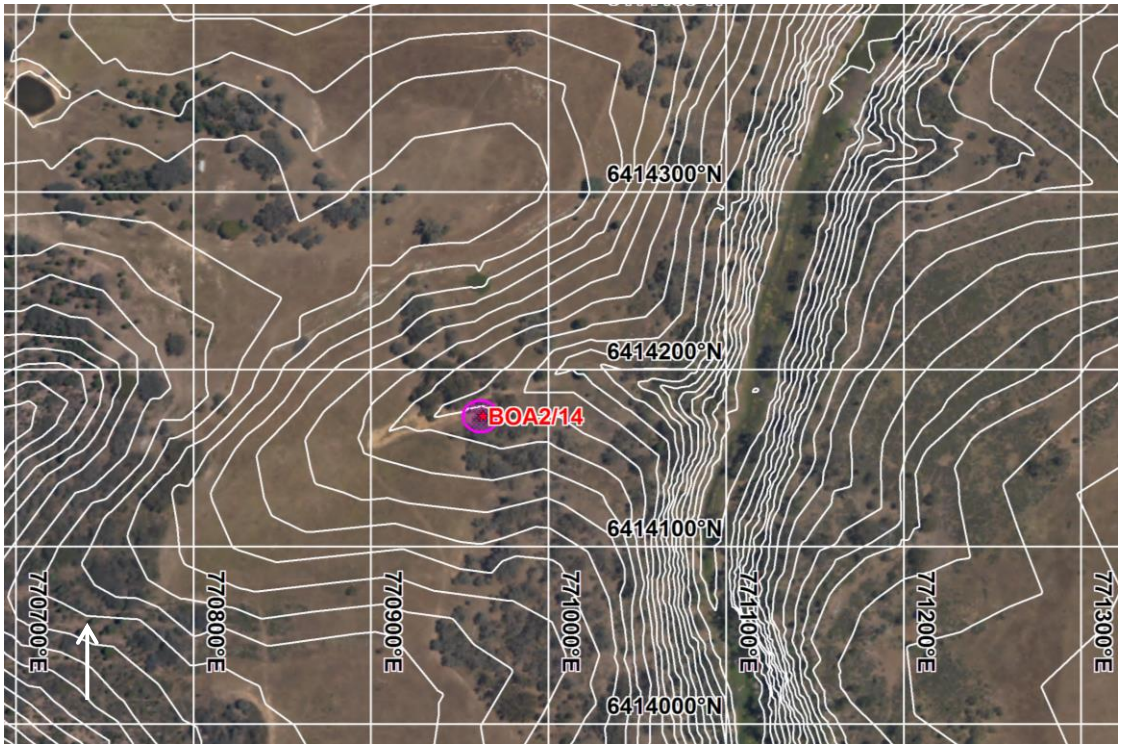
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake	34x24x11	redirecting flake	770963	6414174
2	yellow/cream	tuff	flake	18x16x4	hinge termination; possible retouch on left lateral margin	770961	6414172

Additional Comments:

- Moderate disturbance from erosion;
- Narrow drainage channel;
- Low research potential.

Site Location: BOA2/14 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/14

Photograph: BOA2/14

SITE NAME: BOA2/15

Site Type:	*Open artefact site*	MGA Grid Reference:	*769209:6414210*
Date Recorded:	*24/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Drainage depression*	Vegetation:	*Cleared*
Slope:	*Gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	1	1	1	40	40	0.4	1	2.5	possible

Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake – longitudinal	32x22x8		769209	6414210

Additional Comments:

- Rock outcrop on edge of drainage;
- South of vehicle track;
- Low research potential.

Site Location: BOA2/15 (100 metre MGA Zone 55 grid, 2 metre contours)

Photograph: BOA2/15 (inset – artefact #1)

SITE NAME: BOA2/16

Site Type:	*Open artefact site*	MGA Grid Reference:	*769218:6414169*
Date Recorded:	*24/11/18*	Topographic Map:	*Munghorn 8833-2S*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Simple slope*	Vegetation:	*Cleared*
Slope:	*Gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	50	50	2500	10	10	250	8	0.032	possible

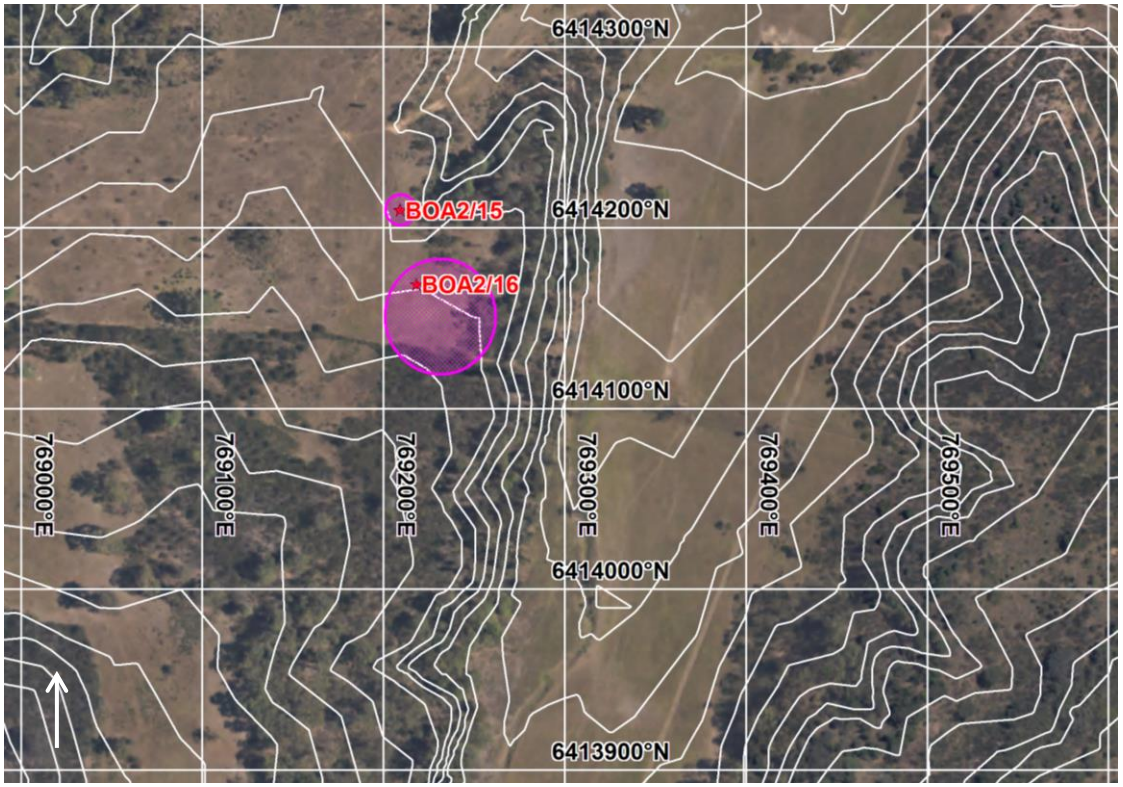
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake – distal	19x12x3		769218	6414169
2	white	quartz	flake – longitudinal	22x16x4		769244	6414172
3	white	quartz	lithic fragment	24x16x11		769249	6414158
4	white	quartz	core	154x94x44	30% tabular cortex; 2 scars; 2 platforms	769249	6414158
5	white	quartz	flake – proximal	21x14x5		769245	6414143
6	white	quartz	flake – distal	25x21x7		769216	6414143
7	white	quartz	retouched flake	34x30x13		769224	6414152
8	black	volcanic	flake	24x20x5	edge damage	769240	6414139

Additional Comments:

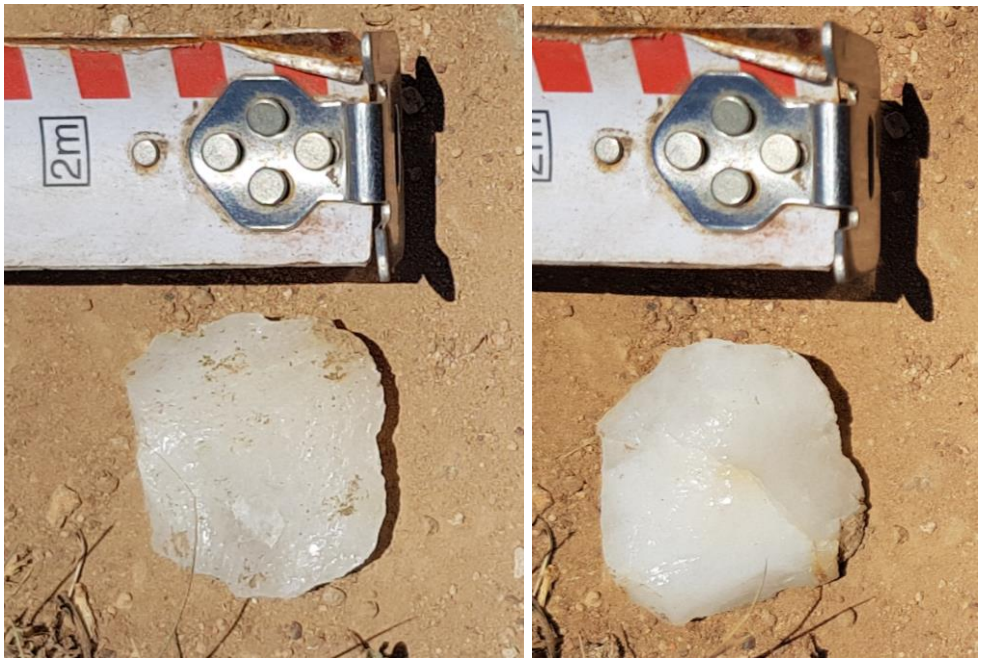
- Low grass;
- Sandstone rocks and shale;
- Further artefacts potentially present;
- Relatively low research potential.

Site Location: BOA2/16 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA2/16

Photograph: BOA2/16 – artefact #7.



Photograph: BOA2/16 – artefact #4.

SITE NAME: BOA3/1

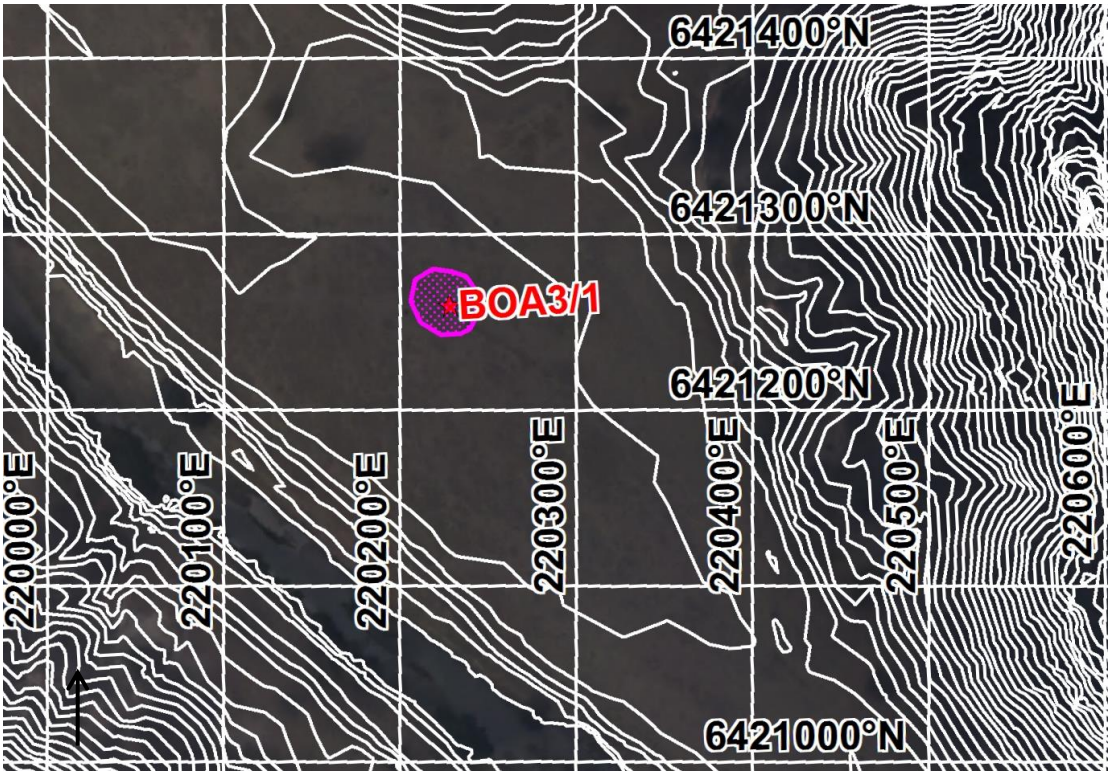
Site Type:	*Open artefact site*	MGA Grid Reference:	*220228:6421260*
Date Recorded:	*27/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Michael Marsh*		
Landform Element:	*Flat*	Vegetation:	*Cleared/grass*
Slope:	*Level very gentle*	Ground Disturbance:	*Low*
Distance to Water:	*>50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	10	1	10	5%	5%	0.5	1	2	probable

Additional Comments:

- Artefacts located on access track, outside of Wilpinjong Biodiversity Offset Area, so minimal details recorded;
- Artefacts and potential deposit may extend across flat, with Goulburn River located 170 metres to west;
- Entire flat bordering Goulburn River of moderate to high research potential.

Site Location: BOA3/1 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA3/1

SITE NAME: BOA3/2

Site Type:	*Open artefact site*	MGA Grid Reference:	*219823:6422025*
Date Recorded:	*27/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Michael Marsh*		
Landform Element:	*Spur crest*	Vegetation:	*Cleared/grass*
Slope:	*Gentle*	Ground Disturbance:	*Low*
Distance to Water:	*>50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
25	10	25	10	250	50%	40%	100	3	0.03	possible

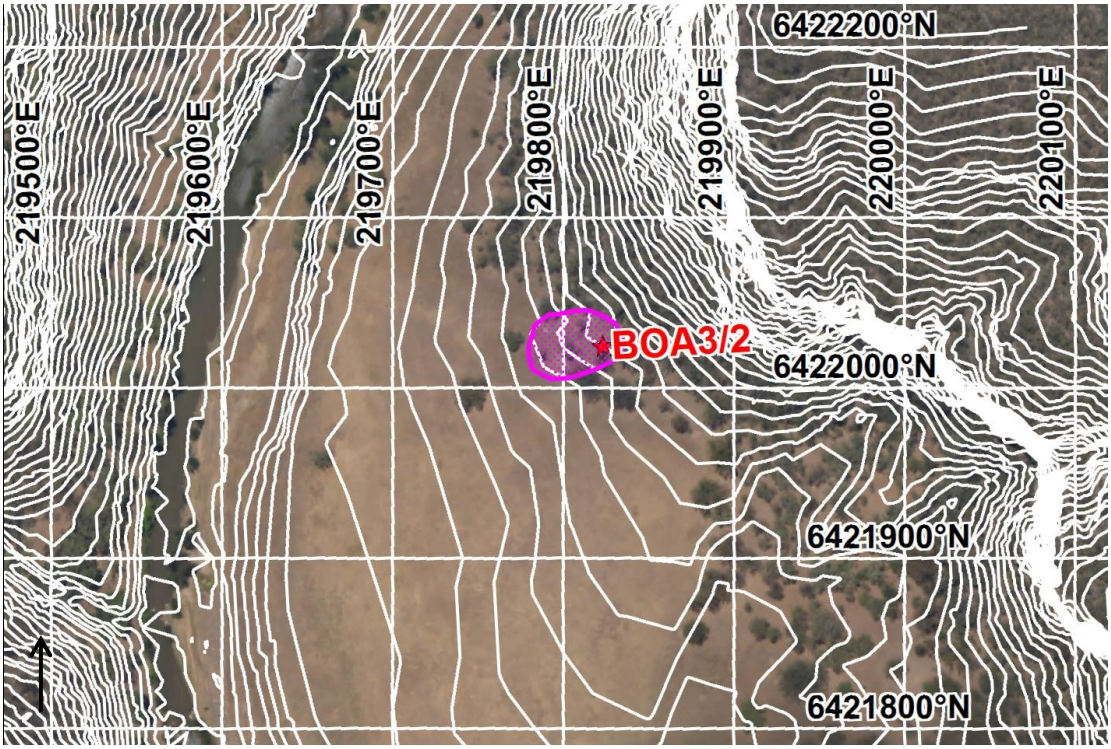
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - medial	3		219800	6422032
2	white	quartz	flake	2		219794	6422024
3	white	quartz	flake - distal	2		219823	6422025

Additional Comments:

- Stone materials available - quartz and chert;
- Small spur crest above undulating flat bordering Goulburn River 150 metres to the west;
- Sheet erosion;
- Relatively low research potential.

Site Location: BOA3/2 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA3/2

SITE NAME: BOA3/3

Site Type:	*Open artefact site*	MGA Grid Reference:	*219608:6422249*
Date Recorded:	*27/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Michael Marsh*		
Landform Element:	*Terrace*	Vegetation:	*Forest/bush/regrowth*
Slope:	*Level very gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	1	1	1	10%	10%	0.1	1	10	probable

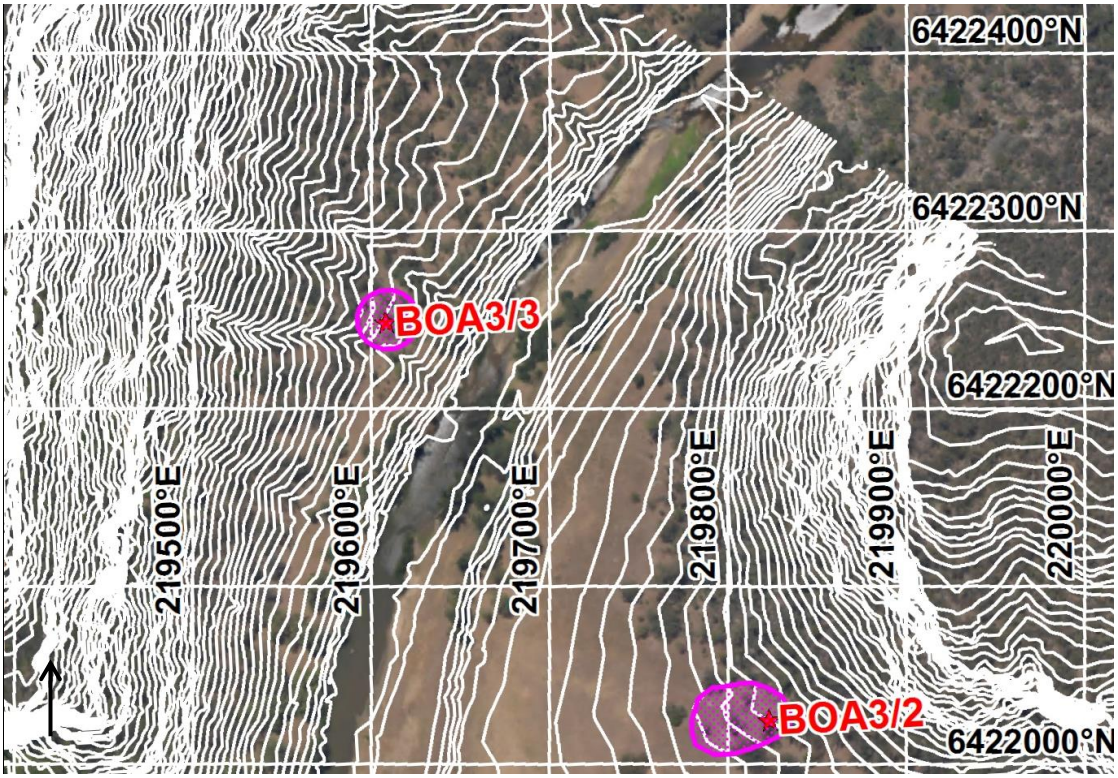
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1		chert	flake - proximal	2		219608	6422249

Additional Comments:

- Terrace on western side of Goulburn River;
- Moderate to high research potential.

Site Location: BOA3/3 (100 metre MGA Zone 56 grid, 2 metre contours)



SITE NAME: BOA3/4

Site Type:	*Open artefact site*	MGA Grid Reference:	*219692:6421316*
Date Recorded:	*26/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Spur crest*	Vegetation:	*Cleared, regrowth*
Slope:	*Level very gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	100	70	7000	60	60	4200	16	0.004	probable

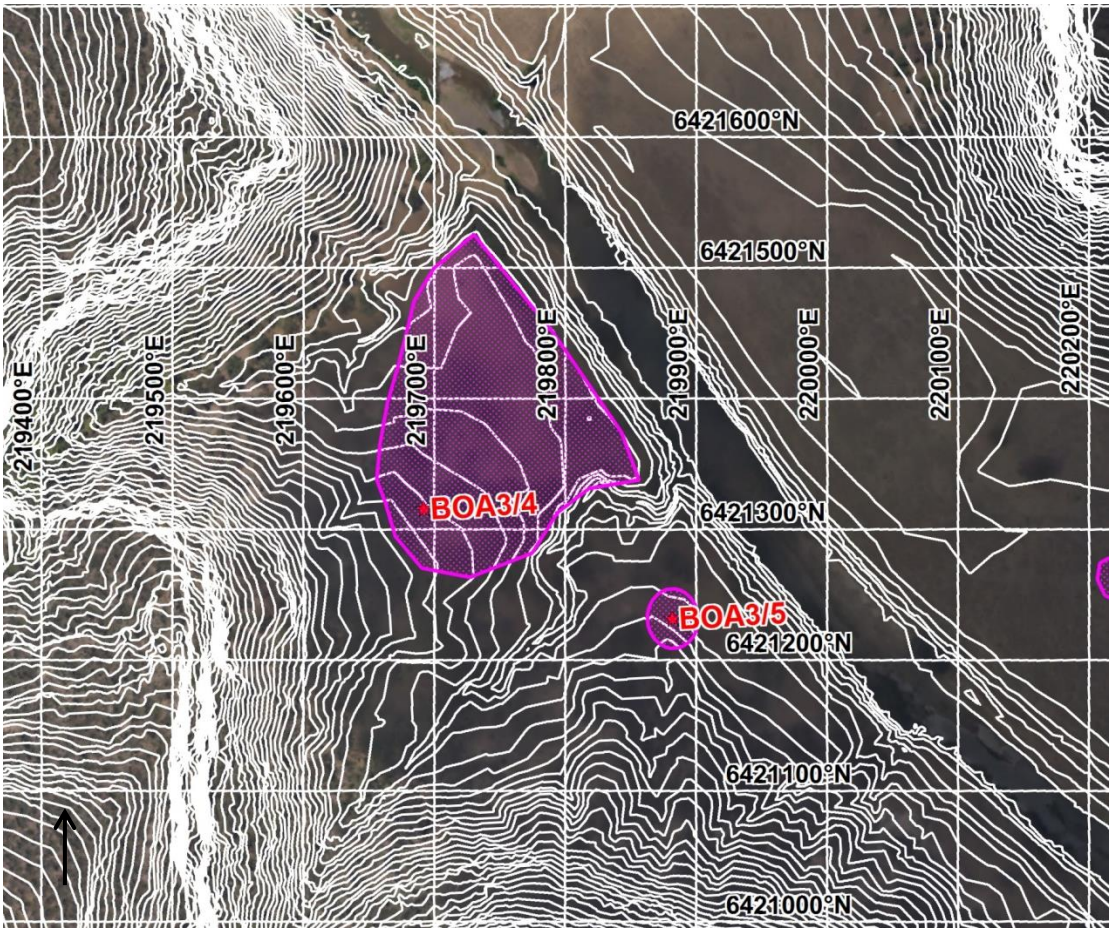
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake	23x16x2	focused platform	219686	6421289
2	white	quartz	flake	24x16x7		219692	6421316
3	white/brown	quartz	lithic fragment	24x14x13		219692	6421316
4	white/pink	quartz	flake - proximal	14x10x2		219692	6421316
5	white	quartz	lithic fragment	9x5x2		219692	6421316
6	white	quartz	retouched flake	25x17x6	resembles backing but more similar to a lateral scraper	219705	6421308
7	grey/cream	tuff	flake - distal	34x14x5	possibly retouched; likely blade portion	219678	6421353
8	white/yellow	quartz	flake	20x11x4		219678	6421353
9	white/pink	quartz	flake	22x16x5		219678	6421353
10	cream	tuff	core	30x20x9	eight scars; two platforms	219678	6421353
11	brown/cream	tuff	retouched flake	34x18x7	15% tabular cortex; right lateral is retouched and ventral and dorsal; cortical platform	219717	6421336
12	brown/cream	tuff	retouched flake	22x16x5	15% tabular cortex; scraper; cortical platform	219717	6421336
13	white/pink	quartz	flake	31x26x14		219717	6421336
14	grey	quartz	flake	36x27x5	white veins	219717	6421336
15	white	quartz	lithic fragment	20x15x10		219727	6421366
16	grey	tuff	retouched flake		right lateral and distal margins retouched in scraper/denticulate fashion; plain platform	219726	6421361

Additional Comments:

- Broad low spur crest above adjacent Goulburn River;
- Sample of artefacts recorded, over 100 estimated to be present;
- Potential extent of site approximately 200 x 170 metres;
- Moderate research potential.

Site Location: BOA3/4 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA3/4

Photographs: BOA3/4

Photograph: BOA3/4 - artefact #1 (left) and #16 (right)

Photograph: BOA3/4 - artefacts #7-10 (above) and #11-15 (below)

SITE NAME: BOA3/5

Site Type:	*Open artefact site*	MGA Grid Reference:	*219882:6421232*
Date Recorded:	*26/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Spur crest*	Vegetation:	*Cleared/regrowth*
Slope:	*Gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	6	1	6	60	60	3.6	2	0.6	probable

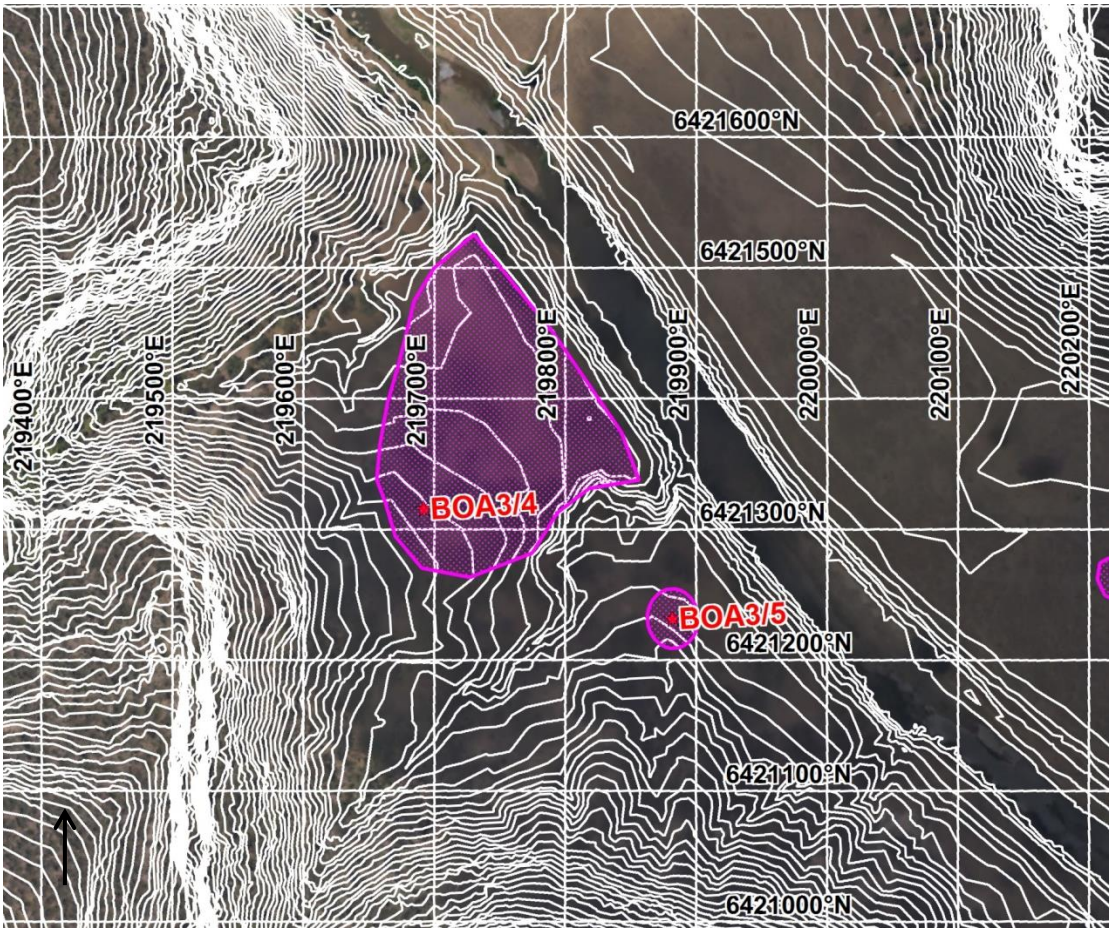
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	grey	tuff	flake - distal	36x22x11		219878	6421222
2	brown/cream	tuff	lithic fragment	32x25x13		219882	6421232

Additional Comments:

- On low spur adjacent to Goulburn River and tributary;
- A number of small exposures;
- Potentially more surface artefacts;
- Moderate research potential.

Site Location: BOA3/5 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA3/5

Photograph: BOA3/5

Photograph: BOA3/5 – artefacts #1 and #2

SITE NAME: BOA3/6

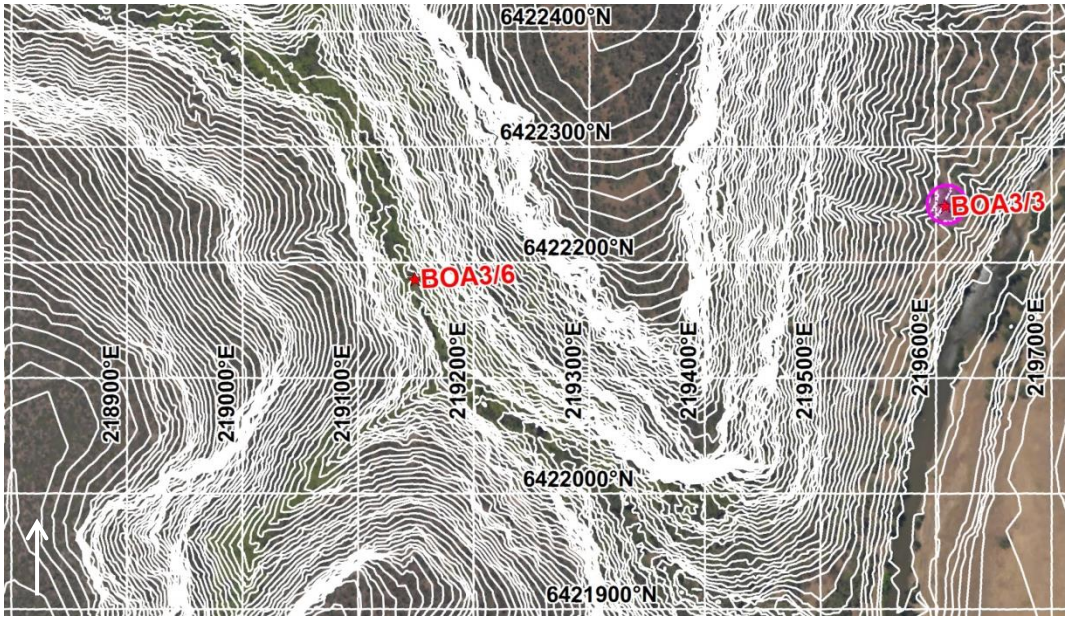
Site Type:	*Waterhole/well*	MGA Grid Reference:	*219149:6422186*
Date Recorded:	*26/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Drainage depression*	Vegetation:	*Forest/bush*
Slope:	*Moderate*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Rock Outcrop Material:	*Sandstone*
Outcrop Form:	*Bedrock*
Waterhole/well size:	*0.8-1 metre diameter*
Depth of Waterhole/well	*0.6 metres deep*

Additional Comments:

- Waterhole occurs in bedrock in drainage;
- No evidence of human modification, but a potential water source.

Site Location: BOA3/6 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA3/6

SITE NAME: BOA4/1

Site Type:	*Rock shelter with PAD*	MGA Grid Reference:	*782069:6423970*
Date Recorded:	*19/11/18*	Topographic Map:	*Wollar 8833-2N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Scarp*	Vegetation:	*Forest/bush*
Slope:	*Steep*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

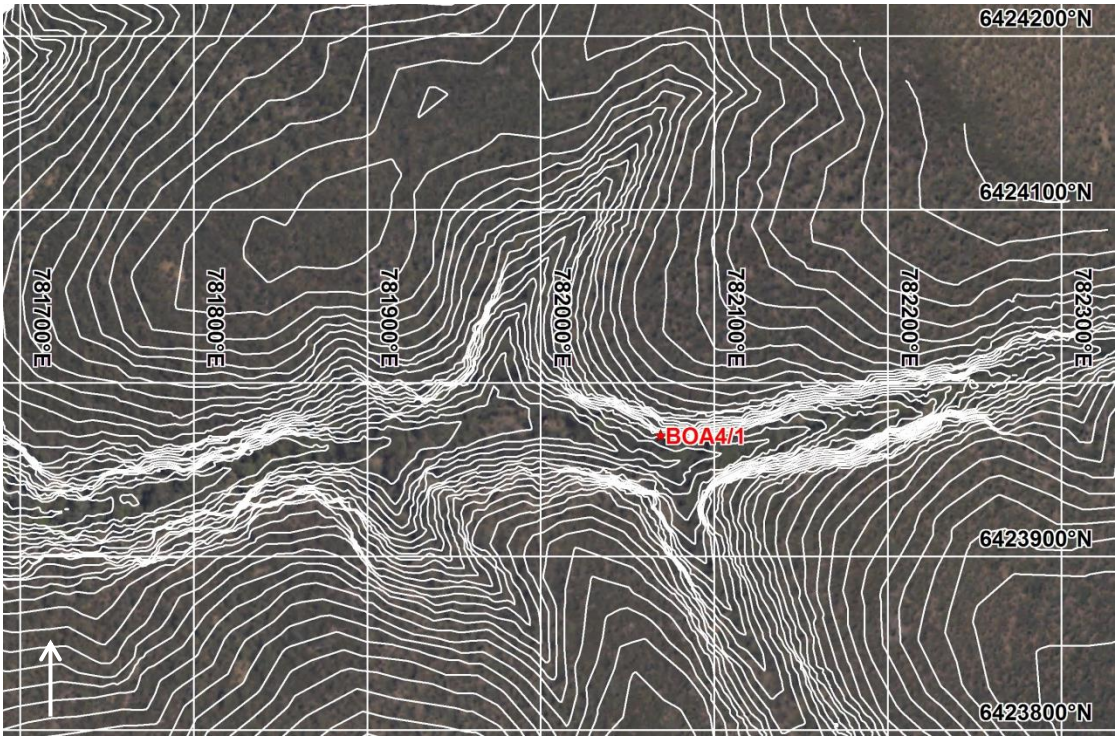
Rock Outcrop Material:	*Sandstone*
Outcrop Type:	*Rockshelter*
Outcrop Form:	*Scarp*
Aspect:	*North-East*
Erosion:	*Exfoliation*
Surface Condition:	*Exfoliating*
Soil:	*Rocky, sand, gravel*
Disturbance to Deposit:	*Moderate*
Causes of Disturbance:	*Erosion*

Possible Extent of Potential Archaeological Deposit:	*5 x 3 metres*
Possible Depth of Potential Archaeological Deposit:	*>0.1 metres*
# of Artefacts:	*Nil*
Archaeological Visibility:	*50%*
Shelter Floor Area:	*20 x 5 metres*
Habitable Shelter Area (roof 1+ metres above floor):	*20 x 5 metres*

Additional Comments:

- Relatively large shelter but sloping floor;
- Moderately impacted by erosion;
- Cracks in wall that water passes through;
- Soft sandstone and fresh soft sediment built up in middle of shelter and sloping either side. Large boulders at front have formed a sediment trap;
- Relatively low research potential.

Site Location: BOA4/1 (100 metre MGA Zone 55 grid, 2 metre contours)



Photograph: BOA4/1

Photographs: BOA4/1

SITE NAME: BOA4/2

Site Type:	*Open artefact site*	MGA Grid Reference:	*217521:6424015*
Date Recorded:	*19/11/18*	Topographic Map:	*Wollar 8833-2N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Simple slope*	Vegetation:	*Cleared, regrowth*
Slope:	*Level very gentle*	Ground Disturbance:	*Moderate*
Distance to Water:	*>50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
100	3	1	1	1	80%	80%	0.8	1	1.25	possible

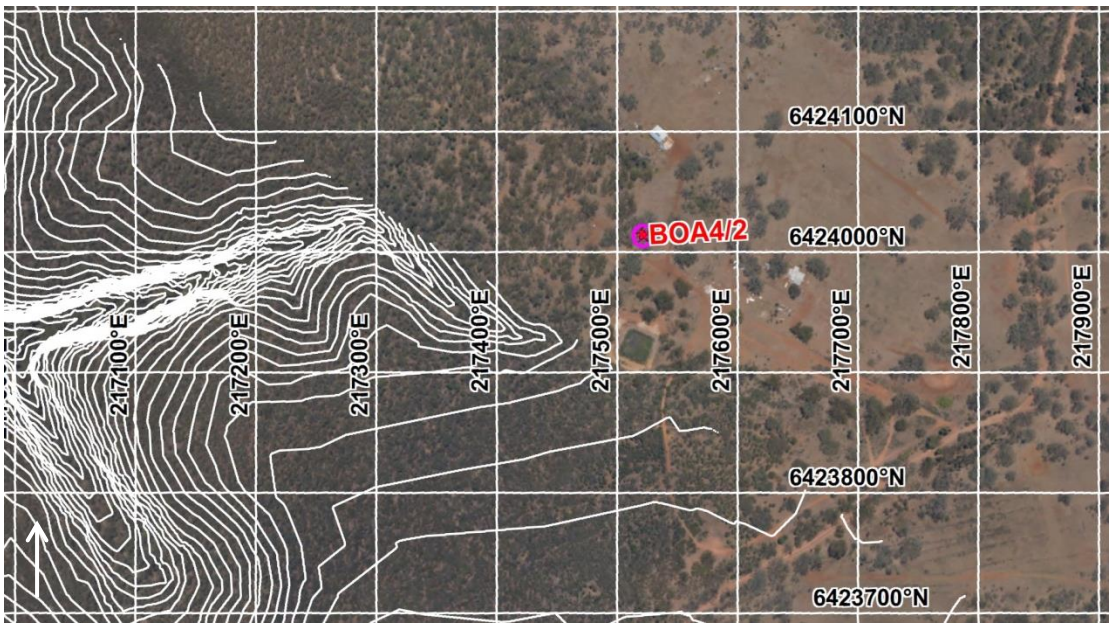
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - longitudinal	20x18x4	broken; on track; no other artefacts nearby	217521	6424015

Additional Comments:

- Small shrubs and Eucalyptus regrowth;
- Artefact on unformed vehicle track;
- Dam located to south-east near junction of vehicle tracks;
- Very gentle slope at base of gentle to moderate slope;
- Moderate disturbance from vegetation removal and vehicle track;
- Low research potential.

Site Location: BOA4/2 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA4/2

Photograph: BOA4/2

Photograph: BOA4/2 - artefact #1

SITE NAME: BOA5/1

Site Type:	*Open artefact site*	MGA Grid Reference:	*218672:6419280*
Date Recorded:	*29/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Michael Marsh*		
Landform Element:	*Flat*	Vegetation:	*Cleared/grass*
Slope:	*Level very gentle*	Ground Disturbance:	*Moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	150	40	6000	50%	40%	2400	4	0.002	probable

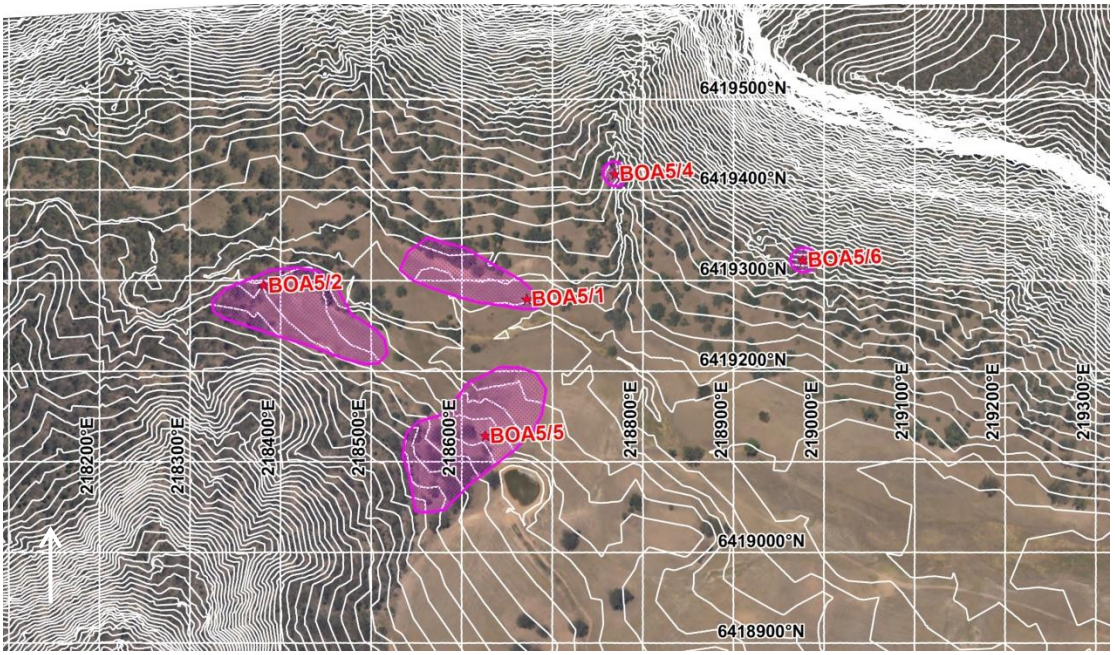
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	grey	tuff	flake - proximal	3		218672	6419280
2	mottled	tuff	core	4		218625	6419303
3	purple	tuff	flake	4		218578	6419335
4	mottled	tuff	core	10	40% tabular cortex	218551	6419313

Additional Comments:

- Above drainage line, adjacent to Craigs Gully on flat and basal slope;
- Ground disturbance from erosion, vegetation removal, cattle and farming;
- Stone materials available - quartz, tuff, quartzite, chert;
- Cobbles in drainage;
- Moderate to high research potential.

Site Location: BOA5/1 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA5/1

Photograph: BOA5/1

Photograph: BOA5/1 - artefacts #1 (left) and #2 (right)

SITE NAME: BOA5/2

Site Type:	*Open artefact site*	MGA Grid Reference:	*218381:6419295*
Date Recorded:	*29/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Michael Marsh*		
Landform Element:	*Flat*	Vegetation:	*Cleared/grass*
Slope:	*Level very gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	100	30	3000	30%	30%	900	3+	>0.003	probable

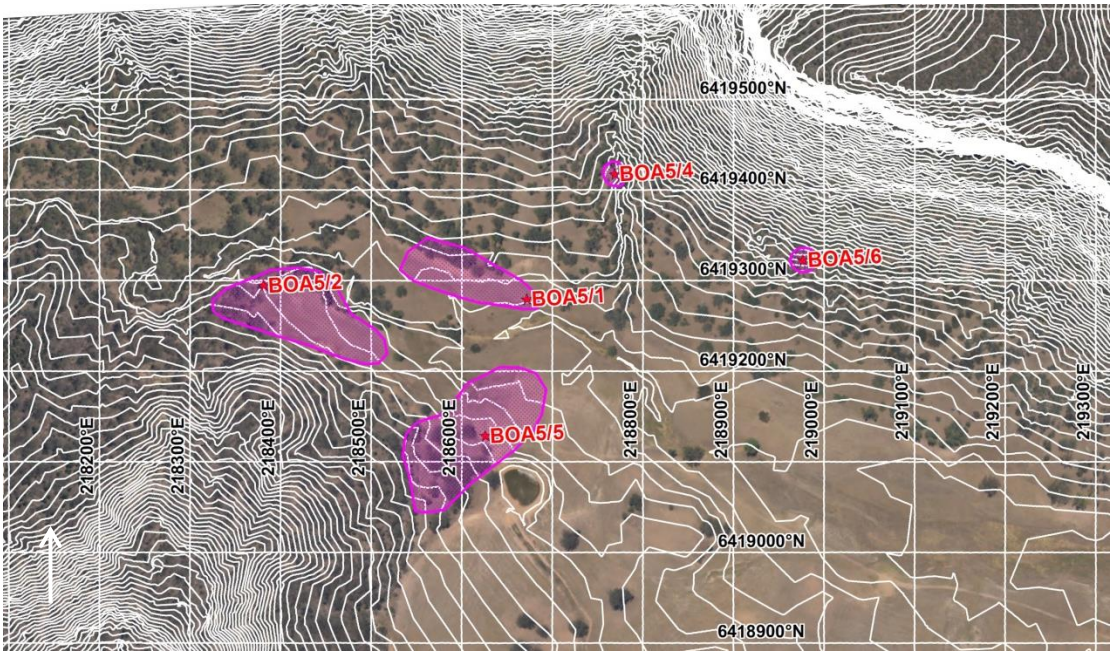
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Size Class	Comments	MGA Easting	MGA Northing
1	white	quartz	flake	2	10% cortex	218375	6419286
2	grey	tuff	flake proximal	2		218381	6419295
3	grey	volcanic	pebble core	10	pebble chopper implement	218452	6419283

Additional Comments:

- Above drainage line, adjacent to Craigs Gully on flat and basal slope;
- Grass and regrowth shrubs;
- At least 12 artefacts present, only sample recorded here;
- Moderate to high research potential.

Site Location: BOA5/2 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA5/2

Photograph: BOA5/2

Photograph: BOA5/2 – artefact #3

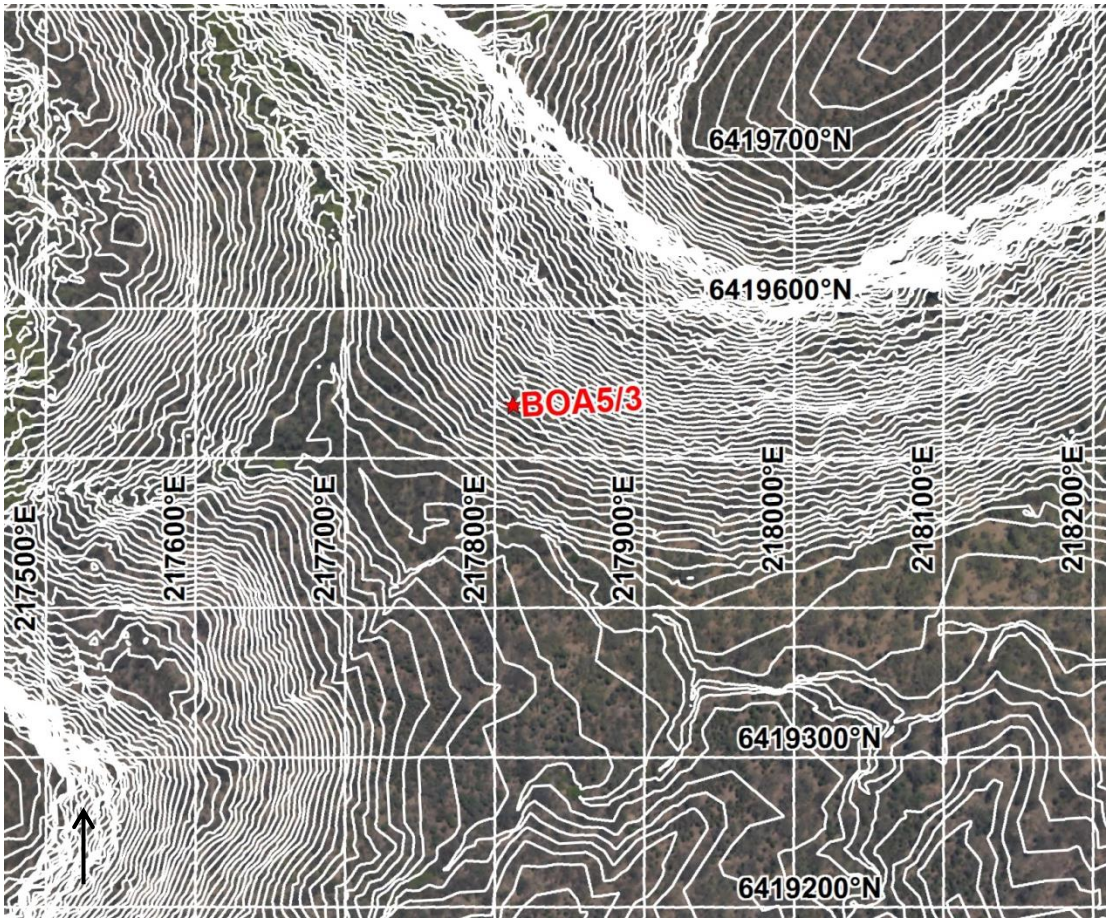
SITE NAME: BOA5/3

Site Type:	*Ochre source*	MGA Grid Reference:	*217812:6419536*
Date Recorded:	*26/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Simple slope*	Vegetation:	*Forest/bush*
Slope:	*Moderate*	Ground Disturbance:	*Low*
Distance to Water:	*>50m*		

Additional Comments:

- White ochre (pipeclay) nodules eroding out of large sandstone boulder on slope;
- Largest nodule observed 20 x 10 x 10 centimetres;
- No evidence of human modification or exploitation, but a potential source of white ochre (pipeclay).

Site Location: BOA5/3 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA5/3

Photograph: BOA5/3

Photograph: BOA5/3 – ochre nodules.

SITE NAME: BOA5/4

Site Type:	*Open artefact site*	MGA Grid Reference:	*218769:6419418*
Date Recorded:	*29/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Spur crest*	Vegetation:	*Grass/regrowth*
Slope:	*Gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	1	1	1	5	5	0.05	1	20	possible

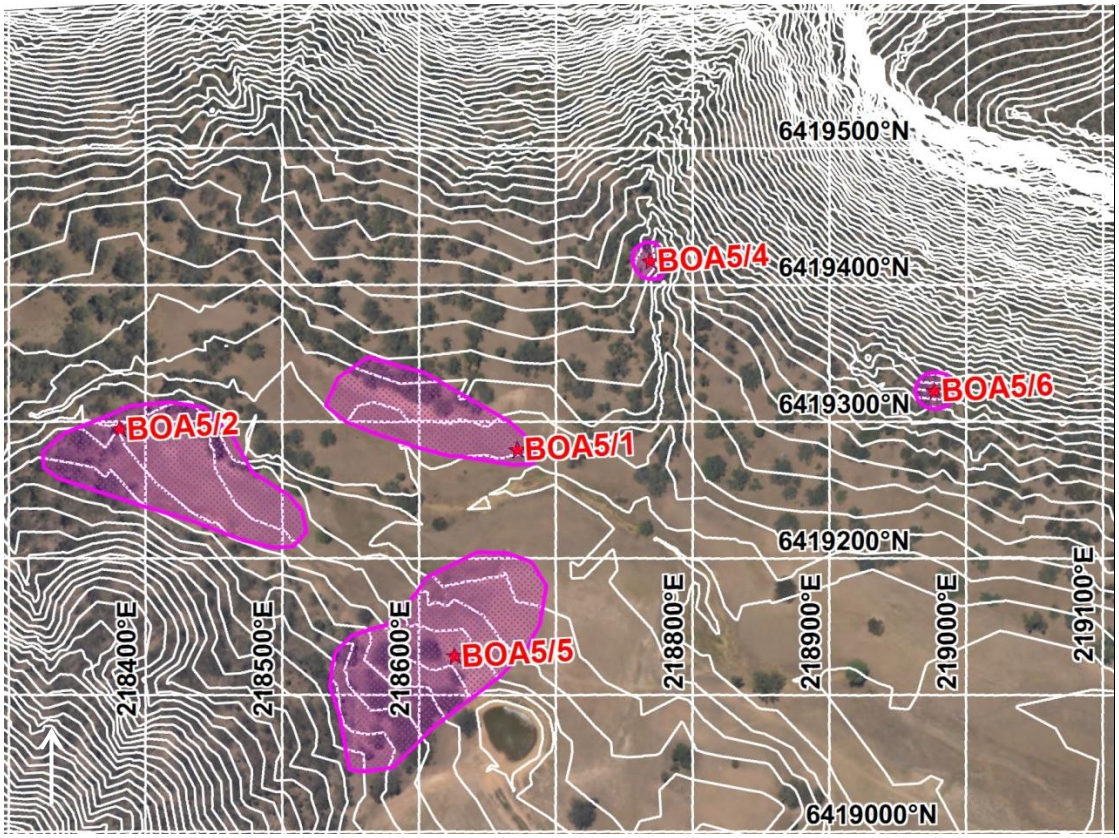
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	brown	tuff	core	100x80x30	large core; three old flake scars overlain by more recent damage/flaking; single platform; 80% pebble cortex	218769	6419418

Additional Comments:

- Low ground disturbance from previous vegetation removal;
- Site above adjacent steeply incised drainage;
- Artefact indicative of potential proximity to tuff source;
- Low research potential.

Site Location: BOA5/4 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA5/4

Photograph: BOA5/4 – artefact #1

SITE NAME: BOA5/5

Site Type:	*Open artefact site*	MGA Grid Reference:	*218626:6419129*
Date Recorded:	*29/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Simple slope*	Vegetation:	*Cleared/grass*
Slope:	*Gentle*	Ground Disturbance:	*Moderate*
Distance to Water:	*>50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	170	50	8500	50	50	4250	6	0.001	probable

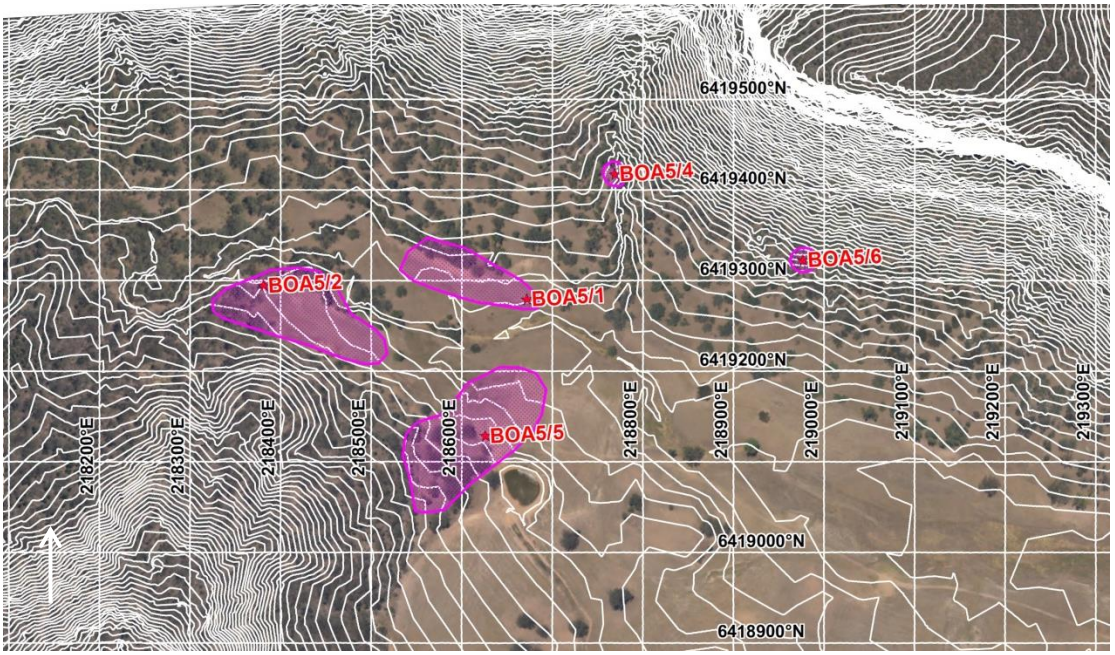
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - longitudinal	17x10x4		218626	6419129
2	white	quartz	lithic fragment	30x20x17		218643	6419139
3	white	quartz	flake - longitudinal	24x18x7	60% pebble cortex; potentially retouched or edge damage	218643	6419139
4	black	chert	lithic fragment	29x33x8	likely flake portion	218656	6419188
5	grey	tuff	core	62x55x50	20% tabular cortex; three platforms; crushing present; >20 scars; rotated	218619	6419161
6	white	quartz	flake - proximal	20x15x3		218556	6419055

Additional Comments:

- Located on a gentle slope above drainage and in proximity to two farm dams, south of Craigs Gully;
- Moderate disturbance from vegetation removal, ploughing;
- Mostly outside of Biodiversity Offset Area;
- Low to possibly moderate research potential.

Site Location: BOA5/5 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA5/5

Photograph: BOA5/5

Photograph: BOA5/5 - artefacts #2 and #3

Photograph: BOA5/5 - artefact #4

Photograph: COD19/A - artefact #5

SITE NAME: BOA5/6

Site Type:	*Open artefact site*	MGA Grid Reference:	*218977:6419323*
Date Recorded:	*30/11/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Spur crest*	Vegetation:	*Regrowth*
Slope:	*Gentle*	Ground Disturbance:	*Low - moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	1	1	1	60	60	0.6	2	3.3	possible

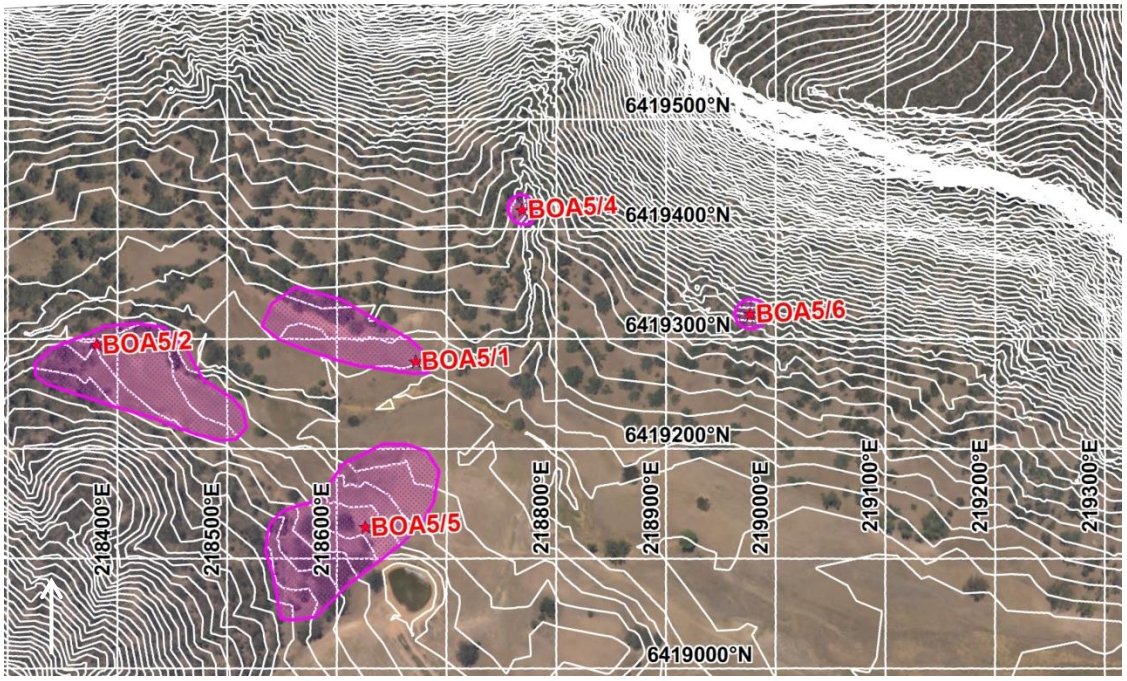
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	banded purple	tuff	flake - longitudinal	38x30x10	25% tabular cortex	218977	6419323
2	brown/cream	tuff	lithic fragment	34x28x10	15% tabular cortex; found within 1 metre of artefact #1	218977	6419323

Additional Comments:

- Low to moderate ground disturbance from previous vegetation removal and erosion;
- Regrowth pine;
- Site above adjacent drainage;
- Low to possibly moderate research potential.

Site Location: BOA5/6 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA5/6

Photograph: BOA5/6 - artefacts #1 and 2

SITE NAME: BOA5/7

Site Type:	*Open artefact site*	MGA Grid Reference:	*218626:6417443*
Date Recorded:	*1/12/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Spur crest*	Vegetation:	*Regrowth*
Slope:	*Gentle*	Ground Disturbance:	*Low*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	1	1	1	90	90	0.9	1	1.1	possible

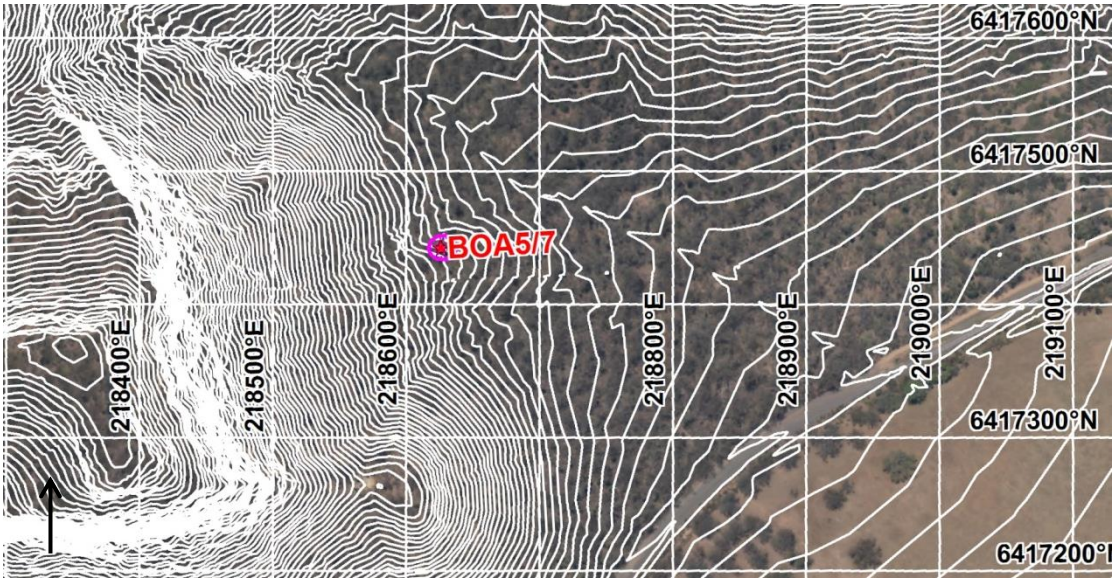
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	cream/pink	tuff	flake	75x35x12	10% tabular cortex; cortical platform; hinge termination	218626	6417443

Additional Comments:

- Artefact on small spur above drainage;
- Dense shrubs;
- Relatively low research potential.

Site Location: BOA5/7 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA5/7

Photograph: BOA5/7 – artefact #1

SITE NAME: BOA5/8

Site Type:	*Open artefact site*	MGA Grid Reference:	*219232:6417589*
Date Recorded:	*1/12/18*	Topographic Map:	*Mount Misery 8933-3N*
Recorder:	*Corey O'Driscoll*		
Landform Element:	*Simple slope*	Vegetation:	*Regrowth*
Slope:	*Moderate*	Ground Disturbance:	*Low - moderate*
Distance to Water:	*<50m*		

Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m^2)	Mean Surface Visibility of Locus (%)	Mean Arch. Visibility of Locus (%)	Effective Locus Area (m^2)	# of Artefacts	# of Artefacts per m^2 of Effective Locus Area	Sub-Surface Deposit
varies	varies	20	10	200	90	90	180	2	0.01	possible

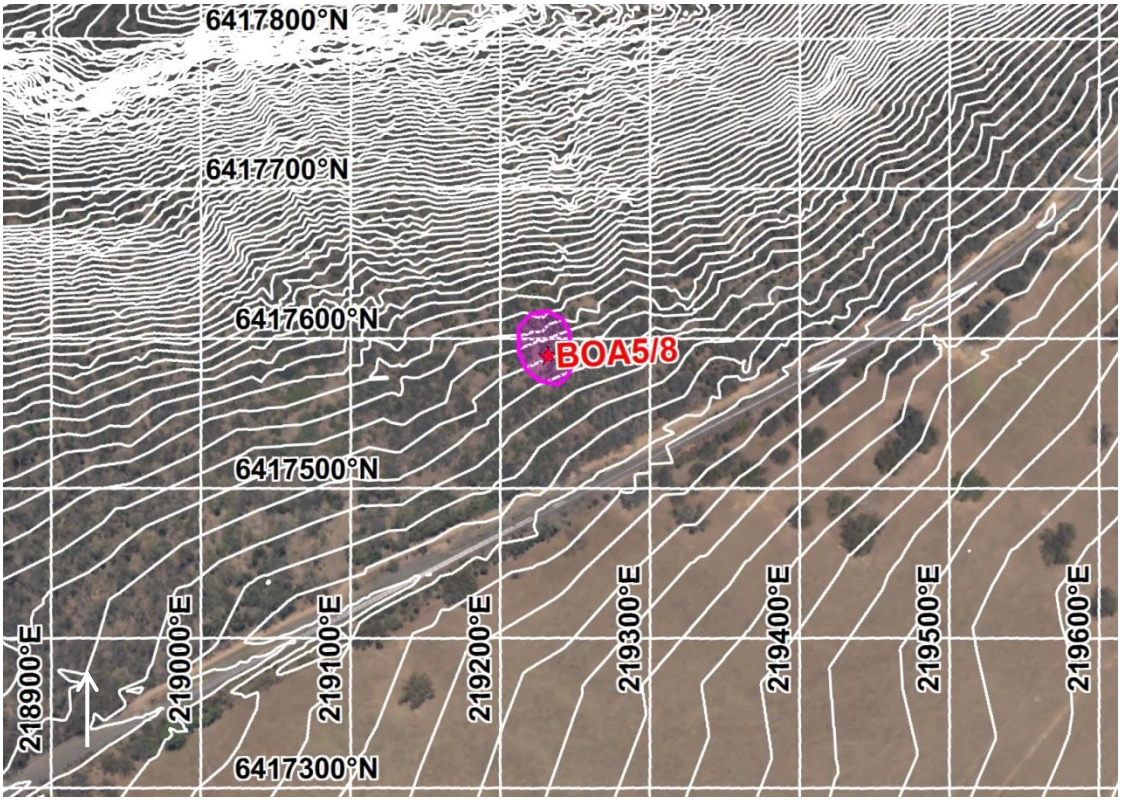
Artefact Database:

Artefact #	Colour	Stone Material	Lithic Item Type	Dimensions (mm)	Comments	MGA Easting	MGA Northing
1	white	quartz	flake - longitudinal	20x15x8		219232	6417589
2	white/grey	quartz	flake - distal	18x8x3	80% pebble cortex	219226	6417602

Additional Comments:

- Pine and Eucalypt regrowth, some shrubs;
- Exposure and site below sandstone boulders and outcrops;
- Low to moderate ground disturbance from vegetation removal and erosion;
- Low research potential.

Site Location: BOA5/8 (100 metre MGA Zone 56 grid, 2 metre contours)



Photograph: BOA5/8

APPENDIX 4.

PLATES[1]

[1] Refer also to photographs associated with site recordings in Appendix 3.

Plate 1: Southern portion of BOA2 from MGA55 769660:6411723.

Plate 2: Cliff formations near Goulburn River in southern portion of BOA3.

Plate 3: Goulburn River valley in north-eastern portion of BOA3.

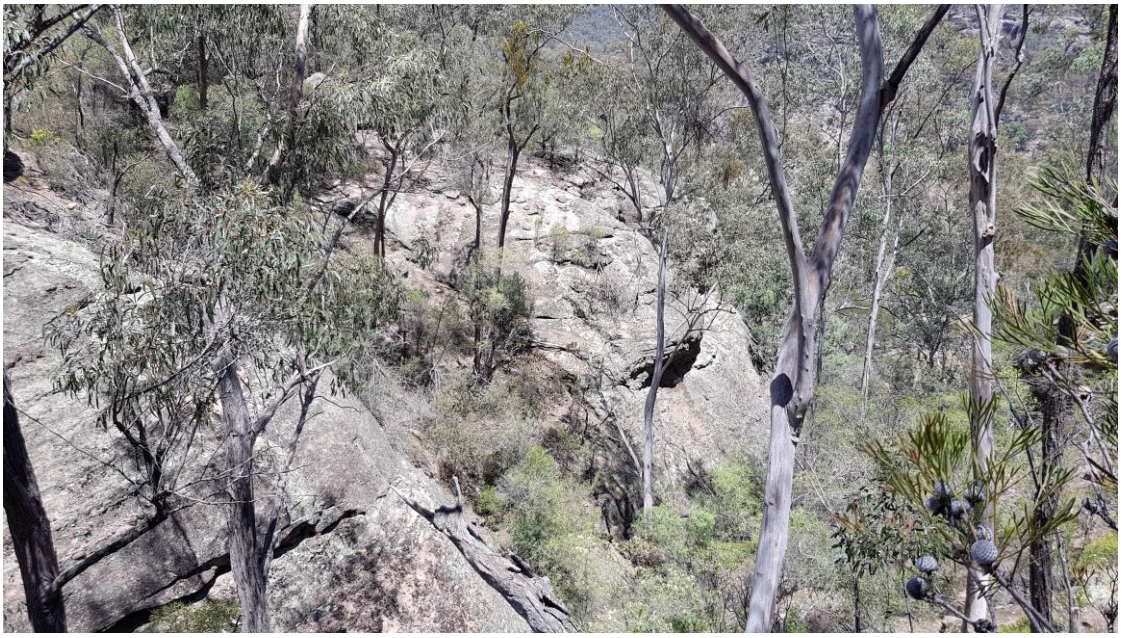


Plate 4: Typical straight-walled rock formations in north-eastern portion of BOA3.

Plate 5: View south-east of Goulburn River valley and cliffs in north-eastern portion of BOA3.

Plate 6: View south of portions of BOA3 flanking the Goulburn River.

Plate 7: North-western portion of BOA5.

Plate 8: North-western portion of BOA5.

Plate 9: Typical straight-walled rock formations in BOA3.

Plate 10: View west to elevated forested terrain that comprises the northern and western portions of BOA5.

Plate 11: View north of northern portion of BOA5.

Plate 12: Northern portion of BOA5.

Plate 13: View north-east from southern portion of BOA5 across adjacent Goulburn River valley.

APPENDIX 5.

CONSULTATION

Correspondence – DP&E Endorsement of Experts:

Planning Services
Resource Assessments & Business Systems
Contact: Stephen Shoesmith
Phone: 02 9274 6164
Email: Stephen.Shoesmith@planning.nsw.gov.au

Mr Ian Flood
Manager, Project Development and Approvals
Wilpinjong Coal

By Email: IFlood@peabodyenergy.com

Dear Mr Flood

Wilpinjong Extension Project (SSD 6764)
Endorsement of Experts

I refer to your letter dated 21 May 2017, seeking the endorsement of a suitably qualified and experienced person to prepare the Aboriginal Cultural Heritage Survey of biodiversity offset areas 1-5 for the Wilpinjong Extension Project.

The Department has reviewed the information you provided, and is satisfied that the nominated person is suitably qualified and experienced. Consequently, the Secretary approves Mr Peter Kuskie to undertake the Cultural Heritage Survey and associated tasks, in accordance with Condition 46(a), Schedule 3 of Development Consent SSD 6764.

If you wish to discuss the matter further, please contact Stephen Shoesmith on 9274 6164.

Yours sincerely

18/6/18.

Mike Young
Director
Resource and Energy Assessments
as nominee of the Secretary

Correspondence – DP&E Extension to Reporting Timeframe:

NSW GOVERNMENT | Planning & Environment

Resource Assessments
Contact: Stephen Shoesmith
Phone: (02) 9274 6164
Email: stephen.shoesmith@planning.nsw.gov.au

Mr Ian Flood
Manager, Project Development and Approvals
Wilpinjong Mine

Via Email to: iflood@peabodyenergy.com

Dear Mr Ian Flood

Wilpinjong Coal Mine (SSD_6764)
Extension – Aboriginal Cultural Heritage Survey

I refer to your letter requesting an extension of time to undertake the Aboriginal cultural heritage surveys of biodiversity offset areas 1 – 5 required under condition 46, schedule 3 of the Wilpinjong Extension Project (Wilpinjong Coal).

It is noted that the endorsed heritage specialist, Mr Peter Kuskie of South East Archaeology (SEA) is not available to undertake the heritage surveys until late 2018. Importantly, Peabody has also highlighted that SEA has extensive prior experience at WEP, and has established long term relationships with the local Registered Aboriginal Parties.

Given the above, the Department is satisfied that an extension of time to complete the heritage investigation is appropriate in this instance. Consequently, the Secretary approves an extension to the timeframe, and therefore requires Wilpinjong Coal to complete the investigation and lodge a report with the Department by **31 March 2019.**

If you require further information, please contact Stephen Shoesmith on (02) 9274 6164 or by email to stephen.shoesmith@planning.nsw.gov.au.

Yours sincerely

3/8/18

Steve O'Donoghue
A/Director
Resource and Energy Assessments
as nominee of the Secretary

Correspondence Between WCPL and Aboriginal Stakeholders and Response to Methods:

From: WVWAC Contact Officer <WVWAC@hotmail.com>
Sent: Monday, 5 November 2018 12:02 PM
To: Peter Kuskie
Cc: Bennetts, Kieren; Flood, Ian K.; Potter, Clark J
Subject: FW: Wilpinjong Coal - Biodiversity Offset Aboriginal Heritage Survey
Attachments: Wilpinjong Biodiversity Offset Area Heritage Investigation Methodology Draft.pdf

Hi Peter,

WVWAC has as of this morning received the attached document in regards to the Wilpinjong Coal - Biodiversity Offset Aboriginal Heritage Survey dated 7th of August 2018.

After reading the document in the section "INVESTIGATION PROCESS AND TIMING" on page 12, see the following extract:

"The aim is to survey (physically inspect on foot) a sample from each of the Biodiversity Offset Areas and to sample as much of the Biodiversity Offset Areas as feasible within a two week period. It is anticipated that the survey will be undertaken by two teams, each comprising at least one qualified and experienced archaeologist, and representatives of the RAPs selected and engaged by WCPL".

WVWAC **do not agree** to the proposal for 2 teams, we strongly request that all sections be investigated by 1 full team, that way less heritage within the landscape will be missed during the pedestrian survey. It will also negate WVWAC not agreeing to findings that our field officer was not present for, including the areas covered, as unless we are present we cannot and will not agree to what others have done or missed within the landscape and we would expect them to object on the same reasoning.

Regards,

Bradley R. Bliss J.P.
WVWAC CEO and Contact Officer
Gallanggabang Aboriginal Corporation Director
Wiradjuri Council of Elders Member
Senior Aboriginal Cultural Heritage Field Officer
Senior Aboriginal Cultural Mentor and Educator
Traditional Owner Clan Descendant
Mobile: 0427321016

Sent from Mail for Windows 10

From: Heesterman, James N. <JHeesterman@peabodyenergy.com>
Sent: Monday, November 5, 2018 9:11:31 AM
To: Tony Lonsdale(External); wanarua@bigpond.net.au; muronggialinga@hotmail.com; Bradley Bliss (External); info@warrabinga.com.au; lynsyme@bigpond.com; Jamiegray66@gmail.com; midnightdowns@bigpond.com
Cc: Bennetts, Kieren; Potter, Clark J; Flood, Ian K.
Subject: RE: Wilpinjong Coal - Biodiversity Offset Aboriginal Heritage Survey

Hello members of Wilpinjong's Registered Aboriginal Parties (RAPs).

Please find attached the draft methodology of works for the upcoming cultural heritage survey of biodiversity areas 1-5. Please respond to Peter Kuskie (peter@southeastarchaeology.com.au) as soon as possible in order to have the methodology finalised before the survey.

Apologies for the late notice.

Regards,

James Heesterman
Environmental Coordinator – Peabody Energy
Wilpinjong Coal
1434 Ulan-Wollar Road, Wilpinjong, NSW 2850
Locked Bag 2005, NSW 2850
Office: +61 (0)2 6370 2559 I Mobile: +61 (0) 437 430 283I JHeesterman@peabodyenergy.com

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From: Heesterman, James N.
Sent: Thursday, 27 September 2018 1:39 PM
To: mudgeelalc@bigpond.com; wanarua@bigpond.net.au; muronggialinga@hotmail.com; Bradley Bliss (External) <wvwac@hotmail.com>; info@warrabinga.com.au; lynsyme@bigpond.com; Jamiegray66@gmail.com; midnightdowns@bigpond.com
Cc: Bennetts, Kieren <KBennetts@peabodyenergy.com>; Potter, Clark J <CPotter@peabodyenergy.com>; Flood, Ian K. <IFlood@peabodyenergy.com>; Frappell, Joshua L <JFrappell@peabodyenergy.com>
Subject: Wilpinjong Coal - Biodiversity Offset Aboriginal Heritage Survey

Hello members of Wilpinjong's Registered Aboriginal Parties (RAPs).

Wilpinjong Coal is scheduled to undertake an aboriginal heritage survey of biodiversity offset areas 1-5 from 19th November until approximately 1st December.
Peter Kuskie, an endorsed and suitably qualified specialist from South East Archaeology, will be undertaking the survey.

Please find a formal invitation attached to this email.

Regards,

James Heesterman
Environmental Coordinator – Peabody Energy
Wilpinjong Coal
1434 Ulan-Wollar Road, Wilpinjong, NSW 2850
Locked Bag 2005, NSW 2850
Office: +61 (0)2 6370 2559 I Mobile: +61 (0) 437 430 283I JHeesterman@peabodyenergy.com

APPENDIX 1.

GLOSSARY