

Excellence in your environment



Aboriginal Cultural Heritage Assessment Report
Moolarben Coal Complex UG2 Modification, Ulan NSW
Mid-Western Regional Council Local Government Area
Prepared for Moolarben Coal Operations Pty Ltd

Prepared by Niche Environment and Heritage Pty Ltd | 19 November 2021



Document control

Project number	Client	Project manager	LGA
6462	Moolarben Coal Operations	Clare Anderson	Mid-Western Regional Character

Version	Author	Review	Status	Date
D1	Chelsea Dell Freeman	Clare Anderson	Draft	26 July 2021
D2	Clare Anderson	-	Draft	27 July 2021
D3	Clare Anderson	Resource Strategies	Draft	23 September 2021
Rev1	-	Moolarben Coal Operations	DraftREV01c	24 September 2021
Rev2	Chelsea Dell Freeman, Clare Anderson	Resource Strategies	Draft	2 October 2021
Rev03	Riley Finnerty, Clare Anderson	Moolarben Coal Operations, Resource Strategies	Draft	8 October 2021
Rev04	Clare Anderson	Moolarben Coal Operations, Resource Strategies	Draft	12 October 2021
Rev05	Chelsea Dell Freeman, Clare Anderson	-	Draft	15 October 2021
Rev06	Chelsea Freeman, Clare Anderson	Moolarben Coal Operations, Resource Strategies	Final Draft	16 November 2021
Rev07	Clare Anderson		Final Draft	19 November 2021

© Niche Environment and Heritage Pty Ltd (ACN 137 111 721) 2019

Copyright protects this publication. All rights reserved. Except for purposes permitted by the Australian *Copyright Act 1968*, reproduction, adaptation, electronic storage, transmission and communication to the public by any means is prohibited without our prior written permission. Any third party material, including images, contained in this publication remains the property of the specified copyright owner unless otherwise indicated, and is used subject to their licensing conditions.

Important information about your Report

Your Report has been written for a specific purpose: The Report has been developed for a specific purpose as agreed by us with you and applies only for that purpose. Unless otherwise stated in the Report, this Report cannot be applied or used when the nature of the specific purpose changes from that agreed. **Report for the sole benefit of Niche's client:** This Report has been prepared by Niche for you, as Niche's client, in accordance with our agreed purpose, scope, schedule and budget. This Report should not be applied for any purpose other than that stated in the Report. Unless otherwise agreed in writing between us, the Report has been prepared for your benefit and no other party. Other parties should not and cannot rely upon the Report or the accuracy or completeness of any recommendation. **Limitations of the Report:** The work was conducted, and the Report has been prepared, in response to an agreed purpose and scope, within respective time and budget constraints, and possibly in reliance on certain data and information made available to Niche. The analyses, assessments, opinions, recommendations, and conclusions presented in this Report are based on that purpose and scope, requirements, data, or information, and they could change if such requirements or data are inaccurate or incomplete. **No responsibility to others:** Niche assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with, or conclusions expressed in the Report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with, or conclusions expressed in the Report.

Niche Environment and Heritage Pty Ltd (ACN 137 111 721)
Enquiries should be addressed to Niche Environment and Heritage
PO Box 2443, Parramatta NSW 1750, Australia
Email: info@niche-eh.com

Executive summary

Moolarben Coal Operations Pty Ltd (MCO) is investigating options to optimise UG2 operations within existing mining lease areas, including extending underground mining to the southeast and increasing the maximum extraction height from 3.0 metres (m) to 3.5 m across the entire UG2 mining domain. This optimisation and extension would be the subject of environmental assessment and approval processes in the form of a Modification application to the Moolarben Coal Complex (MCC) Stage 2 Project Approval (08_0135). The Modification would be assessed under Section 4.55 of the *Environmental Planning and Assessment Act 1979*.

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by MCO to prepare an Aboriginal Cultural Heritage Assessment (ACHA) report and Archaeological Report (AR) to inform the Environmental Assessment of the proposed Modification.

The ACHA assesses potential impacts to Aboriginal heritage sites within the Subject Area, which includes both the UG2 Approved Mining Area and the UG2 Extended Mining Area. This ACHA has been prepared in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011). Aboriginal community consultation was undertaken from Stage 2 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a) with eight (8) Aboriginal stakeholder groups (Registered Aboriginal Parties [RAPs]). All stakeholder groups with an interest in the MCC have previously been identified and MCO has maintained ongoing consultation and engagement with these groups since 2004.

As part of this ACHA, an Aboriginal cultural heritage survey program was completed for the UG2 Extended Mining Area in compliance with the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a). Ten (10) new Aboriginal heritage sites were identified within the Subject Area during the survey. Five (5) of the newly identified sites are located within the extent of the UG2 Approved Mining Area and five (5) are located in the UG2 Extended Mining Area. The results of the archaeological assessment are presented in an AR provided in Appendix A and have been considered in this ACHA when assessing the likely harm of the proposed activity on the Aboriginal objects present within the Subject Area.

A total of 42 Aboriginal heritage sites have now been identified in the Subject Area comprising 37 known Aboriginal heritage sites identified in the UG2 Approved Mining Area and five (5) known Aboriginal heritage sites identified in the UG2 Extended Mining Area.

All Aboriginal heritage sites and Country are considered to have high cultural value by the RAPs.

While there is an increase in the predicted subsidence parameters at 18 sites, the overall impact assessments for the Aboriginal heritage sites within the Approved Mining Area based on the Approved Layout do not change for the Modified Layout. This includes the high significance rock shelter, artwork and artefact scatter site S2MC236 associated with cliff line C7, which is protected by a sterilised coal pillar within a Rock Shelter Management Area. The Modified Layout would not result in any change to the existing subsidence performance measure for S2MC236 of “negligible subsidence impacts or environmental consequences”. Aboriginal heritage sites at cliff line C9 have had impacts reduced through the use of non-subsiding secondary workings and the establishment of a setback at LW202a and LW202b.

Of the five (5) Aboriginal heritage sites within the UG2 Extended Mining Area, three (3) Aboriginal heritage sites (of low to low-moderate archaeological significance) are considered unlikely to experience subsidence impacts as they would not be undermined and two (2) Aboriginal heritage sites (both low archaeological significance) are predicted likely to experience subsidence impacts.

The existing MCO Heritage Management Plan (HMP) (MCO 2020) anticipates the type of harm described in this assessment, and as such provides a robust management framework within which to manage both the impacts and avoidance of harm to Aboriginal heritage sites and values. Management and mitigation measures are provided in Section 7 and 8 of this ACHA report. While the management measures recommended herein are consistent with the currently approved HMP (MCO 2020), management would be undertaken consistent with the contemporary management plan that exists at the time of the works.

Glossary and list of abbreviations

Term or abbreviation	Definition
Aboriginal cultural heritage	The tangible (objects) and intangible (dreaming stories, legends and places) cultural practices and traditions associated with past and present-day Aboriginal communities.
ACHA	Aboriginal Cultural Heritage Assessment.
Aboriginal object(s)	The legal definition for material Aboriginal cultural heritage under the NSW <i>National Parks and Wildlife Act 1974</i> .
AHIMS	Aboriginal Heritage Information Management System.
AR	Archaeological Report.
Archaeology	The scientific Subject of material traces of human history, particularly the relics and cultural remains of past human activities.
Archaeological deposit	A layer of soil material containing archaeological objects and/or human remains.
Archaeological investigation	The process of assessing the archaeological potential of a Subject Area by a qualified archaeologist.
Archaeological site	An area that contains surface or sub-surface material evidence of past human activity in which material evidence (artefacts) of past activity is preserved.
Artefact	An object made by human agency (e.g. stone artefacts).
Assemblage	A group of artefacts found in close association with one another Any group of items designated for analysis that exist in spatial and/or vertical context – without any assumptions of chronological or spatial relatedness.
Avoidance	A management strategy which seeks to minimise or reduce impacts to land and Aboriginal sites within the Subject Area by avoiding them.
BCD	The Biodiversity and Conservation Division (formerly the Office of Environment and Heritage and now Heritage NSW of the Department of Premier and Cabinet).
Code of Practice	<i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> .
Consultation Requirements	<i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i>
Cumulative impacts	Combination of individual effects of the same kind due to multiple actions from various sources over time.
DECCW	The Department of Conservation, Climate Change and Water, replaced by the Biodiversity and Conservation Division (BCD) of the Department of Planning, Industry and Environment (DPIE) and now Heritage NSW of the Department of Premier and Cabinet.
DG	Director General
DPIE	The Department of Planning, Industry and Environment.
Drainage	Natural or artificial means for the interception and removal of surface or subsurface water.
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i> .
Flake	A piece of stone detached from a core, displaying a bulb of percussion and striking platform.
Harm	With regard to Aboriginal objects this has the same meaning as the NSW <i>National Parks and Wildlife Act 1974</i> .
HMP	Heritage Management Plan.
Heritage NSW	Aboriginal cultural heritage regulator in the Department of Premier and Cabinet. Responsible for the management of Aboriginal Cultural Heritage (ACH) regulation functions under the <i>National Parks and Wildlife Act 1974</i> . Formerly BCD of DPIE.
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.

Term or abbreviation	Definition
<i>In situ</i>	Latin words meaning 'on the spot, undisturbed'.
Isolated artefact / find	A single artefact found in an isolated context.
Landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land – built, planted and natural topographical and ecological features.
Land unit	An area of common landform, and frequently with common geology, soils and vegetation types, occurring repeatedly at similar points in the landscape over a defined region. It is a constituent part of a land system.
Landform	Any one of the various features that make up the surface of the earth.
LEP	Local Environmental Plan.
LGA	Local Government Area.
Management plans	Conservation plans which identify short- and long-term management strategies for all known sites recorded within a (usually approved) Subject Area.
MCC	Moolarben Coal Complex
MCO	Moolarben Coal Operations Pty Ltd
Methodology	The procedures used to undertake an archaeological investigation.
Mitigation	Design or other measures of the proposed development employed to avoid, prevent, minimise or offset impacts
MSEC	Mine Subsidence Engineering Consultants Pty Ltd
NPW Act	NSW <i>National Parks and Wildlife Act 1974</i> .
NPW Regulation	NSW <i>National Parks and Wildlife Regulation 2019</i> .
OEH	Office of Environment and Heritage, replaced by the Biodiversity and Conservation Division (BCD) of the Department of Planning, Industry and Environment (DPIE) and now Heritage NSW of the Department of Premier and Cabinet.
Open artefact site	An archaeological site situated within an open space (e.g. archaeological material located on a creek bank, in a forest, on a hill, etc.).
PAD	Potential Archaeological Deposit. A location considered to have a potential for subsurface archaeological material.
RAP	Registered Aboriginal Party.
Site recording	The systematic process of collecting archaeological data for an archaeological investigation.
Site	A place where past human activity is identifiable.
Survey coverage	A graphic and statistical representation of how much of a Subject Area was actually surveyed and therefore assessed.

Table of Contents

Executive summary	i
Glossary and list of abbreviations	i
1. Introduction	1
1.1 Background.....	1
1.2 Proposed activity and need for the project.....	1
1.3 Statutory and regulatory framework.....	4
1.4 Scope and objectives	6
2. Description of the area	7
2.1 Location	7
2.2 Description of land where Aboriginal objects are proposed to be harmed.....	7
2.3 Environmental context	11
2.4 Aboriginal occupation and land use of the Subject Area	18
3. Consultation process	25
3.1 Stage 1 – Notification of project proposal and registration of interest	26
3.2 Stage 2 and 3 – Presentation of project information, assessment methodology and gathering information about the cultural significance of the Subject Area	26
3.3 Stage 4 – Review of draft Aboriginal cultural heritage assessment report.....	31
4. Summary and analysis of background information	35
5. Cultural heritage values and statement of significance	37
5.1 Assessment framework	37
5.2 Significance assessment – Individual Aboriginal cultural heritage sites	39
5.3 Statement of significance for the Subject Area	49
6. The proposed activity	51
6.1 Summary of Subject Area’s history	51
6.2 Proposed activity, staging and timeline	51
6.3 Potential for harm	51
6.4 Project justification.....	56
7. Avoiding and minimising harm	60
7.1 Conservation Principles and Management Framework	60
7.2 Designing to avoid harm.....	60
7.3 Justifying harm.....	60
7.4 Mitigating harm	61

7.5	Consideration of cumulative impacts.....	62
8.	Conclusion and recommendations	63
	References.....	68
	Appendix A: Archaeological Report.....	70
	Appendix B: Aboriginal community consultation documents.....	71
	Appendix C: MSEC Tables and Figures.....	72

List of Figures

Figure 1:	Location of Subject Area within regional context (Source: MCO and Niche).....	2
Figure 2:	Subject Area (Source: Resource Strategies and MCO)	3
Figure 3:	Aboriginal heritage sites in the Subject Area (Source: MCO and Niche).....	8
Figure 4:	Terrain and slope.....	12
Figure 5:	Geology.....	14
Figure 6:	Soil landscapes and hydrology in the local area.....	16
Figure 7:	Survey coverage (Source: Moolarben Coal Operations and Niche)	34

List of Plates

Plate 1:	Sandstone ridgelines within Subject Area.....	13
Plate 2:	Gullies within the Subject Area.	13
Plate 3:	Slopes within Subject Area.....	13
Plate 4:	Exposed shale slope within Subject Area.	13
Plate 5:	Basalt outcrop within Subject Area.....	13
Plate 6:	Second basalt outcrop within Subject Area, steep slope category.....	13
Plate 7:	Open woodland on slopes looking towards cleared gully within the Subject Area.....	17
Plate 8:	Kurrajong, seen across the Subject Area has a range of cultural uses.....	17
Plate 9:	Nguuguung (Tawny frogmouth) observed in Subject Area.....	17
Plate 10:	Sydney coastal fig trees seen on upper slopes within the Subject Area.....	17
Plate 11:	S2MC236 (AHIMS ID#36-3-0134) general location (Source: Hamm 2008b).....	21
Plate 12:	S2MC236 (AHIMS ID#36-3-0134) showing site and art panels (Source: Hamm 2008b).....	21
Plate 13:	Art stencils at S2MC236 (AHIMS ID#36-3-0136) (Source: Hamm 2008b).....	22

Plate 14: S2MC440, Rock Shelter with Artefact and PAD, facing north-east.	22
Plate 15: Quartz complete flake located at S2MC440.....	22
Plate 16: S2MC441, Rock Shelter with Artefacts and PAD, facing south-east.	22
Plate 17: Quartz flake located at site S2MC441.	22
Plate 18: S2MC446, Rock Shelter with Artefact and PADs, facing south, artefact located in foreground.	22
Plate 19: Baked chert flake located at site S2MC446.....	23
Plate 20: S2MC447, Rock Shelter with artefacts, facing north-west.....	23
Plate 21: Quartz flake located at site S2MC447.	23
Plate 22: S2MC443 and S2MC442 facing east.....	23
Plate 23: General photo of view from S2MC443 facing south.....	23

List of Tables

Table 1: Assessment requirements, scope, and objectives.....	6
Table 2: Lot/DP within Subject Area.....	7
Table 3: Summary of Aboriginal cultural heritage sites within the Subject Area.....	9
Table 4: Summary of Aboriginal cultural heritage site S2MC236 and associated subsidence performance measures	11
Table 5: Summary of site types in Subject Area	20
Table 6: Registered Aboriginal Party organisations and contacts.....	26
Table 7: Details of Registered Aboriginal Party feedback on the project information and Proposed Methodology	27
Table 8: Archaeological survey participants.....	31
Table 9: ACHA review information session participants	31
Table 10: Details of Registered Aboriginal Party feedback on the draft ACHA report.....	32
Table 11: Values from which cultural significance is derived.....	37
Table 12: Criteria for assessing scientific value	38
Table 13: Criteria for grading scientific values	39
Table 14: Significance Assessment – Sites within UG2 Approved Mining Area	39
Table 15: Significance Assessment – Sites within the UG2 Extended Mining Area	48
Table 16: Changes in approved level of impact for Aboriginal heritage sites.....	53

Table 17 Impact assessment summary for sites within the Subject Area.....	57
Table 18: Recommendations.....	63
Table 19: Site specific management recommendations for sites within the Subject Area.....	64

1. Introduction

1.1 Background

The Moolarben Coal Complex (MCC) is located approximately 40 kilometres (km) north of Mudgee in the Western Coalfields of New South Wales (NSW) in the Mid-Western Regional Council Local Government Area (Figure 1).

Moolarben Coal Operations Pty Ltd (MCO) is the operator of the MCC on behalf of the Moolarben Joint Venture (Moolarben Coal Mines Pty Ltd [MCM], Yancoal Moolarben [YM] Pty Ltd and a consortium of Korean power companies). MCO, MCM and YM are wholly owned subsidiaries of Yancoal Australia Limited.

Mining operations at the MCC are currently approved until 31 December 2038 and would continue to be carried out in accordance with NSW Project Approval (05_117) (Moolarben Coal Project Stage 1) as modified and NSW Project Approval (08_0135) (Moolarben Coal Project Stage 2) as modified.

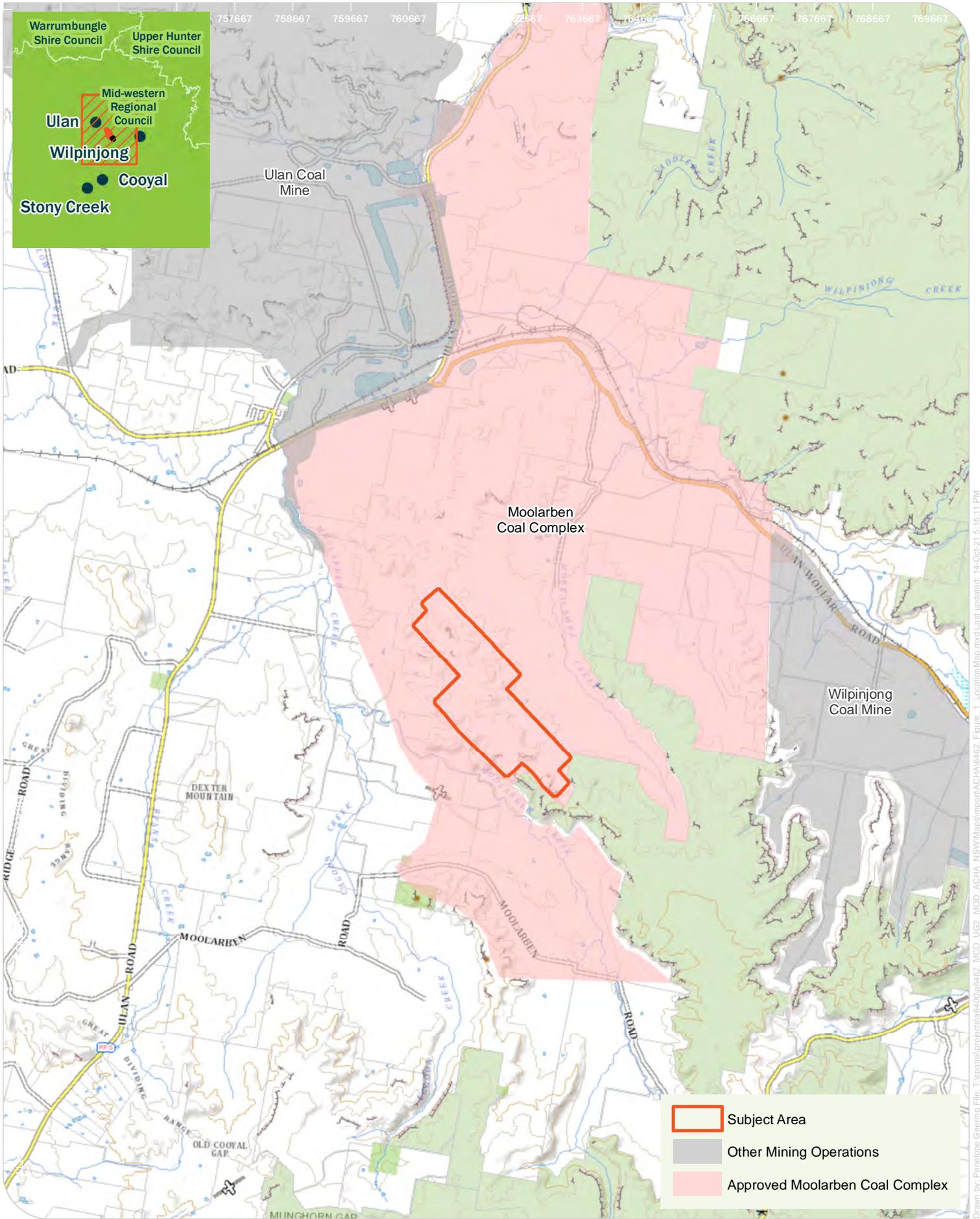
Niche Environment and Heritage Pty Ltd (Niche) has been commissioned by MCO to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed Modification of the Stage 2 Project Approval (08_0135) for activities associated with the UG2 mining domain (the Modification).

1.2 Proposed activity and need for the project

MCO are seeking to modify the Project Approval for Stage 2 of the MCC to allow changes to the currently approved operations of the UG2 mining domain. The Modification would comprise the following changes to the approved UG2:

- optimisation of the approved UG2 layout (including the extension of two approved longwall panels);
- increased UG2 extraction height from 3.0 metres (m) to 3.5 m;
- revised UG2 mining sequence;
- increased UG2 ROM coal production from 9.4 million tonnes (Mt) to 13.9 Mt;
- construction and operation of a remote services infrastructure area (including two UG2 service boreholes) within the approved OC4 disturbance footprint to support UG2 operations;
- development of an additional non-subsiding gate road along the southern boundary of the UG1 mining area to assist with ventilation in UG2; and
- small reduction in the approved OC4 extent to accommodate the optimised UG2 layout.

The proposed modification project is referred to as the UG2 Modification, and the Subject Area for this assessment is illustrated in Figure 2, and further defined in Section 2.2.



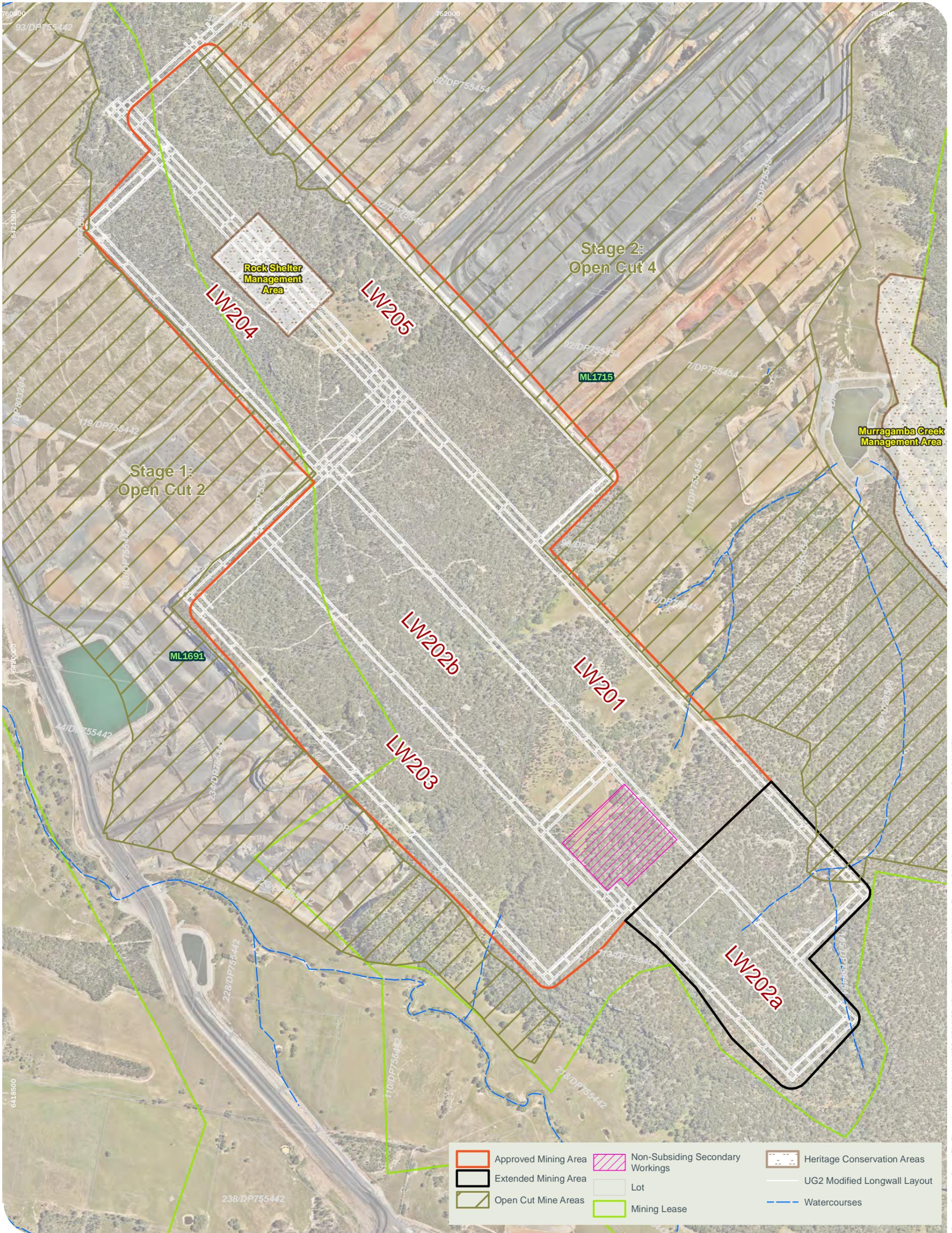
Drawn by: Penelope Geering File: T:\spatial\proj\cas6400\6462_MCO_UG2_MOD_ACHA_NSWMap\report\ACHA6462_Figure_1_LocationMap.mxd Last updated: 14-Oct-21 5:15:11 PM



Location Map
UG2 Modification Aboriginal Cultural Heritage Assessment

Niche PM: Clare Anderson
 Niche Proj. #: 6462
 Client: Moolarben Coal Operations

Figure 1



Drawn by: Penelope Geering File: T:\spatial\projects\6400\6462_MCO_UG2_MOD_ACHA_NSW\Map\report\ACHA\6462_Figure_2_SubjectArea.mxd Last updated: 14-Oct-21 3:39:03 PM

1.3 Statutory and regulatory framework

1.3.1 Commonwealth and National Legislation

1.3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. Under the EPBC Act, protected heritage items of significance are listed on the National Heritage List (NHL) or the Commonwealth Heritage List (CHL). The NHL provides protection to places of cultural significance to the nation of Australia, while the CHL comprises natural, Aboriginal and historic heritage places owned and controlled by the Commonwealth.

No items on the CHL or NHL were identified within the Subject Area.

1.3.2 NSW State Legislation

1.3.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the framework for cultural heritage values to be formally assessed in the land use planning process in NSW. The EP&A Act also requires local governments to prepare planning instruments, such as Local Environmental Plans (LEP) which identify heritage items with statutory protections under the EP&A Act.

Mid-western Regional Council LEP (2001)

Each Local Government Area (LGA) is required to create and maintain a Development Control Plan (DCP) which regulates what development is allowed within the LGA, and an LEP that identifies and conserves Aboriginal objects and historical heritage items. These items are protected under the EP&A Act. Heritage items within each LGA are listed in Schedule 5 of an LEP and are subject to the planning controls and provisions set out in Clause 5.10 (Heritage Conservation) of an LEP.

There are no heritage items with Aboriginal heritage values listed in the LEP/DCP within the Subject Area. Further consideration of heritage items in proximity to the Subject Area are provided in Appendix B.

1.3.2.2 National Parks and Wildlife Act 1974.

Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act). Under section 85 of the NPW Act, the Director General (DG) of the Department of Premier and Cabinet is responsible for the protection of Aboriginal objects and places in NSW. In particular, the DG is responsible for the preservation and protection of any Aboriginal objects or places on land reserved under the NPW Act, and for the proper restoration of any such land that has been disturbed or excavated in accordance with an approval. Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm or desecrate them. Harm means '*... any act or omission that destroys, defaces or damages an object or place or, in relation to an object, moves the object from the land on which it had been situated*' (section 5 of NPW Act).

Heritage NSW maintains the Aboriginal Heritage Information Management Service (AHIMS), a statutory list of Aboriginal objects in NSW. There are Aboriginal objects registered on AHIMS in the Subject Area.

A development consent under Division 4.7 for State Significant Development removes the requirement for:

(d) an Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974

- (2) Division 8 of Part 6 of the [Heritage Act 1977](#) does not apply to prevent or interfere with the [carrying out](#) of [State significant development](#) that is authorised by a [development consent](#) granted after the commencement of this Division.

The management of Aboriginal heritage at the MCC is undertaken in accordance with the currently approved MCC Heritage Management Plan (HMP) (MCO 2020).

The assessment, investigation and reporting on Aboriginal objects and cultural heritage is guided by the *National Parks and Wildlife Regulation 2019* (NPW Regulation), as amended, which establishes three subordinate regulatory instruments:

1. *Aboriginal cultural heritage consultation requirements for proponents 2010* (Department of Environment, Climate Change and Water [DECCW] 2010a) (hereafter referred to as ‘the Consultation Requirements’).
2. *Guide to investigating, assessing and reporting Aboriginal cultural heritage in NSW* (Office of Environment and Heritage [OEH] 2011a).
3. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (hereafter referred to as ‘the Code of Practice’).

This assessment has been conducted with respect to these guidelines.

1.3.3 Heritage Act 1977

The *Heritage Act 1977* affords statutory protection to those items identified as having heritage significance and which form part of the NSW heritage record. The Act defines a heritage item as “a place, building, work, relic, moveable object or precinct”. Items that are assessed as having State heritage significance are listed on the NSW State Heritage Register (SHR) and can include items with Aboriginal heritage values. Proposals to alter, damage, move or destroy heritage items listed on the SHR (or protected by an Interim Heritage Order [IHO]), require an approval under section 60 of the *Heritage Act 1977*.

Archaeological features and deposits are afforded statutory protection by the ‘relics provisions’ of the Act. A relic is defined as “any deposit, artefact, object or material evidence that relates to the settlement of the area that comprises NSW, not being Aboriginal settlement, and is of State or local heritage significance”. Land disturbance or excavation that will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed is prohibited under the provisions of the Act, unless carried out in accordance with a permit issued under section 140 or section 139 of the Act.

There are no heritage items on the SHR within the Subject Area.

1.3.3.1 State Heritage and Conservation (section 170) registers

Under section 170 of the *Heritage Act 1977*, NSW government agencies are required to maintain a register of heritage assets under their control or ownership. Each government agency is responsible for ensuring that the items entered on its register under section 170 are maintained with due diligence in accordance with State Owned Heritage Management Principles. Items listed on section 170 Heritage and Conservation Registers are listed on the State Heritage Inventory (SHI), and some are also listed on the SHR.

There are no section 170 listings for the items within the Subject Area.

1.3.4 The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance

The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (Australia ICOMOS 2013) is a non-statutory instrument that is accepted as presenting the best practice methods for the assessment of cultural heritage values.

1.4 Scope and objectives

This report presents an ACHA, supported by an Archaeological Report (Appendix A) to satisfy the requirements of:

- The Consultation Requirements.
- The Code of Practice.
- *Guide to investigating, assessing and reporting Aboriginal cultural heritage in NSW* (OEH 2011a).
- *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council 2010).
- *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS 2013).
- NPW Regulation.

For this modification MCO is relying on existing registrations and ongoing consultation with the Registered Aboriginal Parties (RAPs) who were involved in the consultation process for the Stage 1 and Stage 2 Project Approvals, and ongoing consultation under the HMP (MCO 2020) noting that this consultation process has been established and conducted in accordance with the Consultation Requirements, and there will be no major departure from the Consultation Requirements.

This ACHA report is designed to inform the design and development process and to manage and mitigate harm to Aboriginal objects and cultural heritage values during any future development within the Subject Area. This assessment does not include consideration of development of an additional non-subsiding gate road along the southern boundary of the UG1 mining area to assist with ventilation in UG2. The assessment requirements and objectives for the ACHA are provided in the Table 1 below.

Table 1: Assessment requirements, scope, and objectives

Objectives:	Addressed in:
<ul style="list-style-type: none"> • Identify whether Aboriginal objects could be present within the Subject Area. 	Appendix A
<ul style="list-style-type: none"> • Provide a description of the Aboriginal objects and declared Aboriginal places located within the area of the proposed activity. 	Section 2, and Appendix A
<ul style="list-style-type: none"> • Provide a description of the cultural heritage values, including the significance of the Aboriginal objects and declared Aboriginal places, that exist across the whole area that will be affected by the proposed activity and the significance of these values for the Aboriginal people who have a cultural association with the land. 	Section 5, Section 6 and Appendix A
<ul style="list-style-type: none"> • Demonstrate how the requirements for consultation with Aboriginal people have been met (as specified in subclause 60(1) of the NPW Regulation). 	Section 3, Appendix B
<ul style="list-style-type: none"> • Present the views of those Aboriginal people regarding the likely impact of the proposed activity on their cultural heritage (if any submissions have been received as a part of the consultation requirements, the report must include a copy of each submission and response). 	Section 3 and Appendix B
<ul style="list-style-type: none"> • Provide an assessment of actual or likely harm posed to the Aboriginal objects or declared Aboriginal places from the proposed activity, with reference to the cultural heritage values identified. 	Section 6
<ul style="list-style-type: none"> • Provide any practical measures that may be taken to protect and conserve those Aboriginal objects or declared Aboriginal places and any practical measures that may be taken to avoid or mitigate any actual or likely harm, alternatives to harm or, if this is not possible, to manage (minimise) harm. 	Section 7, Section 8, Appendix A

2. Description of the area

2.1 Location

The Subject Area is situated within the Central Tablelands of NSW, in the Western Coalfields of NSW, approximately 5 km north-east of the township of Ulan and 40 km north of Mudgee. The Subject Area is within the traditional country of the Wiradjuri People, within the administrative boundaries of the Mid-Western Regional Council LGA and the Mudgee Local Aboriginal Land Council (Figure 1). The MCC comprises four open cut mining areas (OC1 to OC4), three underground mining areas (UG1, UG2 and UG4) and other mining related infrastructure (including coal processing and transport facilities). The Subject Area is situated south-east of OC1 within ML 1691 and ML 1715 (Figure 2).

A summary of the Lot/DP (where available) over which the Subject Area spans is provided in Table 2 below.

Table 2: Lot/DP within Subject Area

Lot	DP	Lot	DP	Lot	DP
32	755454	93	755454	113	755454
42	755454	96	755454	193	755442
62	755454	97	755454	234	755442
82	755454	99	755454	1	1023568
91	755454	105	755454		
92	755454	112	755454		

2.2 Description of land where Aboriginal objects are proposed to be harmed

The Subject Area is defined as the surface area that is likely to be affected by the proposed mining of UG2 Longwalls 201 to 205 in the Ulan Seam by MCO (Figure 2). The extent of the Subject Area to be impacted by subsidence has been calculated by Mine Subsidence Engineering Consultants Pty Ltd (MSEC) (2021) combining the areas bounded by the following limits:

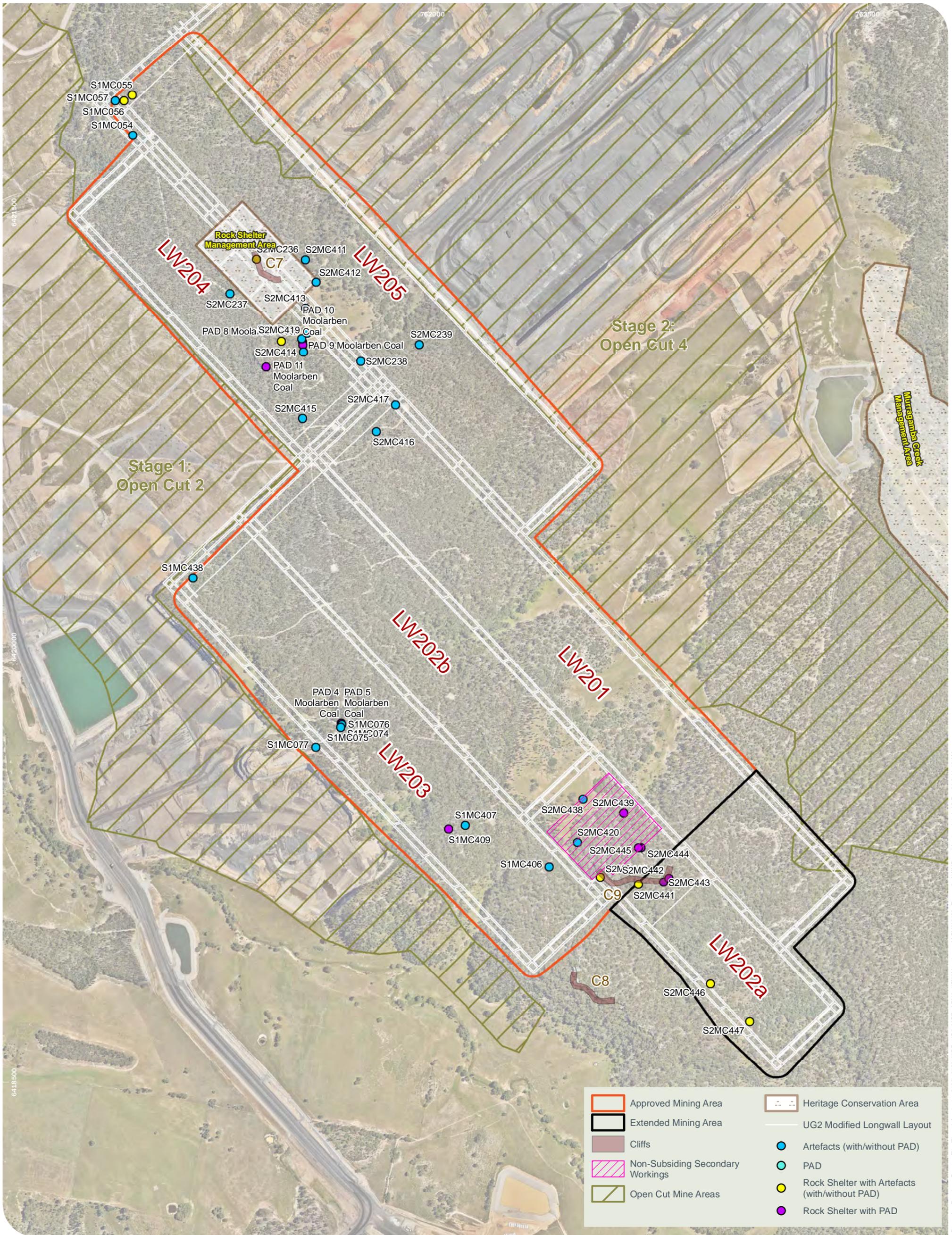
- The 26.5° angle of draw line; and
- The predicted vertical limit of subsidence, taken as the 20 millimetre (mm) subsidence contour.

As the depth of cover above the proposed longwall varies between 40 and 155 m, the 26.5 degree angle of draw line has been conservatively determined by drawing a line around the outer edge of the proposed longwall voids at a horizontal distance that varies between 20 and 78 m (MSEC 2021).

The Subject Area has been further divided into the following sub-areas:

- UG2 Approved Mining Area – this incorporates the approved mining area component inside the Subject Area.
- UG2 Extended Mining Area – this incorporates the LW201 and 202a extension area.

A total of 42 Aboriginal objects have been identified within the Subject Area (Table 3, Figure 3). Five (5) of the Aboriginal heritage sites are located in the UG2 Extended Mining Area and 37 are located in the UG2 Approved Mining Area.



- | | | | |
|--|----------------------------------|--|--|
| | Approved Mining Area | | Heritage Conservation Area |
| | Extended Mining Area | | UG2 Modified Longwall Layout |
| | Cliffs | | Artefacts (with/without PAD) |
| | Non-Subsiding Secondary Workings | | PAD |
| | Open Cut Mine Areas | | Rock Shelter with Artefacts (with/without PAD) |
| | | | Rock Shelter with PAD |

Table 3: Summary of Aboriginal cultural heritage sites within the Subject Area.

Site Name	AHIMS ID#	Site features	Information restriction	Artefact count	Subject area
PAD 10 Moolarben Coal	36-3-0956	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 AMA
PAD 11 Moolarben Coal	36-3-0957	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 AMA
PAD 4 Moolarben Coal	36-3-0883	PAD	None identified to date by RAPs	-	UG2 AMA
PAD 5 Moolarben Coal	36-3-0884	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 AMA
PAD 8 Moolarben Coal	36-3-0954	Rock Shelter with Artefacts and PAD	None identified to date by RAPs	-	UG2 AMA
PAD 9 Moolarben Coal	36-3-0955	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 AMA
S1MC054	36-3-0859	Artefacts	None identified to date by RAPs	3 artefacts	UG2 AMA
S1MC055	36-3-0860	Rock Shelter with Artefacts	None identified to date by RAPs	8 artefacts	UG2 AMA
S1MC056	36-3-0861	Rock Shelter with Artefacts	None identified to date by RAPs	1 artefact	UG2 AMA
S1MC057	36-3-0862	Artefacts	None identified to date by RAPs	16 artefacts	UG2 AMA
S1MC074	36-3-0879	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S1MC075	36-3-0880	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S1MC076	36-3-0881	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S1MC077	36-3-0882	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S1MC406	36-3-3302	Artefacts	None identified to date by RAPs	30 artefacts	UG2 AMA
S1MC407	36-3-3300	Artefacts	None identified to date by RAPs	5 artefacts	UG2 AMA
S1MC409	36-3-3303	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 AMA
S1MC438	36-3-3454	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S2MC236	36-3-0016, 36-3-0134	Rock Shelter with Art and Artefacts	Yes.	Art, 10 artefacts	UG2 AMA
S2MC237	36-3-1382	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S2MC238	36-3-1383	Artefacts	None identified to date by RAPs	104 artefacts	UG2 AMA
S2MC239	36-3-1384	Artefacts	None identified to date by RAPs	3 artefacts	UG2 AMA
S2MC411	36-3-3320	Artefacts	None identified to date by RAPs	11 artefacts	UG2 AMA
S2MC412	36-3-3321	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S2MC413	36-3-3322	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S2MC414	36-3-3323	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA

Site Name	AHIMS ID#	Site features	Information restriction	Artefact count	Subject area
S2MC415	36-3-3324	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S2MC416	36-3-3450	Artefacts	None identified to date by RAPs	3 artefacts	UG2 AMA
S2MC417	36-3-3451	Artefacts	None identified to date by RAPs	26 artefacts	UG2 AMA
S2MC418	36-3-3449	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S2MC419	36-3-3448	Artefacts	None identified to date by RAPs	2 artefacts	UG2 AMA
S2MC420	36-3-3452	Artefacts	None identified to date by RAPs	6 artefacts	UG2 AMA
S2MC438	36-3-3807	Isolated Artefact	None identified to date by RAPs	1 artefact	UG2 AMA
S2MC439	36-3-3808	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 AMA
S2MC440	36-3-3809	Rock Shelter with Artefacts and PAD	None identified to date by RAPs	2 artefacts	UG2 AMA
S2MC441	36-3-3810	Rock Shelter with Artefacts and PAD	None identified to date by RAPs	2 artefacts	UG2 EMA
S2MC442	36-3-3812	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 EMA
S2MC443	36-3-3811	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 EMA
S2MC444	36-3-3813	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 AMA
S2MC445	36-3-3817	Rock Shelter with PAD	None identified to date by RAPs	-	UG2 AMA
S2MC446	36-3-3814	Rock Shelter with Artefacts and PAD	None identified to date by RAPs	1 artefact	UG2 EMA
S2MC447	36-3-3815	Rock Shelter with Artefact	None identified to date by RAPs	1 artefact	UG2 EMA

UG2 AMA = UG2 Approved Mining Area, UG2 EMA = UG2 Extended Mining Area

Further details of these sites are provided in Appendix A. The AHIMS site cards for these Aboriginal cultural heritage sites, which contain further information on site descriptions, is provided in Annex 2 of the AR. Further detail regarding the proposed activity and impact assessment are provided in Section 6.

Aboriginal cultural heritage site S2MC236 (AHIMS ID#36-3-0016 and 36-3-0134) is a Rock Shelter with Art and Artefacts, located in Cliff C7, within the UG2 Approved Mining Area. It is located within Lot 97 DP 755454. S2MC236 (AHIMS ID#36-3-0016 and 36-3-0134) has previously been identified of high archaeological significance and has an existing subsidence performance measure in accordance with the Project Approval (08_0135) (Table 4). A Rock Shelter Management Area has been established (Figure 2), which involved the redesign of the longwall layout to reduce the likelihood of subsidence impacts, and controls to minimise harm to the site have been put in place through the MCO HMP (MCO 2020). These controls include monitoring of subsidence (Section 5.9.1 of the HMP) and blast vibration (Section 5.9.2 of the HMP).

Table 4: Summary of Aboriginal cultural heritage site S2MC236 and associated subsidence performance measures

Site Name	S2MC236
AHIMS ID#	36-3-0016 & 36-3-0134
Site features	Shelters with Art and Artefacts
Information restriction	Oral histories relating to this site have information restrictions, see Appendix 4 of Hamm (2008a)
Artefact count	9 grind stones 1 flake
Landform	Cliff line
Location	UG2 Approved Mining Area – within RSMA
Impact type	Subsidence
Subsidence Performance Measure	Negligible subsidence impacts or environmental consequences. .

No other Aboriginal heritage sites within the UG2 Approved Mining Area have existing subsidence performance measures.

2.3 Environmental context

The environmental context for the Subject Area is described in detail in the AR (Appendix A) and summarised below.

Generally, the area is dominated by sandstone ridgelines, slopes and associated gullies which form part of the system identified in previous heritage assessments as the ‘Moolarben Ridge’ (Figure 4). Elevations around the Subject Area are at approximately 550 m ASL. Cliff C7 is located above a wide coal barrier pillar between Longwalls 204 and 205. Cliff C8 is located directly above Longwall 204. Cliff C9 is located adjacent to the commencing end of Longwall 202a. Cliff C10 is located above solid coal approximately 125 m from the finishing end of Longwall 203 and 265 m from Longwall 202a.

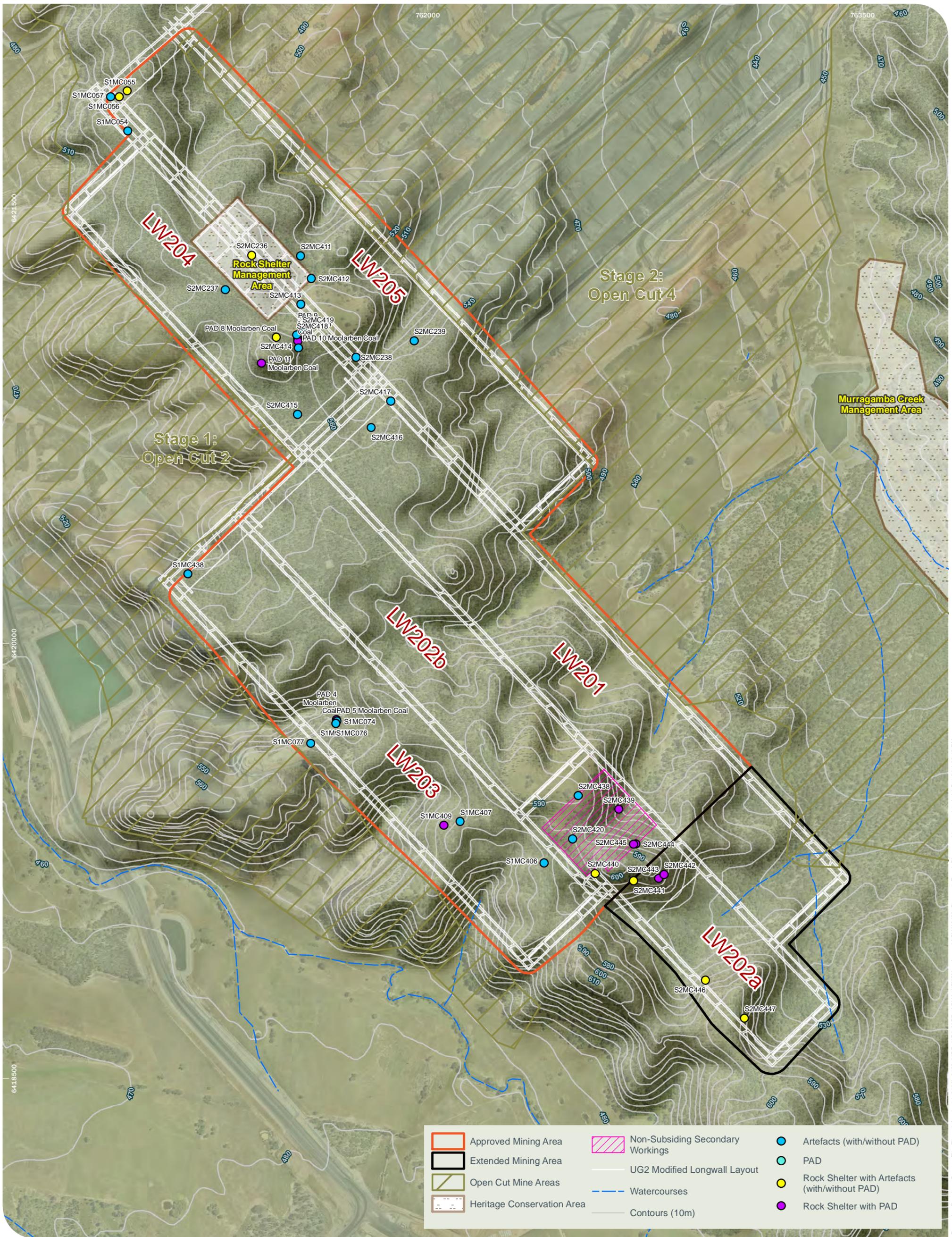




Plate 1: Sandstone ridgelines within Subject Area.



Plate 2: Gullies within the Subject Area.



Plate 3: Slopes within Subject Area.



Plate 4: Exposed shale slope within Subject Area.

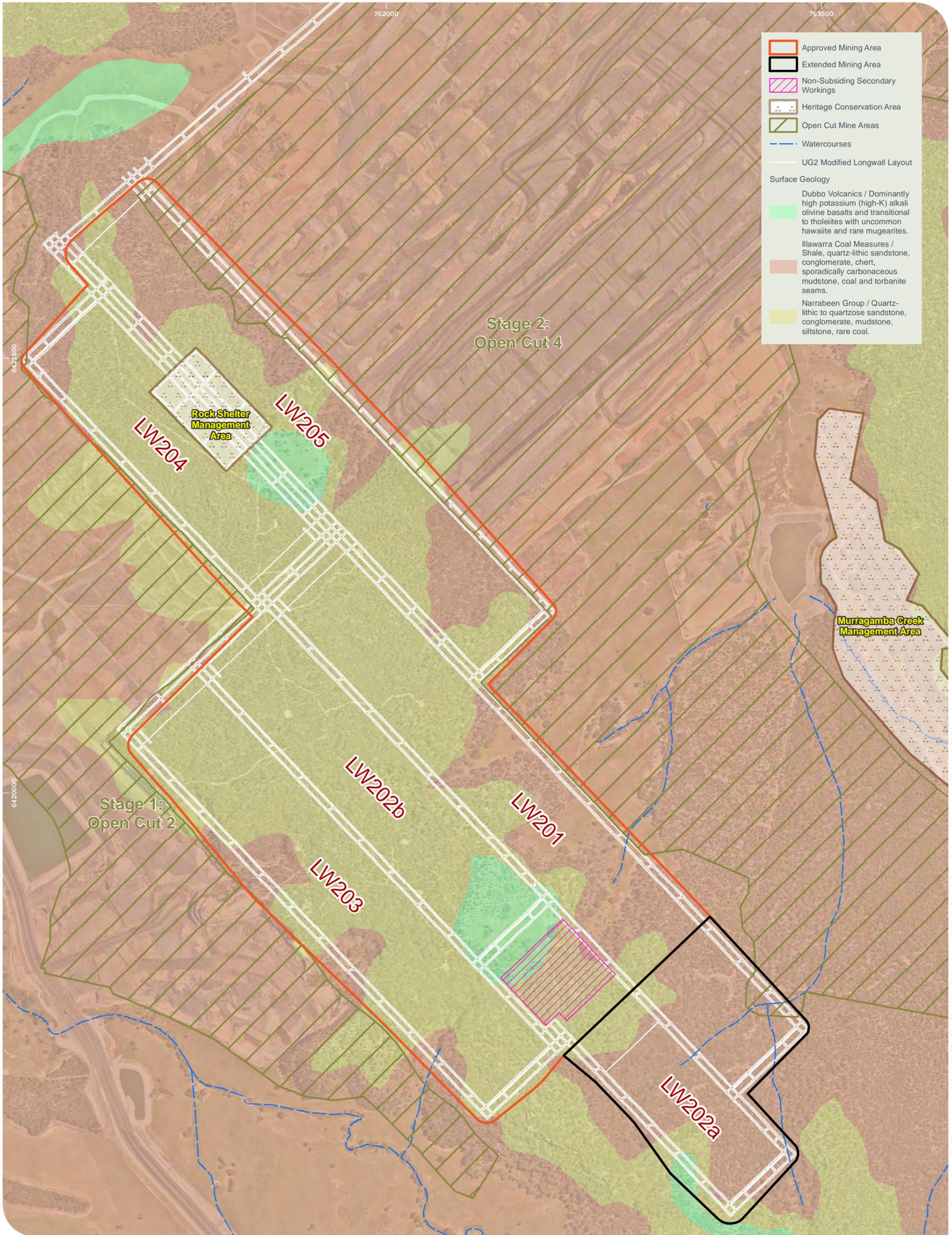
The Subject Area is situated in the north-western part of the Sydney Basin and is characterised by Late Permian age Illawarra Coal Measures (mudstone, claystone, coal (including the Ulan Seam mined by MCO), torbanite and rhyolitic tuff) which is overlain by the Narrabeen Group (sandstone, conglomeratic sandstone, chert, shale coal and torbanite) (Dubbo 1:250k Geological Series Sheet SI 55-4; Figure 5). Outcrops of these stone where they occur may provide sources of raw material for the manufacture of stone tools. No quarries have previously been identified within the Subject Area. Basalt outcrops also occur in the Subject Area, and in the nearby Munghorn Gap Nature Reserve, and may have been a source of material for the basalt artefact identified in Aboriginal heritage sites in the local area.



Plate 5: Basalt outcrop within Subject Area.



Plate 6: Second basalt outcrop within Subject Area, steep slope category.



Drawn by: Penelope Geering File: T:\p\p\proj\6462\6462_MCO_UG2_ACHA_NSW\Map\report\ACHA\6462_Figure_5_SurfaceGeology.mxd Last updated: 06-Oct-21 4:51:26 PM

Water is considered a key resource within any landscape for use and occupation. Murrumbidgee Creek is situated northeast of the Subject Area and possesses several unnamed first and second order tributaries which run east from the Subject Area. Moolarben Creek is situated west of the Subject Area and unnamed first and second order tributaries from Moolarben Creek also run west from the Subject Area. Several springs are noted to the north and west of UG2 (Hamm 2008a).

Climate has played a significant factor in the formation of the landscape and the availability of resources, particularly water. In the late Pleistocene, during the last glacial maximum from about 24,000 to 17,000 years ago, the climate was cooler and drier. It is hypothesised that potable water may not have been as frequently available during this time, with occupation more likely to focus on areas with more reliable water sources and conditions (Kuskie 2013b). Conditions and availability of water would have improved into the Holocene.

Climate data collected at the Gulgong weather station, approximately 20 km to the west of the Subject Area, indicates that the Subject Area is situated in an area with an average rainfall of 630 to 650 mm with warm to hot summers and cold winters. Winter frosts occur. Greater variation in seasonal weather may have resulted in more seasonal changes to Aboriginal past land-use; however, to date there is no archaeological evidence of this occurring. Whilst conditions and temperatures are wide ranging, the conditions in the region of the Subject Area can be summarised as being moderate and would have been very suitable for year-round occupation of the region by Wiradjuri people.

There are four soil landscapes situated with the Subject Area, as mapped by Murphy and Lawrie (1998) (Figure 6). The soil landscapes identified within the Subject Area include the Munghorn, Ulan, Lees Pinch and Bald Hill soil landscapes. Soil landscapes provide a proxy for both available resources, through associated vegetation and stone outcrops, and assist in understanding the suitability of the terrain and understanding soil profiles and other factors which influence the preservation of Aboriginal objects. Further detail is provided in the AR in Appendix A.

The Wiradjuri people of the Moolarben area would have made extensive and obvious use of the natural resources occurring within the Subject Area and the greater Moolarben area. The Moolarben area is a particularly biodiverse region, as it incorporates ecological traits and species of both the sandstone environments (woodlands and forests on sandstone ridges and plateau) to the east and the western slopes and plains (red soils, large rivers and pine woodland and forests) to the west. This richness and diversity means the Moolarben area would have been a valuable utilitarian, social and cultural asset for the Wiradjuri. Species of traditional and ongoing interest in the Wiradjuri economy include possums, kangaroos, wallabies, emus, wombats, lizards, snakes, goannas, birds, insects and a range of plant species (Pearson 1981: 335).

Many of these resources would have been available in the local landscape of the Subject Area, and motifs directly or abstractly representing many of these species are found in the Wiradjuri rock art of the Ulan area, speaking to both the social, utilitarian and possibly ceremonial importance of some of these plants and animals. Edible flora species likely found within the Subject Area and its surroundings include species of Yams (*Dioscorea*), Native Cherry (*Exocarpos cupressiformis*), Emu Bush (*Eremophila*), Scrub Nettle (*Urtica incisa*), Kurrajong roots (*Brachychiton populneus*), Geebung (*Persoonia*), Wild Tomatoes (*Solanum*), Bulbine Lily (*Bulbine bulbosa*) and Flax Lily (*Dianella*) (Hamm 2008a).



Plate 7: Open woodland on slopes looking towards cleared gully within the Subject Area.



Plate 8: Kurrajong, seen across the Subject Area has a range of cultural uses.



Plate 9: Nguuguung (Tawny frogmouth) observed in Subject Area.



Plate 10: Sydney coastal fig trees seen on upper slopes within the Subject Area.

As a whole, the Subject Area has had relatively little disturbance. Past land use and disturbance within the Subject Area includes vegetation clearance, predominately associated with the creation of access tracks and pastoral activities within gullies, open depressions, ridge crests and lower slopes. Graffiti from previous landholders can be found in a number of sandstone overhangs. Exploration drilling, slate quarrying or overburden placement and creation of rural infrastructure such as dams has also occurred in localised parts of the Subject Area. Burnt vegetation and fire affected sandstone overhangs within the Subject Area speak to a history of bush fires, vegetation clearance and lightning strikes. As a result of this past land use, culturally modified trees are less likely to have survived however, other material evidence of Aboriginal land use is likely to have survived, such as open artefact scatters on flat to gently inclined terrain such as gullies, valleys, ridgetops and saddles and sandstone overhangs suitable for habitation and art. The integrity of shelters and overhangs may be impacted by the history of vegetation clearance, grazing, rural use, fire and natural weathering.

The dominant environmental features of the Subject Area which may have influenced local Aboriginal occupation patterns, as described by Hamm (2008a) are:

- Moolarben Ridge south of Carr's Gap Trig Station.
- A series of gullies which have been formed as a result of erosion and run-off to the west of Murragamba Creek Valley with some shelter outcrops located on the edges of the gully features all facing east.
- Some sandstone tors and pinnacles located on the top of the ridge and lower mid slopes.

The ridgeline described above may have been used as a transit feature, especially at the northern end of the ridge where it forms a natural saddle allowing Aboriginal people to traverse across to both Moolarben and Murrumbidgee Creek catchments (Hamm 2008a).

2.4 Aboriginal occupation and land use of the Subject Area

The Subject Area is within the traditional country of Wiradjuri speaking people, close to boundaries with the Kamilaroi, Gweagal and Wonnarua speaking peoples (Tindale 1974, Horton 1994). Pearson (1981: 81) hypothesises three possible Wiradjuri speaking clans living at Bathurst, Wellington and Mudgee – Rylstone. The Subject Area most likely lies within the Mudgee - Rylstone group's area. Based on his review of historical sources, Pearson (1981: 75) suggested that most day to day activities were undertaken by groups of up to 20 individuals who came together into larger groups at certain times of the year to utilise a resource or undertake law or ceremonial activities.

The earliest evidence of Aboriginal occupation in the region was found at Granites 2 Shelter, located approximately 150 km south-west of the Subject Area, and dates to 7,000 years before present (Pearson 1981). A number of other archaeological excavations have been undertaken in the nearby area and resulted in dates of occupation in the last 5,000 years (Kuskie 2009).

A number of archaeological models for the distribution of material evidence of Aboriginal use of the landscape have been developed for the region. The purpose of archaeological models is to assist in the prediction of what Aboriginal sites may be present in the landscape and where they might be located. A review and analysis of AHIMS, ethnohistory, historical records and previous archaeological work within the Subject Area is provided in the AR (Appendix A).

The first archaeological model of the region was developed by Pearson (1981) through the analysis of sites in the Upper Macquarie. He identified a range of site types typical to the region including open artefact sites, scarred trees and grinding grooves, as well as the presence of ceremonial sites and burial sites.

From his data Pearson (1981) proposed that:

- Most sites would occur between 10 m and 500 m from water, with the largest sites occurring nearest to water.
- Good soil drainage, views over watercourses, level ground with shelter from winds and elevation above cold air were important factors in site location.
- The majority of sites were in places that would originally have been open woodlands with an adequate source of fuel.
- Burials and grinding grooves would be located as close to habitation as possible.
- Grinding grooves required the presence of suitable stone, such as sandstone.
- Burials were most likely to occur where soils were deep enough for internment.
- Ceremonial sites such as earth rings and stone arrangements would be situated away from campsites, potentially in isolated places, on small hills or knolls but also on flat land.
- There was no obvious patterning to the location of scarred and carved trees beyond proximity to water and occupation sites.
- Quarries may occur where suitable sources of stone were present and accessible.
- Camp sites were rarely used by Aboriginal people in the past for longer than three nights and that sites with extensive archaeological deposits represented accumulation of material over multiple visits.

This model has since been revised and refined as part of the many archaeological assessments that have been conducted as part of the environmental assessment and approval process for the three mines located within 10 km of the Subject Area: Ulan Coal Mine, Wilpinjong Coal Mine and the MCC. Further information regarding these assessments is provided in the AR (Appendix A).

Kuskie (2009, 2018) has posited a model of past Wiradjuri land-use which uses the concept of “resource zones” to interpret past use of the landscape. In this model higher value resource zones see the focus of more activity – both utilitarian, social and ceremonial – given these higher value zones are interpreted to have the capacity to sustain larger numbers of people for longer periods of time. Primary resource zones, which are the most valuable and most likely to have been used more extensively by Wiradjuri people in the past and therefore will have a more frequent and dense archaeological record, occur around major waterways and landscape features. Secondary resource zones occur around slightly smaller landscape features and waterways, usually in combination with each other and everything else in between these areas is a separate resource zone.

Activities that may have occurred in the Subject Area include food procurement and processing, food consumption, maintenance and production of tools, the building of shelter, children’s play and learning, creative activity, ceremonial activity, spiritual activity, burials and social and political activity by Aboriginal people.

The bulk of these activities would produce archaeological evidence; in particular stone artefact assemblages and the traces of use that can be directly or indirectly inferred from the artefacts. For instance, food procurement and processing might be evident through the presence of use-wear and residues on stone tools. Ceremonial activities may be evident by the presence of art, carved trees, bora grounds and stone arrangements.

The Subject Area, including both the Approved Mining Area and the UG2 Extended Mining Area, has found to have predominately moderate to steep gradient slopes and is distant from higher order watercourses. It forms a high point in the landscape and provides outlook over the surrounding valleys.

In Kuskie’s (2009, 2018) predictive model, the Subject Area falls outside of primary and secondary resource zones. It is hypothesised that Aboriginal use of the Subject Area was more likely to have related to hunting and gathering activities along with transitory movement as part of normal and seasonal movement between resources such as springs, Murragamba and Moolarben Creeks, stone sources and vegetation groups adapted to elevated terrain. Special purposes visits to visit significant sites such as S2MC236 (AHIMS ID#36-3-0134) are also likely. It is hypothesised that the basalt outcrops may have been used for sourcing material to make basalt stone tools, however links between the basalt caps and basalt flakes across MCC are yet to be investigated. Use of the Subject Area is predicted to generally have been of low intensity (Kuskie 2013b), with greater occupation occurring in the nearby secondary resource zones associated with Moolarben and Murragamba Creeks.

Accordingly, the past traces of Aboriginal land use are predicted to reflect this with the Subject Area containing a moderate number of sites, and sites that contain low to moderate numbers of artefacts and features. The Subject Area has the potential to contain both open sites and closed sites (rock shelters).

Rock shelter sites are likely to occur on the moderate to steep slopes and on the lower slopes and valley floors within the Subject Area where there are cliffs, scarps or large boulder falls that form shelters. Rock shelter sites may contain either individual features or a combination of features including: stone artefacts, archaeological or potential archaeological deposit; pigment rock-art; axe grinding grooves; grinding slabs.

Open sites are also likely to occur within the Subject Area, on flat to moderately inclined land at any topographic point in the landscape. Open sites may contain either individual features or a combination of features including; stone artefacts, archaeological or potential archaeological deposits, axe-grinding grooves, grinding slabs. Culturally modified trees may occur but are rare across the region.

The archaeological model predicts that most stone artefacts will be made of quartz due to its ease of access and availability in the local landscape. The model hypothesises that the relative intensity of use of each of the materials will be dependent on the proximity of the original source of the stone. Most stone procurement is hypothesised to have occurred during normal daily and seasonal movement without the need for special purpose visits. As a result of the abundance of available local stone, the stone is less likely to exhibit intensive reduction as evidence of conservation of material.

Most stone technology will be basic and non-specific (e.g. complete and broken flakes) with low frequencies of microblade or microlithic technologies, bipolar knapping, backing and use-wear.

Grinding grooves for the sharpening of ground edge axes may occur on exposed sandstone bedrock, but are unlikely to occur in high numbers within the Subject Area. Where they occur in areas of hills and ridges these occurrences would most likely represent occasional activity and short-term activities.

Through background research and literature reviews, searches of AHIMS, the MCO Aboriginal heritage sites database and heritage surveys undertaken at MCO to date (including for this ACHA) (Appendix A), a total of 42 Aboriginal heritage sites have been identified across the Subject Area (Table 5).

Five (5) Aboriginal heritage sites were identified in the UG2 Longwall Extended Mining Area (S2MC441, S2MC442, S2MC443, S2MC446 and SMC447), with the remaining 37 identified Aboriginal heritage sites falling within the UG2 Approved Mining Area.

Table 5: Summary of site types in Subject Area

Site types	Site Names (UG2 Approved Mining Area)	Site Names (UG2 Extended Mining Area)	Count of previously recorded sites	Count of new sites	Total count of sites
Artefacts (with/without PAD)			23	1	24
Artefacts	S1MC054, S1MC057, S1MC406, S1MC407, S2MC238, S2MC239, S2MC411, S2MC416, S2MC417, S2MC419, S2MC420	-	11		11
Isolated Artefact	S1MC074, S1MC075, S1MC076, S1MC077, S1MC438, S2MC237, S2MC412, S2MC413, S2MC414, S2MC415, S2MC418, S2MC438*	-	11	1	12
PAD	PAD 4		1		1
Rock Shelters			9	9	18
Rock Shelter with Artefacts	S1MC055, S1MC056,	S2MC447*	2	1	3

Site types	Site Names (UG2 Approved Mining Area)	Site Names (UG2 Extended Mining Area)	Count of previously recorded sites	Count of new sites	Total count of sites
Rock Shelter with Artefacts and PAD	PAD 8, S2MC440*	S2MC441*, S2MC442*, S2MC443*, S2MC446*	1	5	6
Rock Shelter with PAD	PAD 5, PAD 9, PAD 10, PAD 11, S1MC409, S2MC439*, S2MC444*, S2MC445*		5	3	8
Rock Shelter with Art and Artefacts	S2MC236		1		1

*Newly identified sites

Ridgelines within the Subject Area provide a suitable landscape for the formation and use of overhangs and rock shelters.

Aboriginal cultural heritage site S2MC236, a Rock Shelter with Art and Artefacts, provides a highly significant cultural location within the Subject Area (Plates 11 to 13). The presence of art and nine grinding dishes and a quartz flake within the shelter show the long-term occupation of the site. The location of the Rock Shelter at the top of a cliff line provided a vantage point of water courses and other features within the surrounding landscape.

Examples of other Rock Shelters with Artefacts and/or PAD, identified in 2021, are provided in Plates 14 to 21.



Plate 11: S2MC236 (AHIMS ID#36-3-0134) general location (Source: Hamm 2008b).



Plate 12: S2MC236 (AHIMS ID#36-3-0134) showing site and art panels (Source: Hamm 2008b).



Plate 13: Art stencils at S2MC236 (AHIMS ID#36-3-0136) (Source: Hamm 2008b).



Plate 14: S2MC440, Rock Shelter with Artefact and PAD, facing north-east.



Plate 15: Quartz complete flake located at S2MC440.



Plate 16: S2MC441, Rock Shelter with Artefacts and PAD, facing south-east.



Plate 17: Quartz flake located at site S2MC441.



Plate 18: S2MC446, Rock Shelter with Artefact and PADs, facing south, artefact located in foreground.



Plate 19: Baked chert flake located at site S2MC446.



Plate 20: S2MC447, Rock Shelter with artefacts, facing north-west.



Plate 21: Quartz flake located at site S2MC447.

In addition, a number of sandstone overhangs are present with PAD, some with relatively minor animal disturbance and good outlook across the landscape.



Plate 22: S2MC443 and S2MC442 facing east.



Plate 23: General photo of view from S2MC443 facing south.

In summary, material evidence of Aboriginal land use of the Subject Area in the past includes:

- Significant art at S2MC236 (including motifs of macropods, reptiles and wombats).

- Quartz stone artefact use and discard with occasional discard of other raw materials such as tuff, chert and basalt in both open settings and in sandstone overhangs.
- Cooking as indicated by charcoal and potential hearths (S2MC236).
- Plant processing as indicated by the presence of grinding stones (S2MC236).
- Longer term or more frequent use of S2MC238.
- Visitation in proximity to a potential basalt source.

During the 1820s, increasing European settlement along the Cudgegong River and from Mudgee to Wellington resulted in increasing upheaval to traditional Aboriginal practices. Hostilities between the local Aboriginal population and non-Indigenous settlers peaked between 1824 and 1826 with the advent of martial law by Governor Brisbane and resistance from Windradyne, a Wiradjuri man (Haglund 1999). Settlement increased with the gold rush between the 1850s and 1870s, causing further displacement of the local Aboriginal population and reducing access to traditional sites, cultural practices and resources.

Today, Aboriginal people continue to live in the district and maintain a strong spiritual connection to Country and are actively engaged in the continuation and management of Country and cultural heritage within the MCC area. Work undertaken in the Subject Area by the RAPs is further outlined in Section 3 of this ACHA and previous ACHAs within the UG2 area (see also Appendix A).

3. Consultation process

In administering its statutory functions under Part 6 of the NPW Act, Heritage NSW requires that proponents consult with Aboriginal people about the Aboriginal cultural heritage values (cultural significance) of Aboriginal objects and/or places within any given development area, in accordance with subclause 60(1) of the NPW Regulation.

Heritage NSW maintains that the objective of consultation with Aboriginal communities about the cultural heritage values of Aboriginal objects and places is to ensure that Aboriginal people have the opportunity to improve Aboriginal cultural heritage assessment outcomes (DECCW 2010b) through creating opportunities for RAPs to:

- Provide relevant information about the cultural significance and values of Aboriginal objects and /or places.
- Inform the design of the methodology to assess cultural and significance of Aboriginal objects and/or places.
- Actively contribute to the development of cultural heritage management options and recommendations for any Aboriginal objects and/or places within the proposed Subject Area.
- Comment on draft assessment reports before they are submitted by the Proponent to the Heritage NSW.

Consultation in the form outlined in the Consultation Requirements (DECCW 2010b) is a formal requirement in cases where a proponent is aware that their development activity has the potential to harm Aboriginal objects or places. Heritage NSW also recommends that these requirements be used when the certainty of harm is not yet established but a proponent has, through some formal development mechanism, been required to undertake a cultural heritage assessment to establish the potential harm their proposal may have on Aboriginal objects and/or places.

The Consultation Requirements outline a four-stage consultation process that includes detailed step-by-step guidance as to the aim of the stage, how it should proceed, and what actions are necessary for it to be considered successfully completed. The four stages are:

- Stage 1 – Notification of project proposal and registration of interest.
- Stage 2 – Presentation of information about the proposed project.
- Stage 3 – Gathering information about the cultural significance of the project area.
- Stage 4 – Review of the draft ACHA report.

The Consultation Requirements also outline the roles and responsibilities of Heritage NSW, RAPs including Local and State Aboriginal Land Councils, and Proponents throughout the consultation process.

To meet the requirements of consultation it is expected that the Proponent will:

- Bring the RAPs (or their nominated representatives) together and be responsible for ensuring appropriate administration and management of the consultation process.
- Consider the cultural perspectives, views, knowledge and advice of the RAPs involved in the consultation process when they assess cultural significance and work together to develop any heritage management outcomes for Aboriginal object(s) and/or place(s).
- Provide evidence to Heritage NSW of consultation by including information such as cultural perspectives, views, knowledge and advice provided by the RAPs.

- Accurately record and clearly articulate all consultation findings in the final cultural heritage assessment report.
- Provide copies of their final cultural heritage assessment report to the RAPs who have been consulted.

The consultation process is undertaken to seek active involvement from appropriate Aboriginal representatives for the UG2 Modification in accordance with the Consultation Requirements. Section 1.3 of the Consultation Requirements describes the guiding principles of the document, which have been derived directly from the Principles section of the Australian Heritage Commission’s *Ask First: A guide to respecting Indigenous heritage places and values* (Australian Heritage Commission 2002). Both documents share the aim of creating a system where advice can be sought from the Aboriginal community.

The following sections outline the process and results of the consultation conducted during this assessment to ascertain and reflect the Aboriginal cultural heritage values of the Subject Area. Further detail regarding the Aboriginal community consultation process is outlined in Appendix B.

3.1 Stage 1 – Notification of project proposal and registration of interest

This stage of the consultation process is used to identify any Aboriginal people or groups who may have a cultural interest and possess cultural knowledge in the subject area. Aboriginal stakeholder groups with an interest in the MCC have been identified during the Stage 1 and 2 Project Approvals (in compliance with the Consultation Requirements).

For the UG2 Modification the existing RAPs (summarised in Table 6), were notified of the project proposal and consulted.

Table 6: Registered Aboriginal Party organisations and contacts

Organisation	Contact Name
Mudgee Local Aboriginal Land Council	Tony Lonsdale
Murong Gialinga Aboriginal and Torres Strait Islander Corporation	Larry and Debbie Foley
North East Wiradjuri Company Ltd	Martin De Launey
Warrabinga Native Title Claimants Aboriginal Corporation	Jack Pennell
Wellington Valley Wiradjuri Aboriginal Corporation	Bradley Bliss
Individual	Craig McConnell
Individual	Aleshia Lonsdale
Individual	Warranha Ngumbaay

3.2 Stage 2 and 3 – Presentation of project information, assessment methodology and gathering information about the cultural significance of the Subject Area

3.2.1 Project information and assessment methodology

The RAPs were provided with a letter outlining information about the project and an assessment methodology in accordance with the Consultation Requirements (DECCW 2010a) and the Code of Practice (DECCW 2010b). The project information was provided on 22 April 2021.

The purpose of the provided documents was to:

- Describe the project, outline the project scope, time frame and proposed works.
- Describe the environment of the Subject Area and information relevant to the ACHA process.

- Provide an opportunity for the RAPs to understand the process and comment on the Proposed Methodology.
- Set a time frame for providing feedback and comments on the Methodology and project information.

The draft methodology was submitted to the RAPs on 22 April 2021 and the closing date for comments was at 5 pm, 21 May 2021 (to meet the minimum 28 days review period). A copy of the cover letter and methodology is included in Appendix B.

An information session was held on Monday 10 May 2021 at the Parklands Resort and Conference Centre to review the Project Information and Methodology and provide stakeholders a chance to provide feedback. All copies of submissions, minutes and the presentation are included in full in Appendix B.

Feedback was provided by RAPs on the project information and Proposed Methodology. Their comments and/or review are outlined in Table 7, and copies of all submissions made are included in full in Appendix B.

Table 7: Details of Registered Aboriginal Party feedback on the project information and Proposed Methodology

RAP	Representative	Comment made	Response
Wellington Valley Wiradjuri Aboriginal Corporation	Bradley Bliss	<p>Dear Mr Cini,</p> <p>Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC) would like to thank you for your invitation to provide a response for This Aboriginal Cultural Heritage issue relevant to obligations to protect our Heritage within our Traditional Lands. Wellington Valley Wiradjuri represent the fourteen traditional families with identified apical ancestry pre European occupation with our known Traditional Lands. We know our culture, country and continue with our association with our traditional lands (Ngurangbang).</p> <p>WVWAC object to any other non-traditional aboriginal organizations or people taking part in site surveys, consultation and assessments within our defined Traditional Lands. These non-traditional people and groups are outsiders under Traditional Lore and have no right to advise on or to be present during consultation or site visits as they do not possess the specific traditional knowledge in relation to these lands or sites. These participants may be indigenous and may live locally within the region however, this still does not give them the right to disregard Traditional Lore and values.</p> <p>Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC) have through consultation with other Traditional Elders and Traditional Community with cultural knowledge have the following comments and or recommendations:</p> <p><i>ATTACHMENT A: UG2 MODIFICATION ABORIGINAL CULTURAL HERITAGE ASSESSMENT PROPOSED METHODOLOGY.</i></p> <p><i>Proposed Modification, pp 1-3.</i></p> <p><i>“In summary, the UG2 Modification would involve:</i></p>	<p>Thankyou for your contribution to this assessment.</p> <p>MCO continues to consult with the RAPs for the project in accordance with the <i>Aboriginal community consultation requirements for proponents 2010</i> and the HMP (MCO 2020).</p>

RAP	Representative	Comment made	Response
		<ul style="list-style-type: none"> • <i>Extension in length of two longwalls (referred to as LW201 and LW202a/b [previously referred to as LW12A and LW11, respectively]) within ML 1715.</i> • <i>Increase in extraction height up to 3.5 m across the entire UG2 mining domain.</i> • <i>Minor increase in longwall void width from 305 m up to 311 m.</i> • <i>Increase in run-of-mine (ROM) coal extraction of 3.8 million tonnes (Mt) to a total of 13.2 Mt from UG2.</i> • <i>Minor reduction in approved extent of OC4 to accommodate extended UG2 longwall (LW201).</i> <ul style="list-style-type: none"> • <i>No additional surface disturbance.</i> • <i>No change to annual combined underground production rate of up to 8 Mtpa run-of-mine (ROM) coal.</i> • <i>Revised layout of LW202a/b due to geological constraints and to maintain existing Project Approval (08_0135) subsidence performance measure relating to Aboriginal cultural heritage site S2MC 236 and cliffs (i.e. negligible subsidence impacts or environmental consequences), including step around cliff feature C9 and section of non-subsiding secondary workings.</i> • <i>No change to access to UG2 via UG1”.</i> <p>Of the above summary of the modification, WVVAC only support the 3rd last point of No additional surface disturbance.</p>	<p>It is acknowledged that WVVAC only supports no additional surface disturbance and strongly objects to the proposed modification.</p>
		<p>WVVAC have concerns around the affect that this modification will have on the ground profile, hydrology both surface and sub surface, the flora and fauna in this proposed modification area and the subsidence post mining and longer term. There are serious questions as to why our people are not out on the ecological assessments to give our input during these phases.</p>	<p>During the public exhibition period for the UG2 Modification, all RAPs will have a further opportunity to review and provide additional comment on the final ACHA report as well as other technical reports supporting the EA, such as but not limited to the biodiversity assessment, hydrology assessment and subsidence impact assessment.</p>
		<p>Comments were received that Aboriginal Cultural Heritage is not just about artefacts and sites, it is about holistic environmental management as our Ancestors did who walked on and used the land your company currently occupies.</p>	<p>This comment is acknowledged and has been incorporated in the statements of cultural value for the project in Section 5.</p>
		<p><i>Proposed Assessment Methodology, pg. 8.</i> <i>“Landforms deemed to hold a low potential for sites, based on results of an updated NSW Aboriginal Heritage Information Management System (AHIMS) search and previous archaeological surveys, will be sampled to a relatively lesser degree”.</i></p>	
		<p>WVVAC objects to this comment, as there may be additional archaeology, intangible cultural items and or cultural use resources found in these areas, as</p>	<p>Survey coverage is presented in Section 8 of the AR (Appendix A).</p>

RAP	Representative	Comment made	Response
		<p>such must be surveyed to the same degree as all other sections of this assessment area.</p> <p><i>“Feedback from Registered Aboriginal Parties regarding the heritage values of the Study Area and sites during the survey will be noted”.</i></p> <p>The feedback from RAPs, MUST be recorded exactly and ALL comments published in the report, not just those deemed suitable, appropriate or useable by the archaeologist to fit their needs.</p>	<p>Feedback regarding the cultural significance and values of the Subject Area provided during the survey have been incorporated into this report in Section 5.</p>
		<ul style="list-style-type: none"> • <i>“An archaeological assessment (including an archaeological significance assessment) of any known or potential Wiradjuri heritage sites identified within the Study Area (which may include the use of existing information)”.</i> • <i>“A request by MCO to Registered Aboriginal Parties for comments regarding the cultural significance of Wiradjuri heritage sites and/or areas within the Study Area”.</i> <p>We are of the belief that archaeologist constantly downgrade the “archaeological significance assessment” as they do not take into account the overall site context, merely concentrate on the individual artefacts types and materials found in them.</p>	<p>Noted.</p>
		<p>In regards to Cultural Significance of an artefact or collective cultural site, again we are of the belief that archaeologist constantly downgrade the significance to us as a people and those of us who are descendants of the clan groups whom these historical objects or cultural sites belonged to or were used by.</p>	<p>Noted.</p>
		<p>There are multiple places or areas of cultural significance within the Moolarben Coal Mine Project area, however when raised over the past decade, this information has been disregarded, downplayed or deemed not of interest by Archaeologists and MCO employees. Only Warrabinga and or Newco representatives or their Executive is listened to, to us it appears that the rest of the RAP’s out in the field are there as token insolvent only.</p>	<p>Consultation for the ACHA has been undertaken in accordance with the Consultation Requirements and subclause 60(1) of the NPW Regulation. The correspondence and comments provided by WVVAC and other RAPs to date have been included in full in Appendix B and considered in detail in this section.</p> <p>All relevant comments received during project information and Proposed Methodology will be considered, including any necessary updates and/or clarification in the report where required.</p> <p>A copy of the draft ACHA report will be made available to all RAPs as part of this consultation process.</p>

RAP	Representative	Comment made	Response
			<p>A copy of the final ACHA report will be made available to all RAPS during the public exhibition period for the UG2 Modification EA. During this exhibition period all RAPS will have a further opportunity to review and provide additional comment on the final ACHA report as well as other technical reports supporting the EA, such as but not limited to the biodiversity assessment, hydrology assessment and subsidence impact assessment.</p>
		<p><i>An example of this was when WVVAC CEO and Senior Field Officer Brad Bliss during cultural heritage survey of OC4 area informed Mr. Cini and Niche Archaeologists Mr. Jamie Reeves and Miss Clare Anderson of a rock shelter with art that was possibly in the OC4 area. Copies of documents were given, nothing further was done nor any feedback as to if this shelter had been found by Kusky or Hamm previously.</i></p> <p><i>Matthews, R.H., Proceedings of Royal Society of Victoria, Vol II, January 1895 pg. 150 Plate VIII., Fig. 5.—</i></p> <p><i>“This large rock shelter is situated in an escarpment of sandstone rock, about three-quarters of a mile southerly from Portion No. 4, of 40 acres, in the Parish of Wilpinjong, County of Phillip. Its length is 79 feet, 25 feet deep from the front inwards, 6 feet 6 inches high where the roof meets the back wall, and increases in height outwards towards the front. The cave faces the north-east”.</i></p>	<p>Thank you for the provision of additional information regarding S2MC236 (AHIMS ID#36-3-0016, 36-3-00134).</p> <p>S2MC236 is located within the Rock Shelter Management Area within the UG2 Approved Mining Area. This highly significant shelter was re-recorded by Hamm (2008a) as part of the Stage 2 ACHA. Protections for this site are recognised in the Rock Shelter Management Area and subsidence performance measures included in the Project Approval (08_0135) and formalised in the HMP (MCO 2020). Additional information about this shelter is presented in Sections 2.2, 4, 5, 6 and 7.</p>
		<p>Critical Timeframes pg. 10</p> <p>WVVAC have concern over the critical timeframe dates provided by MCO for the project, as feedback for the methodology is set for 20th May when the survey has already been conducted 11-12th May. So that any recommendations or information that may have been given are rendered useless as the field component has already been completed 8 day prior to the feedback cut-off date</p>	<p>Noted.</p> <p>Where additional assessment requirements are identified during the review of the Methodology or additional survey requirements are identified, this will be considered and incorporated into the final assessment methodology, where appropriate. There is no regulatory requirement to conduct the surveys subsequent to the expiry of the Proposed Methodology review period (noting that the Proposed Methodology refers to more than just the archaeological survey, and provides a methodology for the progression of the assessment).</p>
		<p>WVVAC Strongly Object to the MCC UG2 Modification.</p>	<p>WVVAC’s objection to the UG2 modification is acknowledged and incorporated into Section 6 and Section 7 of this report.</p>

3.2.2 Archaeological survey

A cultural heritage survey was completed for the project with representatives from the RAPs. Those who participated are provided in Table 8. Survey coverage is shown in Figure 7.

Table 8: Archaeological survey participants

Organisation	Representative	Contribution	Attendance
Moolarben Coal Operations, Native Title Cultural Heritage Officer	Emma Syme	Survey participant	11-12 May 2021
Warrabinga Native Title Claimants Aboriginal Corporation	Tyron Pennell	Survey participant	11-12 May 2021

All survey participants noted the scale of the shelters and the landscape, the outlook across the scenery, the connection between the ridge and S2MC236 and the suitability of many shelters for occupation and art. Survey participants noted that it was surprising that no further art and not many artefacts were identified, and it was discussed whether this might be the result of the increased vegetation after a wet period and the impact of fires and natural weathering of the sandstone shelters.

Tyron Pennell requested that overhang field code: cA12 be recorded due to the presence of multiple grooves on blockfall at western end of shelter outside drip line. Two possible grooves were identified. It was noted during the recording that the grooves are following the bedding of the sandstone, were not smooth due to conglomerate inclusions and followed a similar pattern of weathering to adjacent sandstone and above, however are smoother due to exposure to rain, and water. The shelter was recorded and photographed but has not been registered as an Aboriginal heritage site.

Numerous plants and animal species were observed with known cultural uses and associations, including but not limited to:

- Kurrajong.
- Bush tomatoes.
- Owls, including Powerful owl and Tawny frogmouth.

3.3 Stage 4 – Review of draft Aboriginal cultural heritage assessment report

3.3.1 Information Session

A project information session was held on Friday 5 November 2021 at The Horatio Motel, Mudgee to review the draft ACHA and provide stakeholders a chance to provide feedback. A list of attendees is provided in Table 9. All copies of submissions, minutes and presentation are included in full in Appendix B.

Table 9: ACHA review information session participants

Organisation	Representative
Murong Gialinga Aboriginal and Torres Strait Islander Corporation	Larry Foley
Murong Gialinga Aboriginal and Torres Strait Islander Corporation	Debbie Foley
North East Wiradjuri Company Ltd	Martin de Launey
Guest	Pauline de Launey
Moolarben Coal Operations, Native Title Cultural Heritage Officer	Emma Syme
Niche Environment and Heritage	Clare Anderson
Yancoal – Moolarben Coal Operations	Trent Cini

Organisation	Representative
Yancoal – Moolarben Coal Operations	Mat Croake

3.3.2 Draft ACHA

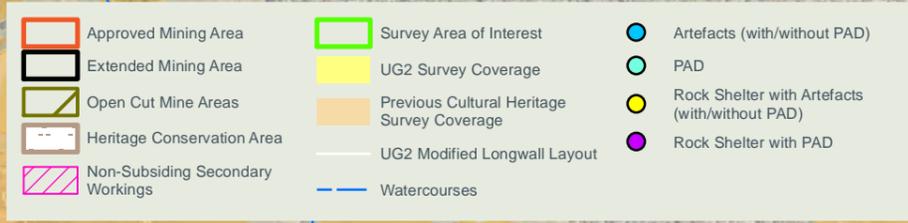
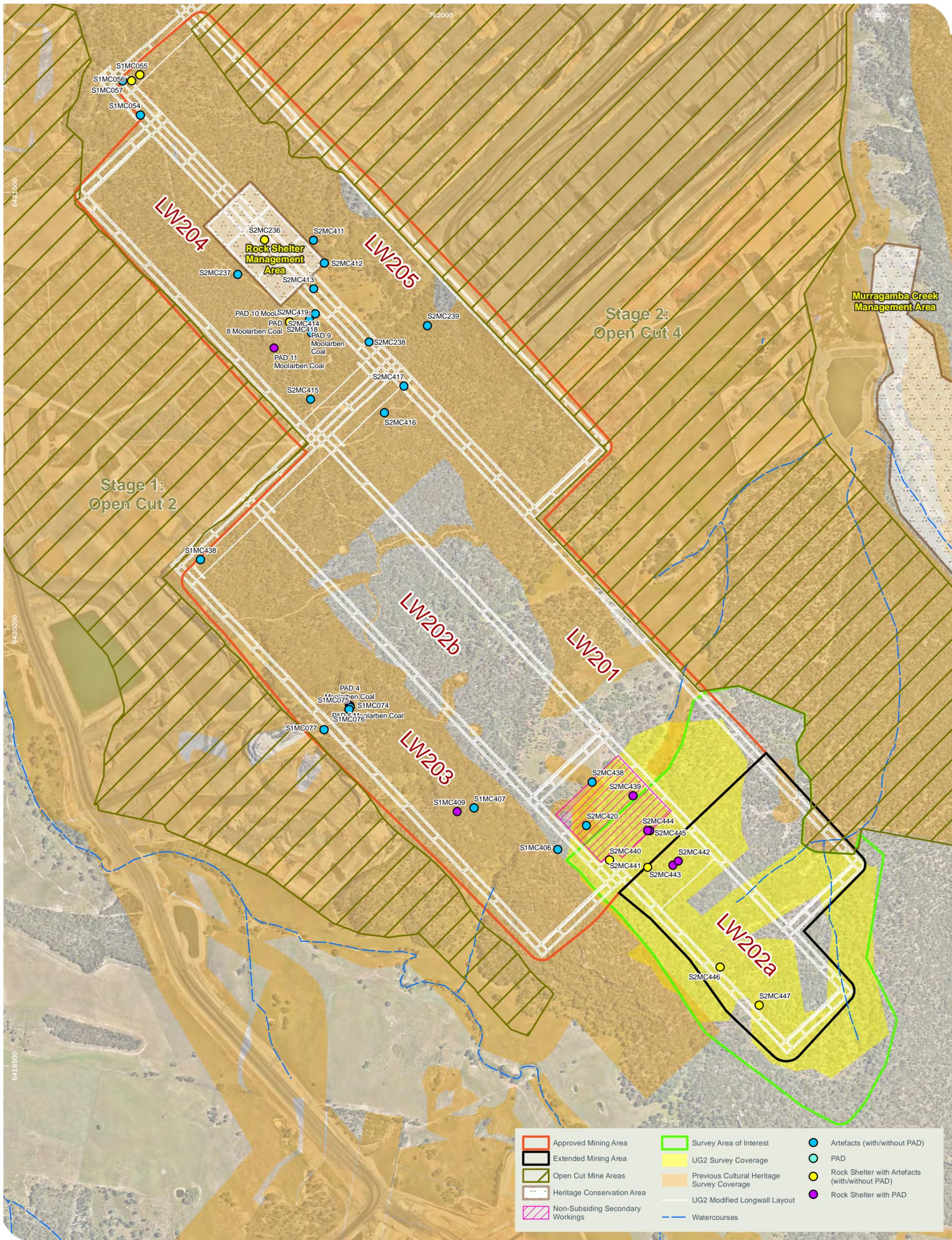
The draft ACHA was submitted to the RAPs on 15 October 2021 for review and comment. The closing date for comments was at 5 pm, 12 November 2021 (28 days).

Feedback was provided by RAPs on the draft ACHA. Their comments and/or review are outlined in Table 10, and copies of all submissions made are included in full in Appendix B.

Table 10: Details of Registered Aboriginal Party feedback on the draft ACHA report

RAP	Representative	Comment made	Response
Murong Gialinga Aboriginal and Torres Strait Islander Corporation	Debbie Foley	Murong Gialinga have reviewed the UG2 ACHA report, Any Aboriginal Object to be impacted are to be collected and stored in the Keeping place, and returned to country in close proximity to the original place in the future	<p>Thankyou for your response and input into the management and mitigation measures.</p> <p>Noted.</p> <p>Aboriginal Objects would be managed in accordance with Section 5 of the HMP (MCO 2020), Recommendations for surface collection and test excavation of Aboriginal objects are provided in Table 17.</p> <p>Section 5.13 of the HMP outlines that the management of sites in the Keeping Place following completion of mining activities at the Moolarben Coal Complex will be determined in consultation with the RAPs. This may include (but is not limited to) the permanent transferral of Aboriginal objects to a RAP, transferral to another party for storage and/or display (such as a local museum, historical society or educational institution) and/or the relocation of the objects on the rehabilitated land (MCO 2020).</p>
North East Wiradjuri Company Ltd	Martin de Launey	<p>In response to the Moolarben UG2 and OC3 Extension and EI Assessment, I make the following comments:</p> <p>I received no Draft ACHA copy for UG2 said to be sent on 15/10/21 until 27/10/21; I deem this unethical and restricts my understanding of all the issues required within the 214 pages, being covered succinctly. Therefore, my response will be limited to the information I have been able to absorb</p>	<p>Thankyou for your response and input into the management and mitigation measures..</p> <p>A copy of the draft ACHA was sent to North East Wiradjuri Company Ltd's contact details as provided by the organisation on 15 October 2021.</p>

RAP	Representative	Comment made	Response
		<p>within the given timeframe perimeter and thankfully, the RAP Information Session I attended on 5/11/21, provided me with more insight.</p> <p>I largely disagree with current endemic archaeological nomenclature, which (in this case) considers the huge majority of archaeological evidence as of “Low Significance”; I fear that the interpretation by the layman of aboriginal occupation of this region, would be assumed to be of minimal importance. We are a society where a web of archaeology connects us holistically within mechanical obligation and connectivity, as well as an aesthetically spiritual dimension (eg. Like identifying with a language/sound - or it’s absence in a family unit) which is rarely validated by non-believers.</p> <p>Anyway, apart from disagreeing with the majority of sites having been determined of Low Significance - without thorough investigation within and on the outside precinct of shelter/cave sites. I am content with the mitigation measures proposed for site S2MC236, and also with monitoring and archaeological excavation of Section 5.6 of HMP prior to extraction; I am also satisfied with the “Setback” border of LW 202a and LW202b.</p> <p>Overall, the proposed mitigation measures for limiting impact to our available, evidential cultural heritage, appears to be in good faith and viable at this stage of the Assessment.</p>	<p>All sites have been assessed as having high cultural value to the Registered Aboriginal Parties. A Statement of Significance which incorporates the social, cultural, aesthetic, historic and scientific values outlined in the Burra Charter is provided in Section 5.3 of this ACHA.</p> <p>Section 5.1.1.3 of this ACHA outlines that the process followed for undertaking the archaeological significance and acknowledges that this procedure stems from compliance with the current heritage guidelines and that grading of heritage values, scientific or otherwise, is a process which does not have support from the RAPs as it can emphasize the values of individual components of a landscape rather than the cultural landscape as a whole.</p> <p>Significance assessments of sites were undertaken after site inspection and a process of consultation outlined in Hamm (2006), Hamm (2008) and this assessment.</p> <p>Notwithstanding the outcomes of this assessment and classification of some of the identified archaeological sites and objects as having Low Scientific Significance, MCO acknowledges that this assessment in no way diminishes the recognition or significance of Aboriginal peoples connection and use of the land and its resources in the vicinity of the Moolarben Coal Complex.</p> <p>Noted.</p>
Wellington Valley Wiradjuri Aboriginal Corporation	Bradley Bliss	<p>Unfortunately I am unable to attend any meetings as I have other commitments. I have asked others for feedback on the various reports that have been sent and to date I have had no response. I will try to give feedback however it is unlikely to make the timeframe you require.</p>	<p>Noted.</p>



4. Summary and analysis of background information

The Subject Area sits in the far north-eastern area of the Wiradjuri Nation, who's land extended across an extensive portion of NSW incorporating the Lachlan, Macquarie and Murrumbidgee Rivers and taking in the woodlands of the Riverina, the western slopes and plains including Griffith and Wagga Wagga and as far west as Mossgiel, south to the Murray River, east to the Great Diving Range and north to Dubbo and Mudgee. The area around Mudgee is a region of high biodiversity, incorporating aspects of both the Wollemi forests to the east, and the red-soil slopes and plains woodlands to the west. The Subject Area has found to have predominately moderate to steep gradient slopes and is distant from higher order watercourses. It forms a high point in the landscape and provides outlook over the surrounding valleys and watercourses.

The RAPs maintain a strong relationship with their traditional lands and have stated that all Aboriginal cultural landscapes and heritage sites at the MCC, known or otherwise, have high cultural significance. This statement was reiterated through comments received from WVVAC for this assessment that *“Aboriginal Cultural Heritage is not just about artefacts and sites, it is about holistic environmental management as our Ancestors did who walked on and used the land your company currently occupies”*.

Consultation and engagement regarding Aboriginal cultural heritage values in the UG2 Approved Mining Area has previously been undertaken as part of the Stage 2 ACHA (Hamm 2008a). Comments by RAPs are provided in full in Hamm (2008b). In addition, a number of oral history interviews were conducted as part of the Stage 2 assessment (Appendix 4, Hamm 2008b).

The RAPs have further previously identified that the ridge south of Carr's Gap has cultural value (Hamm 2008a, Kuskie 2013b). In particular, Aboriginal cultural heritage site S2MC236 (AHIMS ID#36-3-0016 and 36-3-0134), a Rock Shelter with Art and Artefacts, located above the UG2 Approved Mining Area is identified as having high significance at a regional scale (see Section 6). A Rock Shelter Management Area has previously been established (Figure 2), which involved the redesign of the longwall layout to reduce the likelihood of subsidence impacts, and controls to minimise harm to the site have been put in place through the MCO HMP (MCO 2020). These controls include monitoring of subsidence (Section 5.9.1 of the HMP) and blast vibration (Section 5.9.2 of the HMP). The significance of S2MC236 cannot be understated.

The Ulan area has been the subject of intensive archaeological and cultural heritage assessment over the last 20 years, driven mostly by the development of the Ulan, Moolarben and Wilpinjong Coal mines. The archaeological record, therefore, is reasonably well understood, and the archaeological expectations of the Subject Area can be readily and confidently characterised based on the extensive previous findings.

Prior to this assessment 75% (243 hectares [ha]) of the UG2 Approved Mining Area had been surveyed and 6% (6 ha of the UG2 Extended Mining Area had been surveyed). A sampling strategy was developed based on a larger study area than the final Modified Layout, targeting landforms likely to contain features that may be impacted by subsidence, resulting in an additional 70 ha of survey. The survey achieved a good level of survey coverage across the proposed UG2 Extended Mining Area, increasing survey coverage from 6% to 76% (35 ha) in the UG2 Extended Mining Area and from 76% to 80% (260 ha) in the UG2 Approved Mining Area. This survey coverage is consistent with other Modifications at the MCC. All features, such as potential rock shelters, boulders and tor-like structures that were present within the surveyed area for evidence of past Aboriginal land use. As a result of surveys undertaken, see Appendix A, a total of 42 Aboriginal heritage sites, have been identified across the Subject Area.

In the predictive model developed by Kuskie (2009, 2018) and applied to MCC, much of the Subject Area falls outside of primary and secondary resource zones. It is hypothesised that Aboriginal use of the Subject Area was more likely to have related to hunting and gathering activities along with transitory movement as part of normal and seasonal movement between resources such as springs, Murragamba and Moolarben Creeks, stone sources and vegetation groups adapted to elevated terrain. Special purposes visits to visit significant sites such as S2MC236 are also likely. It is hypothesised that the basalt outcrops may have been used for sourcing material to make basalt stone tools, however links between the basalt caps and basalt flakes across MCC are yet to be investigated. Use of the Subject Area is predicted to generally have been of low intensity (Kuskie 2013b), with greater occupation occurring in the nearby secondary resource zones associated with Moolarben and Murragamba Creeks.

The results of the archaeological assessment generally reflected this. The scale, outlook and suitability of rock shelters for occupation and use was noted throughout the area surveyed by survey participants. Multiple rock shelters were of a sufficient size and had surfaces that would have been suitable for art. Despite this, no art was located and relatively few rock shelters contained visible stone artefacts. It was the sense of the survey participants that the absence of evidence may be the result of weathering, impacts from fire and exfoliation of surfaces and low visibility within rock shelters. It has also been hypothesised that with the exception of the Rock Shelter Management Area, there was lower intensity use of these shelters (Hamm 2008a).

5. Cultural heritage values and statement of significance

5.1 Assessment framework

The Burra Charter (Australia ICOMOS 2013) defines the basic principles and procedures to be observed in the conservation of important places. It provides the primary framework within which decisions about the management of heritage sites in Australia should be made.

The NSW Aboriginal cultural heritage regulatory framework supports the significance assessment of Aboriginal archaeological sites and provides guidelines for this ACHA within the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011). The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) outlines two main themes in the overall Aboriginal cultural heritage significance assessment process, namely, the identification of the cultural/social significance of Aboriginal objects and/or places to Aboriginal people and the identification of the scientific (archaeological) significance to the scientific/research community. These themes encapsulate those aspects of the Burra Charter that are of particular relevance to Aboriginal objects and places.

5.1.1 Assessing values and significance

This stage is used to assess and discuss the cultural significance of the values identified during the identification and assessment of cultural significance by consulting Aboriginal people and to prepare a statement of significance. The assessment of values is a discussion of what is significant and why. An assessment of values is more than simply restating the evidence collected during the background review and identification of values stages of the project. Rather, the assessment should lead to a statement of significance that sets out succinct and salient values that have been identified.

5.1.1.1 Cultural significance

The Burra Charter defines cultural significance as being derived from the following values: aesthetic value, historic value, scientific value and social value. However, more precise categories may be developed as an understanding of a particular place or site increases. The values are outlined below in Table 11.

Table 11: Values from which cultural significance is derived

Value type	Description
Aesthetic Value	Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use.
Historic Value	Historic value encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives <i>in situ</i> , or where the setting are substantially intact, than where it has been changed or evidence does not survive. However, some events or association may be so important that the place retains significance regardless of subsequent treatment.
Scientific Value	The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness (conservation value), and on the degree to which the place may contribute further substantial information.
Social Value	Social or cultural value refers to the spiritual, traditional, historical or contemporary associations and attachments the place or area has for Aboriginal people. Social or cultural value is how people express their connection with a place and the meaning that place has for them. Places of social or cultural value have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events.

Value type	Description
	Communities and individuals can experience a sense of loss should a place of social or cultural value be damaged or destroyed.

5.1.1.2 Scientific significance

The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) specifies that information about scientific values will be gathered through archaeological investigation carried out according to the Code of Practice (DECCW 2010b). The Code of Practice (DECCW 2010b) itself does not specify criteria for assessment of Aboriginal objects, but rather suggests to “identify the archaeological values and assess their significance.” The assessment must be supportable and the assessment criteria must reflect best practice assessment processes as set out in the Burra Charter. The scientific values described in the Burra Charter were considered further by the then NSW National Parks and Wildlife Service in their *Aboriginal Cultural Heritage Standards and Guidelines Kit* (DEC 1997). In lieu of specific criteria, the advice from the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (DEC 1997) is summarised and paraphrased below to provide guidance to the assessment of scientific values.

Table 12: Criteria for assessing scientific value

Scientific Value	Description
Research potential	It is the potential to elucidate past behaviour which gives significance under this criterion rather than the potential to yield collections of artefacts. Matters considered under this criterion include the intactness of a site, the potential for the site to build a chronology and the connectedness of the site to other sites in the archaeological landscape.
Representativeness	As a criterion, representativeness is only meaningful in relation to a conservation objective. Presumably all sites are representative of those in their class or they would not be in that class. What is at issue is the extent to which a class of sites is conserved and whether the particular site being assessed should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole. The conservation objective which underwrites the ‘representativeness’ criteria is that such a sample should be conserved.
Rarity	This criterion cannot easily be separated from that of representativeness. If a site is ‘distinctive’ then by definition, it will be part of the variability which a representative sample would represent. The criteria might best be approached as one which exists within the criteria of representativeness, giving a particular weighting to certain classes of site. The main requirement for being able to assess rarity is to determine what is common and what is unusual in the archaeological record, but also the way that archaeology confers prestige on certain sites because of their ability to provide certain information. Items may be common, uncommon or rare. The criterion of rarity may be assessed at a range of levels including local, regional, state, national, and global.
Educational potential	This criterion relates to the ability of the cultural heritage item or place to inform and/or educate people about one or other aspects of the past. It incorporates notions of intactness, relevance, interpretative value and accessibility. Where archaeologists or others carrying out cultural heritage assessments are promoting/advocating the educational value of a cultural heritage item or place it is imperative that public input and support for this value is achieved and sought. Without public input and support the educative value of the items/places is likely to not ever be fully realised.
Aesthetics	In relation to heritage places, aesthetic significance is generally taken to mean the visual beauty of the place. Aesthetic value is not inherent in a place but arises in the sensory response people have to it. The guidelines provide no expectation for archaeologists to consider aesthetic values, it is often the case that the aesthetics including the physical setting of an archaeological site or a landscape contributes to its cultural heritage significance. Examples of archaeological sites that may have high aesthetic values include rock art sites or sites located in environments that evoke strong sensory responses.

5.1.1.3 Grading scientific values

The following gradations, where a site or zone satisfies at least one criterion, have been applied to provide a measure of the values/significance for Aboriginal objects identified within the Subject Area, and to provide an overall assessment of the significance of each of the zones used that define the Subject Area in accordance with the guidelines above. However, it is acknowledged that grading of heritage values, scientific or otherwise, is a process which does not have support from the RAPS as it can emphasize the values of individual components of a landscape rather than the cultural landscape as a whole.

Table 13: Criteria for grading scientific values

Gradation	Description
High	The site or object has value because it contains archaeological and/or contextual features which through further investigation may significantly contribute to our understanding of the past, both locally and on a regional scale. These features include, but are not limited to: Aboriginal ancestral remains; the site's relationship with landscape features or other Aboriginal archaeological sites or areas of identified heritage importance; diagnostic archaeological or landscape features that inform a chronology; and a very large assemblage of stone artefacts associated with other features such as oven remains or shell midden. Such sites will be relatively rare and will be representative of a limited number of similar sites that make up this class; hence they derive high representative and rarity values.
Moderate	The site or object derives value because it contains features, both archaeological and contextual, which through further investigation may contribute to our understanding of the local past. These features include but are not limited to the relationship with landscape features or other Aboriginal archaeological sites or areas of identified heritage importance; diagnostic archaeological or landscape features that inform a chronology; and a relatively large assemblage of stone artefacts. The presence of a diverse artefact and feature assemblage, and connectedness with landscape features and other notable sites provide relatively higher representative and rarity values than sites of low significance.
Low	The site or object contains only a single or limited number of features and has no potential to meaningfully inform our understanding of the past beyond what it contributes through its current recording (i.e. no or low research potential). The site or object is a representative but unexceptional example of the most common class of sites or objects in the region. Many more similar examples can be confidently predicted to occur within the Subject Area, and in the region.

5.2 Significance assessment – Individual Aboriginal cultural heritage sites

The following table provides an assessment of significance and summarises identified heritage values for individual Aboriginal sites within the Subject Area while Section 5.3 provides a statement of significance for the Subject Area as a whole.

Table 14: Significance Assessment – Sites within UG2 Approved Mining Area

Value	Description / Rating
Site Name	PAD 10 Moolarben Coal (AHIMS ID#36-3-0956)
Features	Rock Shelter with PAD
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High.

Value	Description / Rating
Site Name	PAD 11 Moolarben Coal (AHIMS ID#36-3-0957)
Features	Rock Shelter with PAD
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	The historic value of the site was not identified by Hamm (2006a).
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	PAD 4 Moolarben Coal (AHIMS ID#36-3-0883)
Features	PAD
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	PAD 5 Moolarben Coal (AHIMS ID#36-3-0884)
Features	Rock Shelter with PAD
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	PAD 8 Moolarben Coal (AHIMS ID#36-3-0954)
Features	Rock Shelter with Artefacts and PAD
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	PAD 9 Moolarben Coal (AHIMS ID#36-3-0955)
Features	Rock Shelter with PAD
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
scientific value	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	S1MC054 (AHIMS ID#36-3-0859)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High

Value	Description / Rating
Site Name	S1MC055 (AHIMS ID#36-3-0860)
Features	Rock Shelter with Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Moderate** - This site is not identified by Hamm (2006a) as having Scientific value. This site has been reassessed as having moderate scientific values due to its potential to inform research questions around the use of basalt outcrops in the local area and their potential to be connected in the landscape through this resource S1MC055, as a Shelter with Artefacts, is a less common site type with a higher number of stone artefacts than other sites along the Moolarben Ridge, and as such may inform research questions around the frequency of use and occupation along the ridgeline.
Social or cultural value	High
Site Name	S1MC056 (AHIMS ID#36-3-0861)
Features	Rock Shelter with Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	S1MC057 (AHIMS ID#36-3-0862)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	S1MC074 (AHIMS ID#36-3-0879)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	S1MC075 (AHIMS ID#36-3-0880)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High

Value	Description / Rating
Site Name	S1MC076 (AHIMS ID#36-3-0881)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	S1MC077 (AHIMS ID#36-3-0882)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site have previously identified.
Scientific values	Low - This site is not identified by Hamm (2006a) as having Scientific value.
Social or cultural value	High
Site Name	S1MC406 (AHIMS ID#36-3-3302)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site were identified by AECOM (2015d).
Scientific values	Low - This site is identified by AECOM (2015d) as having low scientific value. The site condition is described in the site card as poor due to its location on and adjacent an access track.
Social or cultural value	High
Site Name	S1MC407 (AHIMS ID#36-3-3300)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site were identified by AECOM (2015d).
Scientific values	Low - This site is identified by AECOM (2015d) as having low scientific value. The site condition is described in the site card as poor due to its proximity to an access track.
Social or cultural value	High
Site Name	S1MC409 (AHIMS ID#36-3-3303)
Features	Rock Shelter with PAD
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values of the site were identified by AECOM (2015d).
Scientific values	Low - This site is identified by AECOM (2015d) as having low scientific value. The site condition is described in the site card as good. No Aboriginal occupation or objects have been identified at this location.
Social or cultural value	High

Value	Description / Rating
Site Name	S1MC438 (AHIMS ID#36-3-3454)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low to Moderate - The site is considered to have low to moderate scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. However XRF/PXRF may be able to inform research questions around sourcing and use of the landscape and provide a connection between S1MC417 and S1MC238. The site condition is described in the site card as good.
Social or cultural value	High
Site Name	S2MC236 (AHIMS ID#36-3-0016 & 36-3-0134)
Features	Rock Shelters with Art and Artefacts
Aesthetic values	S2MC 236 is noted as having high aesthetic value due to its art and its landscape setting.
Historic values	S2MC236 has historic value due to its importance to the Wiradjuri people, rarity in the region, its significance to the RAPs and traditional owners and its connection to the works of Fred McCarthy and Ian Bluff.
Scientific values	High - This site has research value due to its importance to the Wiradjuri people, its rarity, conservation value, range of component features, potential for use, wear and residue analysis of grinding features, to investigate motif choice, to look at sourcing of ochre and paints and landscape use through geochemical analysis, possible dating through OSL/TL and radiocarbon, to provide information regarding the chronology of Aboriginal use of the Subject Area. The potential to preserve one or more layers of occupation. The site is strategically located between Moolarben Creek Valley and Murragamba Creek Valley.
Social or cultural values	High – This site has previously been recorded as having significant cultural value to the RAPs and the region. To be updated with input from RAPs during the review of this report. Previous statements of social and cultural value regarding S2MC236 can be found in Hamm (2008a).
AHIMS ID	S2MC237 (AHIMS ID#36-3-1382)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	The historic value of the site was not identified by Hamm (2006a).
Scientific values	Low - A single stone artefact recorded by Hamm (2008a). This site is not identified by Hamm (2008a) as having scientific value. The integrity of the site was not identified by Hamm (2008a) as contributing to the scientific or research value of the site.
Social or cultural value	High

Value	Description / Rating
Site Name	S2MC238 (AHIMS ID#36-3-1383)
Features	Artefacts
Aesthetic value	High - S2MC 238 is noted as having high aesthetic value (Hamm 2008a). The site lies at the head of a gully and overlooks an expanse of sandstone escarpment.
Historic value	The historic value of the site was not identified by Hamm (2008a).
Scientific values	High - A large stone artefact scatter comprising 104 stone artefacts, recorded by Hamm (2008a). This site has research value due to its range (diversity) of component features, integrity and potential to preserve one or more layers of occupation. Where dating samples can be obtained, it may be possible through OSL/TL dating to provide information regarding the chronology of Aboriginal use of the UG2 area, its connectivity and proximity to Moolarben Ridge and the highly significant S2MC236 and proximity to other Aboriginal heritage sites.
Social or cultural value	High Site S2MC238 has previously recorded as having significant cultural and educational values due to its connectivity to other sites (S2MC236) associated with the valley and Moolarben Ridge and its multiple components.
Site Name	S2MC239 (AHIMS ID#36-3-1384)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	Low - Hamm (2008a) identifies the site as having low historic value.
Scientific values	Low - Three stone artefacts, recorded by Hamm (2008a). This site is not identified by Hamm (2008a) as having scientific value.
Social or cultural value	High
Site Name	S2MC411 (AHIMS ID#36-3-3320)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.
Social or cultural value	High
Site Name	S2MC412 (AHIMS ID#36-3-3321)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.
Social or cultural value	High

Value	Description / Rating
Site Name	S2MC413 (AHIMS ID#36-3-3322)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.
Social or cultural value	High
Site Name	S2MC414 (AHIMS ID#36-3-3323)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.
Social or cultural value	High
Site Name	S2MC415 (AHIMS ID#36-3-3324)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.
Social or cultural value	High
Site Name	S2MC416 (AHIMS ID#36-3-3450)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site condition is described in the site card as good.
Social or cultural value	High

Value	Description / Rating
Site Name	S2MC417 (AHIMS ID#36-3-3451)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Moderate** - The site is considered to have moderate scientific value. While the site has limited subsurface deposits due to shallow soils, the site is in close proximity to the highly significant RSMA, a large open artefact scatter comprising 104 stone artefacts and contains basalt core and flakes, which may be able to answer research questions about the connectivity of sites in the landscape and local use of basalt. The site condition is described in the site card as good.
Social or cultural value	High
Site Name	S2MC418 (AHIMS ID#36-3-3449)
Features	Isolated Artefact
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site condition is described in the site card as poor.
Social or cultural value	High
Site Name	S2MC419 (AHIMS ID#36-3-3448)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site condition is described in the site card as poor due to its location on an eroded slope.
Social or cultural value	High
Site Name	S2MC420 (AHIMS ID#36-3-3452)
Features	Artefacts
Aesthetic value	No aesthetic values have previously been noted for this site.
Historic value	No historic values have been identified for the site.
Scientific values	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. The site is considered to have low surface potential due to shallow soils. The site condition is described in the site card as good.
Social or cultural value	High
Site name	S2MC438* (AHIMS ID#36-3-3807)
Site features	Isolated Artefact
Aesthetic value	The setting of this site was noted as it offered views across Murragamba Creek valley and OC4.
Historic value	None identified.
Scientific value	Low - The site has scientific value as basalt is an uncommon resource within the Subject Area and MCC and its potential to improve our understanding of the use of basalt for stone tool manufacture and use across the region.
Social or cultural value	High

Value	Description / Rating
Site name	S2MC439* (AHIMS ID#36-3-3808)
Site features	Rock Shelter with PAD
Aesthetic value	Moderate - S2MC439 has moderate aesthetic value as it is located on the upper slope of steep hills, providing a view over the immediate gully. The rock shelter was noted as a nice cool place to sit by the RAPs during the site inspection.
Historic value	None identified.
Scientific value	Low to Moderate - The site has no visible artefacts, but PAD contains deposit estimated at 50 cm at the dripline. The depth of the deposit offers the potential to preserve one or more layers of occupation. The overall integrity of the PAD remains in good condition; however, portions of the site have been disturbed by rabbit burrowing and seepage along joints. The rock shelter is considered to have low to moderate research value and further investigation is warranted to determine if subsurface material is present.
Social or cultural value	High
Site name	S2MC440* (AHIMS ID#36-3-3809)
Site features	Rock Shelter with Artefacts and PAD
Aesthetic value	Low to Moderate - Site S2MC440 has low to moderate aesthetic value as it is located along the midslope of a continuous sandstone ridge, looking south-west across a gully.
Historic Value	None identified.
Scientific value	Low to Moderate - S2MC440 has scientific value as its sandy deposit with charcoal fragments and artefact assemblage may be datable through OSL/TL and provide information regarding the chronology of Aboriginal use of the UG2 area, however its integrity due to animal disturbance has reduced this research potential.
Social or cultural value	High
Site name	S2MC444* (AHIMS ID#36-3-3813)
Site features	Rock Shelter with PAD
Aesthetic value	Low to Moderate – Site S2MC444 has low to moderate aesthetic value as it is located on the mid slope of a steep hills. It was noted that the site provided a good overlook of the gully.
Historic Value	None identified.
Scientific value	Low to Moderate – Site S2MC444 has scientific value as it has a large habitable floor with at least 30 cm of a sandy deposit. The site contains no visible artefacts, the depth of the deposit offers the potential to preserve one or more layers of occupation. The integrity of the rock shelters and PAD remain in a good condition; however, portions of the site have been disturbed by wombat burrowing.
Social or cultural value	High
Site name	S2MC445* (AHIMS ID#36-3-3817)
Site features	Rock Shelter with PAD
Aesthetic value	No aesthetic values have been noted for this site.
Historic Value	None identified.
Scientific value	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential. No evidence of Aboriginal use has been identified.
Social or cultural value	High

* Newly Recorded Site

** Site with updated scientific values

Table 15: Significance Assessment – Sites within the UG2 Extended Mining Area

Value	Description / Rating
Site name	S2MC441* (AHIMS ID#36-3-3810)
Site features	Rock Shelter with Artefacts and PAD
Aesthetic value	Low to Moderate - Site S2MC441 has low to moderate aesthetic value as the site consists of two adjoining overhangs with a connected deposit and as it is located along the midslope of a continuous sandstone ridgeline, facing south, a overlooking gully.
Historic Value	None identified.
Scientific value	Low to Moderate – Site S2MC441 has scientific value as its sandy deposits and artefact assemblage over the two rock shelters may be datable through OSL/TL and provide information regarding the presence/absence of Aboriginal use of the Moolarben ridge and a chronology of Aboriginal use of the UG2 area. The integrity of the rock shelters and PAD remain in a good condition; however, portions of the site have reduced integrity as it has been disturbed by wombat burrowing.
Social or cultural value	High
Site name	S2MC442* (AHIMS ID#36-3-3812)
Site features	Rock Shelter with PAD
Aesthetic value	Low to Moderate - Site S2MC442 has low to moderate aesthetic value as it is located on the upper slope of a steep hills, overlooking the surrounding valleys.
Historic Value	None identified.
Scientific value	Low to Moderate - The site has scientific value as its sandy deposits and artefact assemblage over the shelter may be datable through OSL/TL and provide information regarding the presence/absence of Aboriginal use of the Moolarben ridge and a chronology of Aboriginal use of the Subject Area.
Social or cultural value	High
Site name	S2MC443* (AHIMS ID#36-3-3811)
Site features	Rock Shelter with PAD
Aesthetic value	Low to Moderate – Site S2MC443 has low to moderate aesthetic value as it is located on the upper slope of a steep hills, overlooking the surrounding valleys.
Historic Value	None identified.
Scientific value	Low - The site has scientific value as it may be able to assist in answering questions regarding presence/absence of Aboriginal stone artefact use in shelters across the Moolarben ridge. The site is in good condition.
Social or cultural value	High
Site name	S2MC446* (AHIMS ID#36-3-3814)
Site features	Rock Shelter with Artefacts and PAD
Aesthetic value	Low to Moderate – Site S2MC446 has low to moderate aesthetic value as it is located on the upper slope of a steep hills, looking out over a gully.
Historic Value	None identified.
Scientific value	Low - While further stone artefacts are likely within the deposit, the area of PAD is relatively small and the deposit is moderately sloped, decreasing the integrity of any deposits.
Social or cultural value	High

Value	Description / Rating
Site name	S2MC447* (AHIMS ID#36-3-3815)
Site features	Rock Shelter with Artefact
Aesthetic value	Low to Moderate – Site S1MC447 has low to moderate aesthetic values. The site is located along the upper slope of a ridgeline. Native vegetation of Kurrajong trees and fig were noted surrounding the site. The site shows evidence of fire.
Historic Value	None identified.
Scientific value	Low - The site is considered to have low scientific value, representing transient movement across sloped terrain with shallow, erosional soil with no subsurface archaeological potential.
Social or cultural value	High

* Newly Recorded Site

5.3 Statement of significance for the Subject Area

The Subject Area contains 42 Aboriginal heritage sites, five (5) of which are located within the UG2 Extended Mining Area and 37 are located within the UG2 Approved Mining Area.

The RAPs for the MCC have been consulted on the nature and extent of Aboriginal cultural heritage at the MCC on a number of occasions, including during the community consultation processes undertaken for previous cultural heritage assessments and investigations (described in Appendix C of the complex-wide HMP).

The RAPs maintain a strong relationship with their traditional lands and have stated that all Aboriginal heritage sites, known or otherwise, and Country are considered to have high cultural and social value by the RAPs. This statement was reiterated through comments received from WVVAC for this assessment that *“Aboriginal Cultural Heritage is not just about artefacts and sites, it is about holistic environmental management as our Ancestors did who walked on and used the land your company currently occupies”*.

The Subject Area, including both the UG2 Approved Mining Area and UG2 Extended Mining Area, has social and cultural value to the RAPs.

Previous assessments have identified and documented cultural values for the MCC area, including:

- Archaeological sites have contemporary cultural value because they provide a tangible link to the traditional past (Kuskie 2013).
- The presence of flora and fauna species with known traditional uses (Kuskie 2013).
- The area of Moolarben Ridge to the south of Carr’s Gap having contemporary cultural value to the Wiradjuri community (Hamm 2008, Kuskie 2013b).

The Subject Area has been noted to have aesthetic values by the RAPs associated with views at and from some rock shelter sites and from elevated landforms across Murrumbidgee Creek and Moolarben Creek valleys. Views and outlook were considered by the RAPs during the survey as part of the character of a number of rock shelter sites recorded.

Consultation with the RAPs, desktop investigations and literature review have identified no direct historical figures, events, phases or activities associated with the UG2 Extended Mining Area. Within the UG2 Approved Mining Area, S2MC236 is considered to have historic value due to its importance to Aboriginal people, RAPs and traditional owners, its rarity in the region and its connection to the works of Fred McCarthy and Ian Bluff.

The Subject Area has a range of scientific values. S2MC236 and S2MC238 are considered to have high scientific value to due to their cultural values, the range (diversity) of component features, rarity, representativeness, integrity and potential to answer research questions around the chronology of Aboriginal use of the Subject Area, its connectivity and proximity to other sites in the landscape, art motifs in the region and movement of people in the landscape through sourcing studies of ochre and stones. Additional Aboriginal heritage sites are considered to have low to moderate scientific value for their potential to answer research questions about the frequency and intensity of use of shelters in the local area, chronology of Aboriginal use of the local area and stone technology.

6. The proposed activity

6.1 Summary of Subject Area's history

Aboriginal land use in the Subject Area is outlined in Section 2.4.

Early visits and recordings of Aboriginal heritage sites are known to have occurred in the 1840s, 1940s and 1990s (Matthews 1895, McCarthy 1944, Lambert 1999). Activities in the Subject Area during this time included pastoral and grazing activities, with construction of some rural infrastructure such as dams, fences and access tracks.

Mining activities have also been undertaken in the Subject Area, including exploration programs, ancillary infrastructure and construction of access tracks. Mining activities and harm to Aboriginal heritage sites within the UG2 Approved Mining Area was granted under Project Approval (08_0135) (Moolarben Coal Project Stage 2) as modified, supported by Environmental Assessments (Hamm 2006a, Hamm 2008b, AECOM 2011, Kuskie 2013b). A Rock Shelter Management Area was subsequently established to minimise harm to S2MC236 (AHIMS ID#36-3-0016 & 36-3-0134) and a HMP developed with a framework for managing heritage sites, subsequently modified (MCO 2020).

Additional heritage assessments have been undertaken to support the implementation and updates to the HMP (AECOM 2015a, 2015b) and exploration drilling activities within ML 1715 (Niche 2018, 2019). Further detail and consideration of past heritage assessments is presented in the AR in Appendix A.

As a result of these previous heritage assessments and this assessment, a total of 42 Aboriginal heritage sites were identified across the Subject Area.

6.2 Proposed activity, staging and timeline

The scope of works for the UG2 Modification will include: The Modification would comprise the following changes to the approved UG2:

- optimisation of the approved UG2 layout (including the extension of two approved longwall panels);
- increased UG2 extraction height from 3.0 metres (m) to 3.5 m;
- revised UG2 mining sequence;
- increased UG2 ROM coal production from 9.4 million tonnes (Mt) to 13.9 Mt;
- construction and operation of a remote services infrastructure area (including two UG2 service boreholes) within the approved OC4 disturbance footprint to support UG2 operations;
- development of an additional non-subsiding gate road along the southern boundary of the UG1 mining area to assist with ventilation in UG2; and
- small reduction in the approved OC4 extent to accommodate the optimised UG2 layout.

6.3 Potential for harm

6.3.1 Preamble

The Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011) requires that both direct and indirect harm to Aboriginal objects and Aboriginal places be considered. Generally direct harm refers to occasions where an activity physically impacts a site or objects and therefore affects the heritage values possessed by the site or objects. Indirect harm is usually taken to mean harm stemming from secondary consequences of the activity and may affect sites or objects as an indirect consequence of the activity. Examples of such indirect harm are increased visitors to a site, or increased erosion in an area as a result of an activity.

The proposed development has the potential to directly harm Aboriginal objects through subsidence induced impacts.

The consideration of potential harm to Aboriginal heritage sites from the proposed activity from subsidence induced ground movements falls into three distinct categories:

- sites relatively more susceptible to harm from subsidence (e.g. rock shelters);
- sites relatively less susceptible to harm from subsidence (open artefact sites); and
- other sites of cultural value where landscape changes (such as mass movement) may impact heritage values.

6.3.2 Potential subsidence impacts

MSEC has prepared a subsidence report to inform the application to modify the current approved UG2 longwalls (MSEC 2021, see Appendix C).

As a result of changes in the longwall layout within the UG2 Approved Mining Area, some locations will experience a reduction in observed impacts and some locations will experience an increase in observed impacts (MSEC 2021). The main reductions in impacts will be observed between LW201 and 204, and between LW 202a and 202b (MSEC 2021). The main increases in impacts within the UG2 Approved Mining Area will be observed to the north west of LW204 (MSEC 2021).

While there is an increase in the predicted subsidence parameters (vertical subsidence, maximum predicted tilt and curvatures) at 18 Aboriginal heritage sites within the UG2 Approved Mining Area (Appendix C), the overall impact assessments based on the Approved Layout do not change for the Modified Layout (MSEC 2021).

The predicted subsidence parameters in the UG2 Extended Mining Area based on the Modified Layout are similar to those predicted for the UG2 Approved Mining Area and therefore the potential impacts to Aboriginal heritage sites in the UG2 Extended Mining Area would be similar to the UG2 Approved Mining Area (MSEC 2021).

Of the five (5) Aboriginal heritage sites within the UG2 Extended Mining Area, three (3) Aboriginal heritage sites (of low to low-moderate archaeological significance) are considered unlikely to experience subsidence impacts as they would not be undermined and two (2) Aboriginal heritage sites (both low archaeological significance) are predicted likely to experience subsidence impacts.

Table 16 provides a summary of changes to the approved level of impact for Aboriginal heritage sites within the Subject Area from the Approved layout and the Modified layout. These changes in impacts are further broken down by site significance.

Table 16: Changes in approved level of impact for Aboriginal heritage sites

Change in approved level of impact from Approved Layout to Modified Layout	Scientific significance ¹	Site Name	Count of Aboriginal heritage sites
Decrease			14
	High	S2MC238	1
	Moderate	S2MC417	1
	Low-Moderate	S2MC412, S2MC439*, S2MC440*, S2MC444*, S2MC441*	5
	Low	S1MC077, S2MC413, S2MC415, S2MC416, S2MC420 S2MC438*, S2MC445*	7
No change			26
	High	S2MC236	1
	Moderate	S1MC055	1
	Low-Moderate	S1MC438, S2MC442*	2
	Low	S1MC054, S1MC056, S1MC057, PAD 10 Moolarben Coal, PAD 11 Moolarben Coal, PAD 4 Moolarben Coal, PAD 5 Moolarben Coal, PAD 8 Moolarben Coal, PAD 9 Moolarben Coal, S1MC074, S1MC075, S1MC076, S1MC406, S1MC407, S1MC409, S2MC237, S2MC239, S2MC411, S2MC414, S2MC418, S2MC419, S2MC443*	22
Increase			2
	Low	S2MC446*, S2MC447*	2
Grand Total			42

¹ All sites in this table are considered to have high cultural value by the RAPs

* Newly recorded Aboriginal heritage site.

6.3.2.1 Rock shelters

There are a total of 19 rock shelter sites within the Subject Area, five (5) within the UG2 Extended Mining Area and 14 within the UG2 Approved Mining Area.

Of the five (5) Aboriginal heritage sites within the UG2 Extended Mining Area, all are rock shelters with one or more components (artefacts and/or PAD). Three (3) of the sites (S2MC441, S2MC442, S2MC443), located at Cliff C9 where the design of the longwall layout has been stepped back, are considered to have low potential for harm through subsidence and two (2) Aboriginal heritage sites (S2MC446, S2MC447), located on steep slopes within LW202a, are predicted to have a moderate to high potential for harm through subsidence impacts.

The remaining 14 rock shelters with one or more components (art and/or artefacts and/or PAD) are located within the UG2 Approved Mining Area. While there is an increase in the predicted subsidence parameters at some sites within the UG2 Approved Mining Area (Appendix A), the overall impact assessment based on the Approved Layout do not change for the Modified Layout (MSEC 2021) (including the highly significant S2MC236 Rock Shelter site).

S2MC236 is located at Cliff C7 within the UG2 Approved Mining Area and includes a rock shelter, artwork and artefact scatter. S2MC236 is considered to have high significance at a regional level and any harm to the Aboriginal cultural heritage site would be considered an unacceptable impact. Cliff C7 and S2MC236 are protected by a sterilised coal pillar based on 0.5 times the depth of cover from the Cliff. Based on the low magnitude of predicted subsidence parameters, the potential for impacts at Cliff C7 and S2MC236 is considered to be negligible (MSEC 2021). The Modified Layout would not result in any change to the existing subsidence performance measure for S2MC236 of “negligible subsidence impacts or environmental consequences”.

6.3.2.2 Open artefact sites

No open artefact sites have been identified to date in the UG2 Extended Mining Area, though these may occur anywhere within MCC landscape. Twenty-three (23) open artefact sites (with/without PAD) are recorded within the UG2 Approved Mining Area.

Open sites, containing artefact scatters, isolated finds and PADs, are generally not susceptible to direct harm from ground movements caused by mine subsidence, and Aboriginal objects are therefore not likely to lose cultural heritage value due to subsidence. MSEC (2021) also states that while it is unlikely that the open sites themselves would be directly impacted by mine subsidence, it is possible that, if remediation works to the surface areas around the Aboriginal heritage sites was required after mining, these works could potentially impact on the Aboriginal heritage sites.

Open sites can potentially be indirectly impacted by subsidence from rockfalls near outcropping sandstone features and cracking of the surface soils as a result of mine subsidence movements. Other sites of cultural value where landscape changes (such as mass movement) may impact heritage values.

6.3.2.3 Other sites of cultural value where landscape changes (such as mass movement) may impact heritage values.

The RAPs involved in previous assessments of UG2 have highlighted cultural values associated with the environmental management of the landscape setting, the hydrology and the plants and animal habitat. Potential subsidence impacts to these environmental features are outlined in MSEC (2021). As noted in Section 6.3.2, and consistent with the Approved Layout, the proposed Modified layout would likely result in cracking of the ground surface and rockfall.

Minor cliffs and rock face features are located across the Subject Area and include shelters and overhangs with no material evidence of Aboriginal use. Schedule 4 of the Stage 2 Project Approval (08_0135) lists subsidence performance measures for minor cliffs and rock face features of minor environmental consequences (i.e. no impact more than 5% of the total face). MSEC (2021) states that it is difficult to quantify the expected extent of impacts to the minor cliffs and rock face features in total as some locations above the longwall panels may exceed the performance measures and some locations may be within the performance measures.

The predicted vertical subsidence, maximum predicted tilt and curvatures in the UG2 Extended Mining Area based on the Modified Layout are similar to those predicted for the UG2 Approved Mining Area. Therefore, the potential impacts to environmental features within the UG2 Extended Mining Area, including ephemeral drainage lines, cliffs and steep slopes, have been assessed to be similar to the UG2 Approved Mining Area (MSEC 2021).

6.3.3 Likely impacted values

All Aboriginal heritage sites and Country are considered to have high cultural value by the RAPs.

The proposed works would result in potential impacts to both Aboriginal cultural heritage sites and the Aboriginal cultural heritage values of the Subject Area.

The following statements have been provided from the RAPs to date regarding impacted values:

WWAC Comments Regarding Impacted Values

Comments were received that Aboriginal Cultural Heritage is not just about artefacts and sites, it is about holistic environmental management as our Ancestors did who walked on and used the land your company currently occupies.

WWAC have concerns around the affect that this modification will have on the ground profile, hydrology both surface and sub surface, the flora and fauna in this proposed modification area and the subsidence post mining and longer term.

WWAC Strongly Object to the Moolarben Coal Complex UG2 Modification.

North East Wiradjuri Company

I am content with the mitigation measures proposed for site S2MC236, and also with monitoring and archaeological excavation of Section 5.6 of HMP prior to extraction; I am also satisfied with the "Setback" border of LW 202a and LW202b.

Overall, the proposed mitigation measures for limiting impact to our available, evidential cultural heritage, appears to be in good faith and viable at this stage of the Assessment.

Of the five (5) Aboriginal heritage sites within the UG2 Extended Mining Area, three (3) Aboriginal heritage sites (of low to low-moderate archaeological significance) are considered unlikely to experience subsidence impacts as they would not be undermined and two (2) Aboriginal heritage sites (S2MC446 and S2MC447, both low archaeological significance) are predicted likely to experience subsidence impacts

S2MC446 does not warrant archaeological excavation due to the poor integrity of the PAD. The PAD has been disturbed by animal use and downslope sediment movement due to the sloped shelter floor. While S2MC447 contains PAD and may be impacted by subsidence, the internal shelter floor is stone and sloped

and the PAD extends from the dripline towards the break of slope of the ridge and as such is unlikely to be impacted in the event of shelter collapse.

6.3.4 Summary of potential impacts

As described in Section 1 and Section 2, this report focuses on the UG2 Extended Mining Area where there is the potential for impacts to areas not already approved for impact associated with the Moolarben Coal Project Stage 2. Notwithstanding, those sites with approved subsidence impacts (i.e. from the Moolarben Coal Project Stage 2) are also considered in terms of the incremental impacts or change in impacts within the UG2 Approved Mining Area associated with the Modified Layout.

As required by the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b), the likely impacts, type, degree and consequence of harm to Aboriginal heritage sites from the UG2 Modification are presented in Table 17 .

6.4 Project justification

Mining operations at the MCC are currently approved until 31 December 2038 and would continue to be carried out in accordance with NSW Project Approval (05_117) (Moolarben Coal Project Stage 1) as modified and NSW Project Approval (08_0135) (Moolarben Coal Project Stage 2) as modified. MCO propose to modify the Project Approval for Stage 2 of the MCC to allow changes to the currently approved operations of the UG2 mining domain.

The UG2 Modification would not result in any additional surface disturbance to that already approved, no change to annual combined underground production rate of up to 8 Mtpa ROM coal and no change to existing subsidence performance measures relating to “negligible subsidence impacts or environmental consequences” for Aboriginal cultural heritage site S2MC236 and cliff lines C7, C9 and C10 (due to mining step around of C9 and no change to distance of undermining from C10).

Of the 42 Aboriginal heritage sites in the Subject Area, the proposed activity would result in no change in impacts assessments for 40 Aboriginal heritage sites and an increase in predicted subsidence impacts to two (2) Aboriginal heritage sites.

Table 17 Impact assessment summary for sites within the Subject Area.

Site Name	Site Features	AHIMS ID#	Location	Potential impact mechanism	Type of harm	Likelihood of harm	Degree of harm (Total, Partial, None)	Consequence of harm
PAD 10 Moolarben Coal	Rock Shelter with PAD	36-3-0956	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
PAD 11 Moolarben Coal	Rock Shelter with PAD	36-3-0957	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
PAD 4 Moolarben Coal	PAD	36-3-0883	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
PAD 5 Moolarben Coal	Rock Shelter with PAD	36-3-0884	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
PAD 8 Moolarben Coal	Rock Shelter with Artefacts and PAD	36-3-0954	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
PAD 9 Moolarben Coal	Rock Shelter with PAD	36-3-0955	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
S1MC054	Artefacts	36-3-0859	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC055	Rock Shelter with Artefacts	36-3-0860	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC056	Rock Shelter with Artefacts	36-3-0861	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC057	Artefacts	36-3-0862	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC074	Isolated Artefact	36-3-0879	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC075	Isolated Artefact	36-3-0880	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC076	Isolated Artefact	36-3-0881	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC077	Isolated Artefact	36-3-0882	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC406	Artefacts	36-3-3302	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC407	Artefacts	36-3-3300	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC409	Rock Shelter with PAD	36-3-3303	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
S1MC438	Isolated Artefact	36-3-3454	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC236	Rock Shelter with Art and Artefacts	36-3-0016 & 36-3-0134	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Loss of value
S2MC237	Isolated Artefact	36-3-1382	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value

Site Name	Site Features	AHIMS ID#	Location	Potential impact mechanism	Type of harm	Likelihood of harm	Degree of harm (Total, Partial, None)	Consequence of harm
S2MC238	Artefacts	36-3-1383	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC239	Artefacts	36-3-1384	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC411	Artefacts	36-3-3320	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC412	Isolated Artefact	36-3-3321	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC413	Isolated Artefact	36-3-3322	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC414	Isolated Artefact	36-3-3323	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC415	Isolated Artefact	36-3-3324	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC416	Artefacts	36-3-3450	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC417	Artefacts	36-3-3451	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC418	Isolated Artefact	36-3-3449	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC419	Artefacts	36-3-3448	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC420	Artefacts	36-3-3452	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC438*	Isolated Artefact	36-3-3807	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC439*	Rock Shelter with PAD	36-3-3808	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC440*	Rock Shelter with Artefacts and PAD	36-3-3809	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC441*	Rock Shelter with Artefacts and PAD	36-3-3810	UG2 EMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC442*	Rock Shelter with PAD	36-3-3812	UG2 EMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC443*	Rock Shelter with PAD	36-3-3811	UG2 EMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC444*	Rock Shelter with PAD	36-3-3813	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC445*	Rock Shelter with PAD	36-3-3817	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC446*	Rock Shelter with Artefacts and PAD	36-3-3814	UG2 EMA	Subsidence	Direct	Likely	Total	Total Loss of value
S2MC447*	Rock Shelter with Artefact	36-3-3815	UG2 EMA	Subsidence	Direct	Likely	Total	Total Loss of value

* Newly recorded site.

¹ The code does not provide definitions for these categories; however they are taken to mean:

Type of harm: Direct- the object will or may be subject to direct physical disturbance. Indirect- there may be secondary consequences from the activity, resulting in harm. None- neither the object nor its context will be altered.

Degree of harm: Total: the object(s) will be directly harmed in their entirety. Partial- some objects will be directly or indirectly harmed, however a portion of a site may remain unaffected. None- there will be no harm.

Consequence of harm: Total loss of value- no heritage values will remain subsequent to the harm. Partial loss of value- some heritage values will remain subsequent to the harm. No loss of value- there will be no harm, and no loss of value

UG2 AMA = UG2 Approved Mining Area, UG2 EMA = UG2 Extended Mining Area.

7. Avoiding and minimising harm

7.1 Conservation Principles and Management Framework

The two founding principles behind the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011:12) are ecologically sustainable development and intergenerational equity. These principles hold that “*the present generation should make every effort to ensure the health, diversity and productivity of the environment – which includes cultural heritage – is available for the benefit of future generations*”.

The strong emphasis, as in the Burra Charter, is to quantify and understand the heritage values of a place, a site, or an object and exhaust avenues of avoiding harm to those values. If harm cannot be avoided, then there must be consideration and implementation of strategies to minimise harm (OEH 2011:13).

It follows that the hierarchy for consideration in terms of the management strategies available for surface stone artefacts and subsurface stone artefacts and areas of archaeological potential, fall into four general categories, in order of preference from a conservation perspective:

- avoidance and in-situ conservation;
- partial avoidance and partial in-situ conservation (includes partial harm);
- harm caused with mitigating circumstances such as collection or salvage; and
- unmitigated harm.

The four general categories (described above) have been considered in the following subsections with regard to both direct impacts and indirect impacts.

A framework for the management of Aboriginal heritage sites within the approved MCC has been developed as part of the HMP (MCO 2020) based on sites assessed significance, site type and the nature of proposed impacts. It is proposed to manage Aboriginal heritage sites to be impacted by the UG2 Modification using the same framework, with some amendments.

Recommended management and mitigation measures would be updated in consideration of comments received from the RAPs during the consultation process. All comments received from the RAPs are considered in Section 3.2.

7.2 Designing to avoid harm

The following actions were undertaken to minimise the risk of subsidence impacts:

- As noted previously, the longwall mining layout has been designed to include a coal block pillar beneath the Rock Shelter Management Area to reduce the risk of subsidence induced impacts S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134) and Cliff Line C7.
- During the assessment process, a setback of LW202a and 202b from Cliff Line C9 was established, resulting in a reduction in maximum predicted subsidence parameters to sites S2MC438, S2MC420, S1MC439, S2MC440, S2MC441, S2MC442, S2MC443, S2MC444, S2MC445.

7.3 Justifying harm

Actions have been taken to reduce harm and the likelihood of harm through design, as outlined in the section above.

7.4 Mitigating harm

Management measures are warranted to mitigate the loss of values to Aboriginal heritage sites and values that would result from the proposed activity in the Subject Area. Management and mitigation measures are also needed to ensure continued compliance with the HMP (MCO 2020) and Project Approval.

For the UG2 Modification, harm would be mitigated using the principles established and outlined in the HMP (MCO 2020), which has been developed in consultation with the RAPs. In summary this would see a process of:

- Survey of Underground Areas not previously surveyed (Section 5.3.2 of the HMP).
- Rock shelter sites with potential for subsidence being subject to monitoring (Section 5.9.1 of the HMP).
- Determining the likely impact of blasting and subsidence (Section 5.8.3, 5.8.4 and Section 5.9.1 of the HMP) and, if required, undertaking archaeological excavation (Section 5.6 of the HMP).
- Following the protocol for recording and surface collection (Section 5.5 of the HMP).
- Management of Previously Unrecorded Aboriginal Archaeological Site (Section 5.10 of the HMP).
- Following the protocol for the Discovery of Human Remains (Section 5.11 of the HMP).
- Management of the Aboriginal Archaeological Sites Database (Section 5.12 of the HMP).
- Management of the Keeping Place (Section 5.13 of the HMP).
- Following the protocol for damage to a known Aboriginal archaeological site (Section 5.16 of the HMP).

7.4.1 Management of S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134)

Schedule 4 of the Stage 2 Project Approval (08_0135) provides a subsidence performance measure for Aboriginal heritage site S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134) of “negligible subsidence impacts or environmental consequences”. There are no proposed changes to this subsidence performance measure as a result of the UG2 Modification.

It is however noted that the significance of this site cannot be understated. Given the significance of this site and its setting, MCO would implement all means to avoid impact to this site. The HMP (MCO 2020) requires that S2MC236 be subject to a comprehensive subsidence monitoring regime (as per Section 5.9.1 of the HMP) and blast vibration monitoring (as per Section 5.9.2 of the HMP). MSEC (2021: ii) recommends a survey monitoring program to enable an adaptive management approach to satisfy the performance measures for Aboriginal heritage site S2MC236 and Cliff line C7.

7.4.2 Management requirements for other Aboriginal heritage sites at UG2

Management requirements for other Aboriginal heritage sites at UG2 are outlined in the sections below.

7.4.2.1 Survey of Underground Areas not previously surveyed

Management of unsurveyed land would be undertaken in accordance with Section 5.3.2 of the HMP (MCO 2020).

It is proposed any unsurveyed land within the Subject Area containing features likely to be affected by subsidence impacts would also be managed under this framework to inform the Extraction Plan.

7.4.2.2 Monitoring of Aboriginal sites

Newly recorded Aboriginal heritage sites in the Subject Area would be managed in accordance with Section 5.9.1 of the HMP (MCO 2020).

No Aboriginal cultural heritage sites were identified of moderate-high or high scientific significance in the UG2 Extended Mining Area.

7.4.2.3 Previously unrecorded Aboriginal heritage sites

Previously unrecorded Aboriginal heritage sites within the Subject Area would be managed in accordance with Section 5.10 of the HMP (MCO 2020).

The proposed management mitigation measures relate to subsidence impacts only. Any surface disturbance would require further assessment.

7.5 Consideration of cumulative impacts

All Aboriginal heritage sites and Country are considered to have high cultural value to the RAPs. The proposed works will result in an overall increase in harm and loss of values to these Aboriginal heritage sites and landscapes.

Harm to 37 known Aboriginal heritage sites has been approved within the Subject Area. As noted in Table 16, the Modified layout would not result in any change in the approved subsidence impacts to Aboriginal heritage sites within the UG2 Approved Mining Area.

The UG2 Modification would result in an increase in potential for harm and loss of values to five (5) Aboriginal heritage sites considered to have high cultural value and low and low-moderate scientific value in the UG2 Extended Mining Area.

Taken within the context of the over 550 known Aboriginal heritage sites across the MCC and those across Ulan and Wilpinjong Coal Mines, the UG2 Modification with incorporation of appropriate management and mitigation measures would not result in a significant increase in cumulative impacts to scientific values of Aboriginal cultural heritage.

8. Conclusion and recommendations

The existing HMP (MCO 2020) anticipates the type of harm described in this assessment, and as such provides a robust management framework within which to manage both the impacts and avoidance of harm to Aboriginal heritage sites and values. While the management measures recommended herein are consistent with the currently approved plan, management should be undertaken consistent with the contemporary management plan that exists at the time of the works.

The following recommendations have been made (Table 18). Site specific management measures are detailed in Table 19.

Table 18: Recommendations

Recommendations	
Continued consultation with RAPs	
1.	MCO would continue to engage with the RAPs throughout the assessment and activities associated UG2 Modification in accordance with the procedures outlined in Section 5.1 of the HMP (MCO 2020).
Management of the Rock shelter Management Area, including S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134)	
2.	MCO maintains performance measures, contingency plans and improves strategies to achieve these for the Rock Shelter Management Area, including S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134). Detailed monitoring measures (e.g. baseline recording, real-time monitoring, visual inspections etc.) for S2MC236 would be determined in consideration of outcomes of further detailed assessment undertaken to inform preparation of an Extraction Management Plan. Trigger Action Response Plans (TARPs) would also be developed to inform implementation of mitigation measures in consideration of monitoring outcomes. The HMP (MCO 2020) would be updated to incorporate any revised monitoring measures and associated TARPs.
General	
3.	If approved, the HMP (MCO 2020) would be updated to include the extent of the UG2 Extended Mining Area and the management of Aboriginal heritage values within it.
4.	Management of Aboriginal heritage sites in the Subject Area be undertaken in accordance with the procedures outlined in the HMP (MCO 2020).

Table 19: Site specific management recommendations for sites within the Subject Area.

Aboriginal Heritage Site	Description	AHIMS ID#	Location	Cultural Value	Scientific Value	Proposed Management Strategy
PAD 10 Moolarben Coal	Rock Shelter with PAD	36-3-0956	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
PAD 11 Moolarben Coal	Rock Shelter with PAD	36-3-0957	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
PAD 4 Moolarben Coal	PAD	36-3-0883	UG2 AMA	High	Low	Complete detailed recording prior to impact Undertake a monitoring program in accordance with Section 5.9.1 of the HMP
PAD 5 Moolarben Coal	Rock Shelter with PAD	36-3-0884	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
PAD 8 Moolarben Coal	Rock Shelter with Artefacts and PAD	36-3-0954	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
PAD 9 Moolarben Coal	Rock Shelter with PAD	36-3-0955	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
S1MC054	Artefacts	36-3-0859	UG2 AMA	High	Low	Unmitigated impacts
S1MC055	Rock Shelter with Artefacts	36-3-0860	UG2 AMA	High	Moderate	Complete baseline recording Undertake a monitoring program in accordance with Section 5.9.1 of the HMP

Aboriginal Heritage Site	Description	AHIMS ID#	Location	Cultural Value	Scientific Value	Proposed Management Strategy
						Undertake surface collection and archaeological excavation where warranted where monitoring indicates impacts are likely
S1MC056	Rock Shelter with Artefacts	36-3-0861	UG2 AMA	High	Low	Unmitigated impact.
S1MC057	Artefacts	36-3-0862	UG2 AMA	High	Low	Unmitigated impact.
S1MC074	Isolated Artefact	36-3-0879	UG2 AMA	High	Low	Unmitigated impact.
S1MC075	Isolated Artefact	36-3-0880	UG2 AMA	High	Low	Unmitigated impact.
S1MC076	Isolated Artefact	36-3-0881	UG2 AMA	High	Low	Unmitigated impact.
S1MC077	Isolated Artefact	36-3-0882	UG2 AMA	High	Low	Unmitigated impact.
S1MC406	Artefacts	36-3-3302	UG2 AMA	High	Low	Unmitigated impact.
S1MC407	Artefacts	36-3-3300	UG2 AMA	High	Low	Unmitigated impact.
S1MC409	Rock Shelter with PAD	36-3-3303	UG2 AMA	High	Low	Unmitigated impact.
S1MC438	Isolated Artefact	36-3-3454	UG2 AMA	High	Low-Moderate	Unmitigated impacts.
S2MC236	Rock Shelter with Art and Artefacts	36-3-0016 & 36-3-0134	UG2 AMA	High	High	S2MC236 would be subject to avoidance Rock shelter sites and PAD sites with potential for subsidence impacts or blasting would be subject to a comprehensive monitoring regime (Section 5.9.1 of the HMP).
S2MC237	Isolated Artefact	36-3-1382	UG2 AMA	High	Low	Unmitigated impact.
S2MC238	Artefacts	36-3-1383	UG2 AMA	High	High	Unmitigated impact.
S2MC239	Artefacts	36-3-1384	UG2 AMA	High	Low	Unmitigated impact.
S2MC411	Artefacts	36-3-3320	UG2 AMA	High	Low	Unmitigated impact.
S2MC412	Isolated Artefact	36-3-3321	UG2 AMA	High	Low-Moderate	Unmitigated impact.
S2MC413	Isolated Artefact	36-3-3322	UG2 AMA	High	Low	Unmitigated impact.
S2MC414	Isolated Artefact	36-3-3323	UG2 AMA	High	Low	Unmitigated impact.
S2MC415	Isolated Artefact	36-3-3324	UG2 AMA	High	Low	Unmitigated impact.
S2MC416	Artefacts	36-3-3450	UG2 AMA	High	Low	Unmitigated impact.

Aboriginal Heritage Site	Description	AHIMS ID#	Location	Cultural Value	Scientific Value	Proposed Management Strategy
S2MC417	Artefacts	36-3-3451	UG2 AMA	High	Moderate	Unmitigated impact.
S2MC418	Isolated Artefact	36-3-3449	UG2 AMA	High	Low	Unmitigated impact.
S2MC419	Artefacts	36-3-3448	UG2 AMA	High	Low	Unmitigated impact.
S2MC420	Artefacts	36-3-3452	UG2 AMA	High	Low	Unmitigated impact.
S2MC438*	Isolated Artefact	36-3-3807	UG2 AMA	High	Low	Unmitigated impact.
S2MC439*	Rock Shelter with PAD	36-3-3808	UG2 AMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC440*	Rock Shelter with Artefacts and PAD	36-3-3809	UG2 AMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC441*	Rock Shelter with Artefacts and PAD	36-3-3810	UG2 EMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC442*	Rock Shelter with PAD	36-3-3812	UG2 EMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC443*	Rock Shelter with PAD	36-3-3811	UG2 EMA	High	Low	Unmitigated impact
S2MC444*	Rock Shelter with PAD	36-3-3813	UG2 AMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC445*	Rock Shelter with PAD	36-3-3817	UG2 AMA	High	Low	Unmitigated impact.
S2MC446*	Rock Shelter with Artefacts and PAD	36-3-3814	UG2 EMA	High	Low	Complete detailed recording prior to impact Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP).
S2MC447*	Rock Shelter with Artefact	36-3-3815	UG2 EMA	High	Low	Complete detailed recording prior to impact

Aboriginal Heritage Site	Description	AHIMS ID#	Location	Cultural Value	Scientific Value	Proposed Management Strategy
						Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP).

**Newly recorded site*

UG2 AMA = UG2 Approved Mining Area.

UG2 EMA = UG2 Extended Mining Area.

References

- Australian Government (1992) National Strategy for Ecologically Sustainable Development. Prepared by the Ecologically Sustainable Development Steering Committee: Endorsed by the Council of Australian Governments.
- Australian Heritage Commission (2002) Ask First: A guide to respecting Indigenous Heritage places and values.
- Australia ICOMOS (2013) The Burra Charter. Australia ICOMOS, Burwood.
- DECCW (2010a) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. New South Wales Department of Environment, Climate Change and Water, Sydney.
- DECCW (2010b) *Aboriginal Cultural Heritage Consultation Requirements for Proponents. Part 6 National Parks and Wildlife Act 1974*. Department of Environment, Climate Change and Water, Sydney.
- Haglund, L. (1999) Addendum to Ulan Coal Mines Second Longwall Project Environmental Statement. Report to Ulan Coal Mines Ltd.
- Hamm, G. (2006a) Moolarben Coal Project - Aboriginal Cultural Heritage Assessment Report. Report to Moolarben Coal Mines Pty Ltd.
- Hamm, G. (2008a) Moolarben Coal Project - Aboriginal Cultural Heritage Assessment Report Stage 2. Report Prepared for Moolarben Coal Mine.
- Hamm, G. (2008b) Aboriginal Heritage Plan for MCP Stage 1 Development Areas: Open Cut 1 and Main Infrastructure Area. Report Prepared for Moolarben Coal Mine.
- Horton, D. (1994) *Encyclopaedia of Aboriginal Australia*. Aboriginal Studies Press, Canberra.
- Kuskie, P. (2009) Ulan Coal Continued Operations: Aboriginal Heritage Assessment Volumes A and B. Report to Ulan Coal Mines Ltd.
- Kuskie, P. (2013) Moolarben Coal Project – Stage 1 Optimisation Modification, Near Ulan, Central Tablelands of New South Wales: Aboriginal Cultural Heritage Assessment. Report to Moolarben Coal.
- Liverpool LEP. (2008) Liverpool Local Environmental Plan 2018 under the *Environmental Planning and Assessment Act 1979*. New South Wales.
- McCarthy, F. D. (1976) *Australian Aboriginal Stone Implements: Including Bone, Shell and Tooth Implements*. The Australian Museum Trust, Sydney.
- MCO (2020) Moolarben Coal Operations Heritage Management Plan.
- Murphy, B.W. and Lawrie J.M., (1998) *Soil Landscapes of the Dubbo 1:250,000 Sheet*, NSW Department of Land and Water Conservation, Sydney.
- NSW Heritage Office (2001) *Assessing heritage significance – A NSW Heritage Manual update*. Office of Environment and Heritage, Sydney.

NSW Minerals Council (2010) *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects*.

Office of Environment and Heritage (2011) *Applying for an Aboriginal Impact Permit: Guide for applicants*.

Office of Environment and Heritage (2011) *Guide to investigating, assessing and reporting on Aboriginal Cultural heritage in NSW: Part 6 National Parks and Wildlife Act 1974*, Office of Environment and Heritage, Sydney South, N.S.W.

Pearson, M. (1981) *Seen Through Different Eyes: Changing Land Use and Settlement Patterns in the Upper Macquarie River Region of NSW from Prehistoric Times to 1860*. Ph.D. Thesis, Department of Prehistory and Anthropology, Australian National University, Canberra.

Senior and Rudder (2005) *A First Wiradjuri Dictionary*.

Tindale, N. (1974) *Aboriginal Tribes of Australia*. ANU Press, Canberra.

Appendix A: Archaeological Report

Archaeological Report

Moolarben Coal Complex UG2 Modification, Ulan NSW

Mid-Western Regional Council Local Government Area

Prepared for Moolarben Coal Operations Pty Ltd

Prepared by Niche Environment and Heritage Pty Ltd | 19 November 2021



Document control

Project number	Client	Project manager	LGA
6075	Moolarben Coal Operations Pty Ltd	Clare Anderson	Mid-Western Regional Council

Version	Author	Review	Status	Date
D1	Chelsea Dell Freeman, Clare Anderson	Clare Anderson	Draft	26 June 2021
D2	Clare Anderson	-	Draft	27 July 2021
D3	Clare Anderson	Resource Strategies	Draft	23 September 2021
Rev1	Clare Anderson	Moolarben Coal Complex	Draft	24 September 2021
Rev2	Clare Anderson	Resource Strategies	Draft	12 October 2021
Rev3	Chelsea Dell Freeman, Clare Anderson	Resource Strategies, Moolarben Coal Complex	Draft	12 October 2021
Rev4	Chelsea Freeman, Clare Anderson	-	Draft	15 October 2021
Rev5	Chelsea Freeman, Clare Anderson	Resource Strategies, Moolarben Coal Operations	Final Draft	16 November 2021
Rev6	Clare Anderson	-	Final Draft	19 November 2021

© Niche Environment and Heritage Pty Ltd (ACN 137 111 721) 2019

Copyright protects this publication. All rights reserved. Except for purposes permitted by the Australian *Copyright Act 1968*, reproduction, adaptation, electronic storage, transmission and communication to the public by any means is prohibited without our prior written permission. Any third party material, including images, contained in this publication remains the property of the specified copyright owner unless otherwise indicated, and is used subject to their licensing conditions.

Important information about your Report

Your Report has been written for a specific purpose: The Report has been developed for a specific purpose as agreed by us with you and applies only for that purpose. Unless otherwise stated in the Report, this Report cannot be applied or used when the nature of the specific purpose changes from that agreed. **Report for the sole benefit of Niche's client:** This Report has been prepared by Niche for you, as Niche's client, in accordance with our agreed purpose, scope, schedule and budget. This Report should not be applied for any purpose other than that stated in the Report. Unless otherwise agreed in writing between us, the Report has been prepared for your benefit and no other party. Other parties should not and cannot rely upon the Report or the accuracy or completeness of any recommendation. **Limitations of the Report:** The work was conducted, and the Report has been prepared, in response to an agreed purpose and scope, within respective time and budget constraints, and possibly in reliance on certain data and information made available to Niche. The analyses, assessments, opinions, recommendations, and conclusions presented in this Report are based on that purpose and scope, requirements, data, or information, and they could change if such requirements or data are inaccurate or incomplete. **No responsibility to others:** Niche assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with, or conclusions expressed in the Report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with, or conclusions expressed in the Report.

Niche Environment and Heritage Pty Ltd (ACN 137 111 721)
Enquiries should be addressed to Niche Environment and Heritage
PO Box 2443, Parramatta NSW 1750, Australia
Email: info@niche-eh.com

Executive summary

Moolarben Coal Operations Pty Ltd (MCO) is investigating options to optimise UG2 operations within existing mining lease areas, including extending underground mining to the southeast and increasing the maximum extraction height from 3.0 metres (m) to 3.5 m across the entire UG2 mining domain. This optimisation and extension would be the subject of environmental assessment and approval processes in the form of a Modification application to the Moolarben Coal Complex (MCC) Stage 2 Project Approval (08_0135). The Modification would be assessed under Section 4.55 of the *Environmental Planning and Assessment Act 1979*.

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by MCO, to prepare an Aboriginal Cultural Heritage Assessment (ACHA) report and Archaeological Report (AR) to inform the Environmental Assessment of the proposed Modification to the Stage 2 Project Approval (08_0135).

This AR presents the results of an archaeological assessment within the Subject Area, which includes both the UG2 Approved Mining Area and the UG2 Extended Mining Area. The survey program was completed by Niche and representatives of the Registered Aboriginal Parties (RAPs), to inform the ACHA report.

The Aboriginal cultural heritage survey program was undertaken on Tuesday 11 May to Wednesday 12 May 2021. A total of 70 ha was surveyed within the Subject Area. The survey sampled a range of landforms including open depressions and gullies, slopes, ridges and crests. 100% of steep slopes and cliffs within the UG2 Extended Mining Area were surveyed and approximately 90% of moderate slopes were surveyed. Over 57 sandstone overhangs were inspected. Ten (10) new Aboriginal heritage sites were identified within the Subject Area. One (1) new Aboriginal heritage site was identified outside the Subject Area during the survey.

A total of 42 Aboriginal heritage sites have now been identified in the Subject Area comprising of 37 known Aboriginal heritage sites identified in the UG2 Approved Mining Area and five (5) known Aboriginal heritage sites identified in the UG2 Extended Mining Area.

All Aboriginal heritage sites and Country are considered to have high cultural value by the RAPs.

While there is an increase in the predicted subsidence parameters at 18 sites, the overall impact assessments for the Aboriginal heritage sites within the Approved Mining Area based on the Approved Layout do not change for the Modified Layout. This includes the high significance rock shelter, art and artefact scatter site S2MC236 associated with cliff line C7, which is protected by a sterilised coal pillar within a Rock Shelter Management Area. The Modified Layout would not result in any change to the existing subsidence performance measure for S2MC236 of “negligible subsidence impacts or environmental consequences”. Aboriginal heritage sites at cliff line C9 have had impacts reduced through the use of non-subsiding secondary workings and the establishment of a setback at LW202a and LW202b.

Of the five (5) Aboriginal heritage sites within the UG2 Extended Mining Area, three (3) Aboriginal heritage sites (of low to low-moderate archaeological significance) are considered unlikely to experience subsidence impacts as they would not be undermined and two (2) Aboriginal heritage sites (both low archaeological significance) are predicted likely to experience subsidence impacts.

The existing MCO Heritage Management Plan (HMP) (MCO 2020) anticipates the type of harm described in this assessment, and as such provides a robust management framework within which to manage both the impacts and avoidance of harm to Aboriginal heritage sites and values. Management and mitigation

measures are provided in Section 14 and 15 of this AR. While the management measures recommended herein are consistent with the currently approved HMP (MCO 2020), management would be undertaken consistent with the contemporary management plan that exists at the time of the works.

Table of Contents

Executive summary	i
1. Introduction	1
1.1 Background and scope.....	1
2. Investigators and contributors	4
3. Description of development proposal	5
3.1 Proposed development description	5
3.2 Subject Area.....	5
4. Previous archaeological work	7
4.1 Heritage registers	7
4.2 Previous heritage and archaeological assessments	9
5. Landscape context	23
5.1 Overview.....	23
5.2 Topography.....	23
5.3 Geology.....	23
5.4 Soils.....	26
5.5 Hydrology.....	28
5.6 Ecology.....	28
5.7 Past land use and disturbance.....	30
5.8 Summary.....	31
6. Regional character	32
7. Predictive model	35
8. Sampling strategy	37
8.1 Archaeological survey.....	37
9. Survey methods	38
10. Survey Results	39
10.1 Survey coverage.....	39
10.2 Survey results	42
10.3 Description of individual sites	43
11. Analysis and discussion	51
11.1 Site types and features within the Subject Area	51
11.2 Revisiting the predictive model.....	52
11.3 Archaeological research questions and opportunities.....	52

12. Scientific values and significance assessment	54
12.1 Assessment framework	54
12.2 Other approaches	54
12.3 Assessment of archaeological significance.....	56
13. Impact assessment	66
13.1 Potential for harm	66
14. Management and mitigation measures	75
14.1 Management framework.....	75
14.2 Designing to avoid harm.....	75
14.3 Justifying harm.....	75
14.4 Mitigating harm	75
15. Conclusion and recommendations	77
References.....	82
Annex 1: AHIMS extensive search.....	87
Annex 2: Field data for Aboriginal Heritage Sites.....	88
Annex 3: Field data for Overhangs	89

List of Figures

Figure 1: Location of Subject Area within regional context (Source: Moolarben Coal Operations and Niche)	2
Figure 2: The Subject Area (Source: Moolarben Coal Operations and Resource Strategies).....	6
Figure 3: Terrain and slope (Source: BCD, Moolarben Coal Operations and Niche).....	24
Figure 4. Geology in the local area (Source: BCD, Moolarben Coal Operations and Niche)	25
Figure 5: Soil landscape and hydrology in the local area (Source: BCD, Moolarben Coal Operations and Niche).....	27
Figure 6: Location of AHIMS Sites (Source: Heritage NSW, Moolarben Coal Operations and Niche).....	29
Figure 7: Survey coverage and results (Source: Moolarben Coal Operations and Niche)	41

List of Plates

Plate 1: S2MC236 (AHIMS ID#36-3-0134) general location (Source: Hamm 2008b).....	11
Plate 2: S2MC236 (AHIMS ID#36-3-0134) showing site and art panels (Source: Hamm 2008b).....	11
Plate 3: Art stencils at S2MC 236 (AHIMS ID#36-3-0136) (Source: Hamm 2008b).....	12
Plate 4: Basalt outcrop within the Subject Area.....	26
Plate 5: Second basalt outcrop within the Subject Area.	26
Plate 6: Open woodland on slopes looking towards cleared gully within the Subject Area.....	30
Plate 7:Kurrajong, seen across the Subject Area has a range of cultural uses.....	30
Plate 8: Nguuguung (Tawny frogmouth) observed in Subject Area.....	30
Plate 9: Sydney coastal fig trees seen on upper slopes within the Subject Area.....	30
Plate 10: General photo of a ridge and slope landforms.	39
Plate 11: Visibility and exposure in the ridge and slope landforms.	39
Plate 12: General photo of slope with rock formations and overhangs.	40
Plate 13: Lower slopes and open depression.....	40
Plate 14: S2MC438 (AHIMS ID#36-3-3807), general location.	43
Plate 15: S2MC438 (AHIMS ID#36-3-3807), chert flake.	43
Plate 16: S2MC439 (AHIMS ID#36-3-3808), Rock Shelter with PAD, facing north-east.....	43
Plate 17: S2MC439 (AHIMS ID#36-3-3808), Rock Shelter with PAD, facing south.....	43
Plate 18: S2MC439 (AHIMS ID#36-3-3808), Rock Shelter with PAD, facing south.....	44

Plate 19: S2MC440 (AHIMS ID#36-3-3809), Rock Shelter with Artefact and PADs, general location, facing north-east..... 44

Plate 20: S2MC440 (AHIMS ID#36-3-3809), Rock Shelter with Artefact and PAD, facing north-east..... 44

Plate 21: S2MC440 (AHIMS ID#36-3-3809), rock shelter detail with wombat burrowing at back of rock shelter..... 44

Plate 22: Quartz complete flake located at S2MC440 (AHIMS ID#36-3-3809). 44

Plate 23: S2MC441 (AHIMS ID#36-3-3810), Rock Shelter with Artefacts and PAD, facing south-east. 45

Plate 24: S2MC441 (AHIMS ID#36-3-3810), Rock Shelter with Artefacts and PAD, facing north-east. 45

Plate 25: S2MC441 (AHIMS ID#36-3-3810), Rock Shelter with Artefacts and PAD, facing south-east. 45

Plate 26: S2MC441 (AHIMS ID#36-3-3810), Rock Shelter with Artefacts and PAD, facing north-east. 45

Plate 27: General photo S2MC442 (AHIMS ID#36-3-3812), facing north-west. 46

Plate 28: General photo of view from S2MC442 (AHIMS ID#36-3-3812), facing south-west..... 46

Plate 29: S2MC443 (AHIMS ID#36-3-3811), facing east..... 46

Plate 30: Rock shelter detail S2MC443 (AHIMS ID#36-3-3811). 46

Plate 31: General photo of S2MC443 (AHIMS ID#36-3-3811), facing north-west. 47

Plate 32: General photo of view from S2MC443 (AHIMS ID#36-3-3811), facing south..... 47

Plate 33: S2MC444 (AHIMS ID#36-3-3813), Rock Shelter with PAD, facing south-east..... 47

Plate 34: S2MC444 (AHIMS ID#36-3-3813), Rock Shelter with PAD, facing south-west..... 47

Plate 35: S2MC444 (AHIMS ID#36-3-3813), Rock Shelter with PAD, facing south-west..... 47

Plate 36: S2MC444 (AHIMS ID#36-3-3813), Rock Shelter with PAD, facing south-east..... 47

Plate 37: S2MC445 (AHIMS ID#36-3-3817), Rock Shelter with PAD, facing south-west..... 48

Plate 38: S2MC445 (AHIMS ID#36-3-3817), Rock Shelter with PAD, facing west. 48

Plate 39: S2MC445 (AHIMS ID#36-3-3817), Rock Shelter with PAD, facing east..... 48

Plate 40: View from S2MC445 (AHIMS ID#36-3-3817), Rock Shelter with PAD, facing north-east. 48

Plate 41: S2MC446 (AHIMS ID#36-3-3814), Rock Shelter with Artefact and PADs, facing south, artefact located in foreground..... 49

Plate 42: S2MC446 (AHIMS ID#36-3-3814), Rock Shelter with Artefact and PAD, facing south-west..... 49

Plate 43: S2MC446 (AHIMS ID#36-3-3814), backed chert flake..... 49

Plate 44: S2MC446 (AHIMS ID#36-3-3814), Rock Shelter with Artefact and PAD, interior detail, facing south. 49

Plate 45: S2MC447 (AHIMS ID#36-3-3815), Rock Shelter with Artefacts, facing north-west.....	49
Plate 46: S2MC447 (AHIMS ID#36-3-3815) Rock Shelter with Artefacts, facing south-west.....	49
Plate 47: Quartz flake located at site S2MC447 (AHIMS ID#36-3-3815).....	50
Plate 48: Landscape view from S2MC447 (AHIMS ID#36-3-3815), Rock Shelter with Artefacts, facing south-east.....	50
Plate 49: S2MC448 (AHIMS ID#36-3-3816), general location.....	50

List of Tables

Table 1: List of fieldwork participants, affiliation, and dates.....	4
Table 2: Summary of AHIMS site features within the search area.....	7
Table 3: Previously Recorded Aboriginal cultural heritage sites within the UG2 Approved Mining Area.....	7
Table 4: Listed heritage items in proximity to the Subject Area.....	9
Table 5: Summary of past Aboriginal archaeological assessments at the Moolarben Coal Complex.....	14
Table 6: Summary of Assessments at the Ulan Coal Mine (Source: Kuskie 2013a: 15).....	18
Table 7: Summary of Assessments at the Wilpinjong Coal Mine (Source: Kuskie 2013b).....	20
Table 8: Survey coverage and landform summary.....	40
Table 9: Newly recorded Aboriginal heritage sites.....	42
Table 10: Summary of site types in Subject Area.....	51
Table 11: Scientific values as outlined by the Burra Charter.....	54
Table 12: Criteria specified for archaeological significance.....	55
Table 13: Criteria for grading scientific values.....	55
Table 14: Summary of Aboriginal heritage sites by scientific significance rating and location.....	56
Table 15: Significance Assessment – previously recorded sites.....	58
Table 16: Significance Assessment – newly recorded sites.....	64
Table 17: Comparison of Maximum Predicted Conventional Subsidence Parameters based on the Approved Layout and the Modified Layout, taken from Table 4.3 in MSEC (2021).....	67
Table 18: Comparison of Maximum Predicted Conventional Subsidence Parameters for the Cliffs based on the Approved and Modified Layouts (Table 5.7 in MSEC 2021).....	68
Table 19: Changes to approved impacts for Aboriginal heritage sites*.....	71
Table 20: Impact assessment summary for Subject Area.....	72

Table 21: Recommendations..... 77

1. Introduction

1.1 Background and scope

The Moolarben Coal Complex (MCC) is located approximately 40 kilometres (km) north of Mudgee in the Western Coalfields of New South Wales (NSW) within the administrative boundaries of the Mid-Western Regional Council Local Government Area and the Mudgee Local Aboriginal Land Council (Figure 1).

Moolarben Coal Operations Pty Ltd (MCO) is the operator of the MCC on behalf of the Moolarben Joint Venture (Moolarben Coal Mines Pty Ltd [MCM], Yancoal Moolarben [YM] Pty Ltd and a consortium of Korean power companies). MCO, MCM and YM are wholly owned subsidiaries of Yancoal Australia Limited (Yancoal).

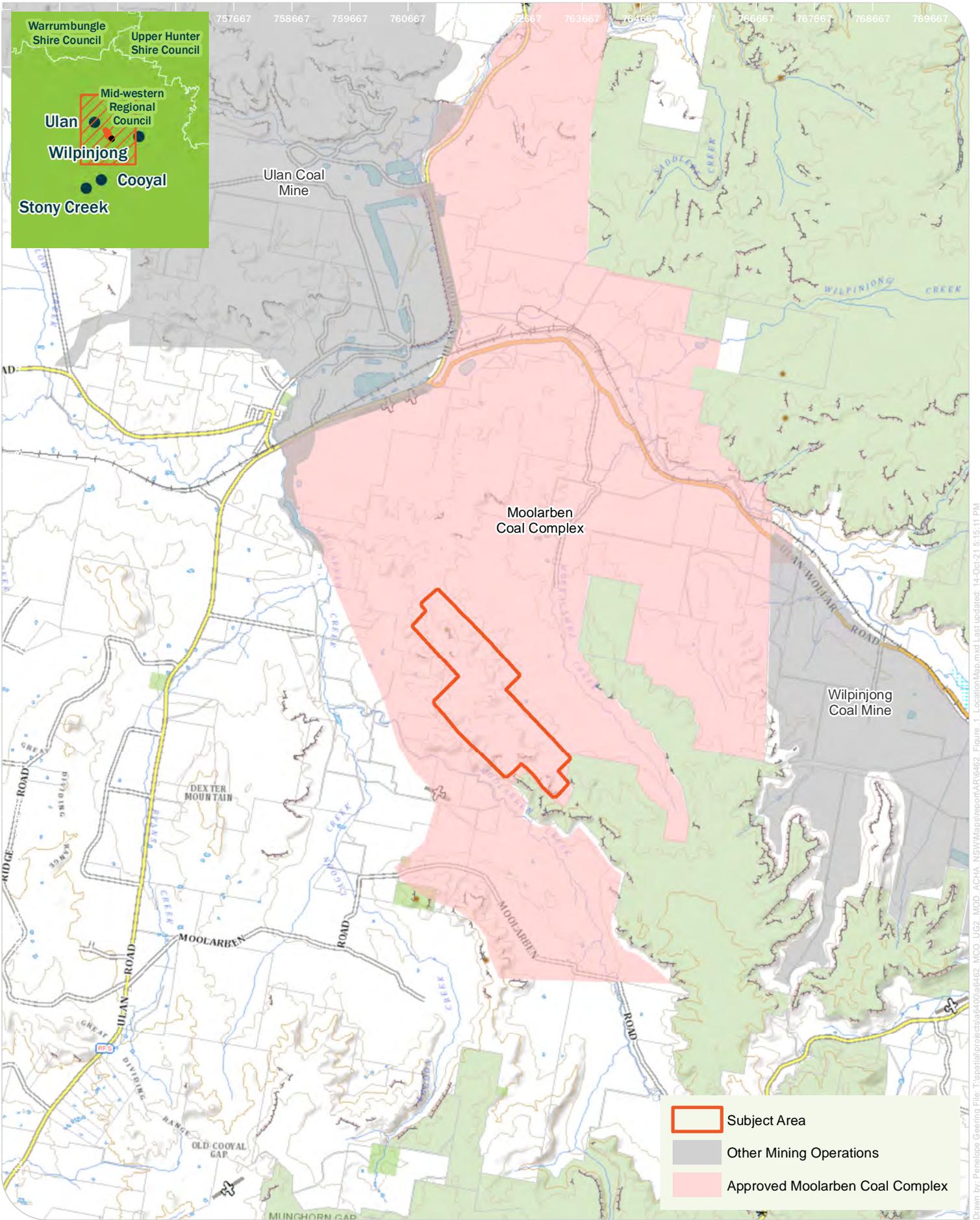
The MCC comprises four approved open cut mining areas (OC1 to OC4), three approved underground mining areas (UG1, UG2 and UG4) and other mining related infrastructure (including coal processing and transport facilities). Mining operations at the MCC are currently approved until 31 December 2038 in accordance with Project Approval (05_0117) (Moolarben Coal Project Stage 1) (as modified) and Project Approval (08_0135) (Moolarben Coal Project Stage 2) (as modified).

The management of Aboriginal heritage at the MCC is undertaken in accordance with the currently approved MCO Heritage Management Plan (HMP) (MCO 2020). MCO has identified an opportunity to optimise UG2 operations within existing mining lease areas, including extending underground mining to the southeast and increasing the maximum extraction height from 3.0 metres (m) to 3.5 m across the entire UG2 mining domain. This optimisation and extension would be the subject of environmental assessment and approval processes in the form of a Modification application to the Stage 2 Project Approval (08_0135). The Modification would be assessed under Section 4.55 of the *Environmental Planning and Assessment Act 1979*.

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by MCO to prepare an Aboriginal Cultural Heritage Assessment (ACHA) report and Archaeological Report (AR) to inform the Environmental Assessment of the proposed Modification to the Stage 2 Project Approval (08_0135).

This AR presents the results of an archaeological assessment, including a survey program completed by Niche and representatives of the Registered Aboriginal Parties (RAPs), to inform the ACHA Report. This AR and the ACHA report have been prepared in accordance with (but not limited to) the following regulations and guidelines:

- *Aboriginal cultural heritage consultation requirements for proponents 2010* (ACHCRs) (NSW Department of Environment, Climate Change and Water [DECCW] 2010a) (hereafter referred to as 'The Consultation Guidelines').
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (hereafter referred to as 'The Code of Practice').
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (NSW Office of Environment and Heritage [OEH] 2011).
- NSW Minerals Industry Due Diligence Code of Practice for the Projection of Aboriginal Objects (NSW Minerals Council 2010).
- The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (Australia ICOMOS 2013).
- NSW *National Parks and Wildlife Regulation 2019*.



Drawn by: Penelope Geering File: T:\spatial\proj\cas640\6462_MCO_UG2_MOD_ACHA_NSWMap\report\AR\6462_Figure_1_LocationMap.mxd Last updated: 14-Oct-21 5:15:11 PM



Niche PM: Clare Anderson
 Niche Proj. #: 6462
 Client: Moolarben Coal Operations

Location Map
 UG2 Modification - Archaeological Report

Figure 1

As per the Code of Practice, the objectives of the archaeological assessment undertaken to inform the ACHA were:

- Describe the aims of the project and the rationale for the archaeological assessment.
- Present a feasible and appropriate methodology for the archaeological survey and other investigations.
- Undertake additional surveys in accordance with Section 5.3.1 and Section 5.3.2 of the HMP (MCO 2020).
- Present the findings and interpretation of the results within a wider context of archaeological knowledge and Aboriginal history.
- Ensure that the findings and interpretation of the results support the assessment and the archaeological significance of the Subject Area.

2. Investigators and contributors

This report was written by Clare Anderson (BA Hons, 14 years experience) and Chelsea Freeman (BA, 3 years experience) of Niche.

The following RAPs were consulted with and invited to provide advice on cultural heritage values during the assessment:

- Mudgee Local Aboriginal Land Council.
- Murong Gialinga Aboriginal and Torres Strait Islander Corporation.
- North East Wiradjuri Company Ltd.
- Warrabinga Native Title Claimants Aboriginal Corporation.
- Wellington Valley Wiradjuri Aboriginal Corporation.
- Warranha Ngumbaay.
- Craig McConnell.
- Aleisha Lonsdale

The consultation undertaken for the modification is described in the ACHA.

In accordance with the HMP (MCO 2020), Mudgee Local Aboriginal Land Council, Murong Gialinga Aboriginal and Torres Strait Islanders Corporation, North-East Wiradjuri Company Ltd, Wellington Valley Wiradjuri Aboriginal Corporation and Warrabinga Native Title Claimants Aboriginal Corporation were invited to participated in the archaeological survey of the Subject Area.

Table 1 provides a list of fieldwork participants

Table 1: List of fieldwork participants, affiliation, and dates

Participant	Affiliation	Dates
Rebecca Shanks	MCO, Environmental and Community Advisor	11/5/2021-12/5/2021
Clare Anderson	Niche	11/5/2021-12/5/2021
Chelsea Freeman	Niche	11/5/2021-12/5/2021
Emma Syme	MCO, Native Title Cultural Heritage Officer	11/5/2021-12/5/2021
Tyron Pennell	Warrabinga Native Title Claimants Aboriginal Corporation	11/5/2021-12/5/2021

3. Description of development proposal

3.1 Proposed development description

MCO are seeking to modify the Project Approval for Stage 2 of the MCC to allow changes to the currently approved operations of the UG2 mining domain (the UG2 Modification).

The Modification would comprise the following changes to the approved UG2:

- optimisation of the approved UG2 layout (including the extension of two approved longwall panels);
- increased UG2 extraction height from 3.0 metres (m) to 3.5 m;
- revised UG2 mining sequence;
- increased UG2 ROM coal production from 9.4 million tonnes (Mt) to 13.9 Mt;
- construction and operation of a remote services infrastructure area (including two UG2 service boreholes) within the approved OC4 disturbance footprint to support UG2 operations;
- development of an additional non-subsiding gate road along the southern boundary of the UG1 mining area to assist with ventilation in UG2; and
- small reduction in the approved OC4 extent to accommodate the optimised UG2 layout.

The UG2 Modification does not propose any additional surface disturbance. There is also no proposed change to the annual combined underground production rate of up to 8 Mtpa ROM coal.

3.2 Subject Area

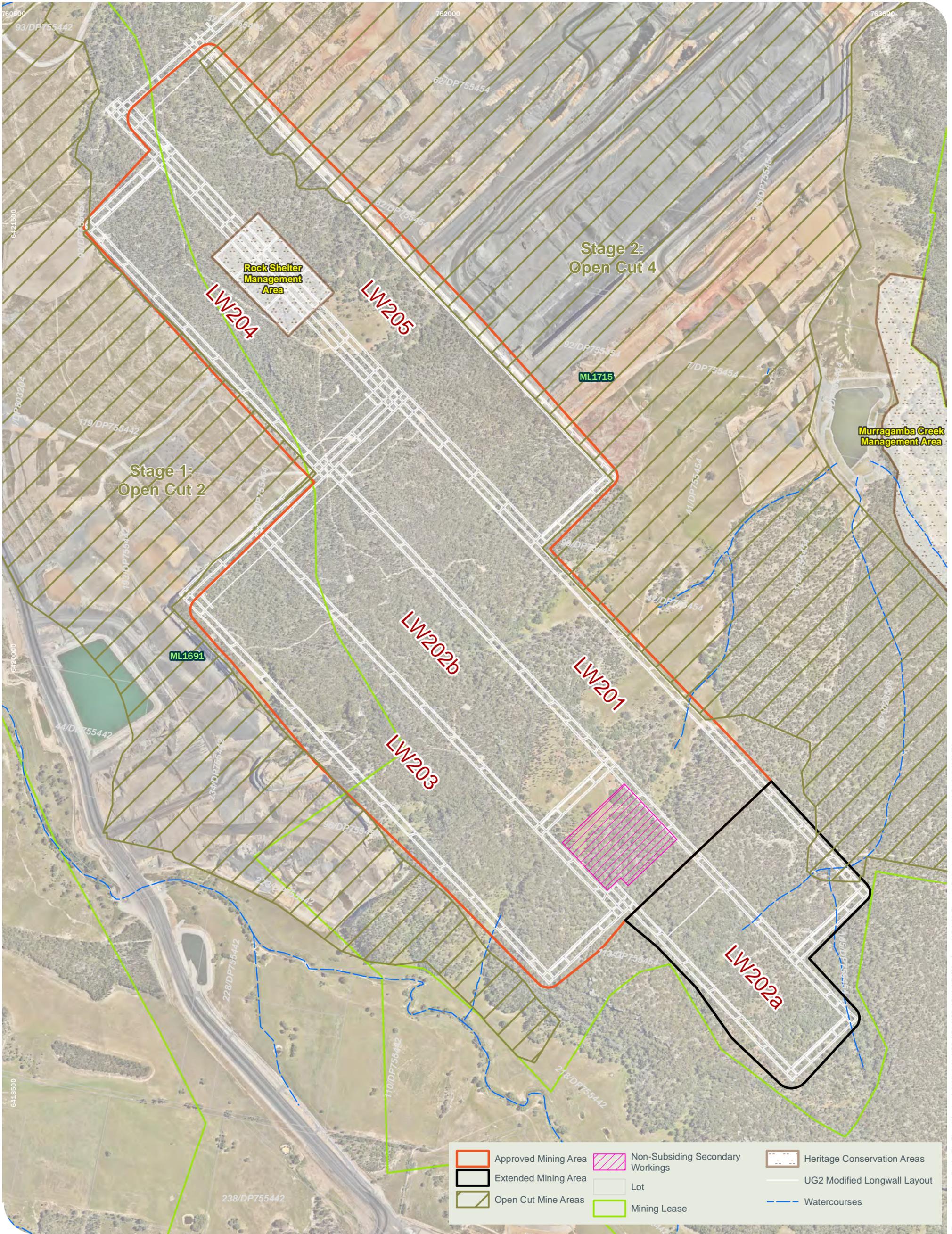
The Subject Area (Figure 2) comprises the following components:

- The UG2 Approved Mining Area.
- Rock Shelter Management Area.
- UG2 Extended Mining Area

For the purposes of this assessment, management of Aboriginal heritage sites within the UG2 Approved Mining Area would be guided by the approved HMP (MCO 2020). Therefore, this AR assesses both the UG2 Approved Mining Area and UG2 Extended Mining Area, with a focus on the areas of land identified in the proposed UG2 Extended Mining Area in Figure 2. As part of the early assessment process, a larger longwall extension area was identified for survey.

This assessment does not include consideration of development of an additional non-subsiding gate road along the southern boundary of the UG1 mining area to assist with ventilation in UG2.

The proposed development has the potential to harm Aboriginal objects through subsidence induced impacts.



Drawn by: Penelope Geering File: T:\spatial\projects\6400\6462_MCO_UG2_MOD_ACHA_NSW\Mapa\report\AR\6462_Figure_2_SubjectArea.mxd Last updated: 14-Oct-21 5:44:30 PM

4. Previous archaeological work

4.1 Heritage registers

4.1.1 Aboriginal Heritage Information Management System (AHIMS) and Moolarben Coal Complex Aboriginal Sites Database.

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) was carried out on 3 March 2021 (AHIMS Client ID #572903 & 572908; Annex 1) for the Subject Area and surrounds. A total of 201 Aboriginal cultural heritage sites were identified within the search area. The recorded AHIMS sites within the search area consisted of Artefacts (including open artefact sites, also referred to as Artefact Scatters or Isolated Artefacts), Potential Archaeological Deposits (PAD), Art and Rock shelters with PAD.

Table 2: Summary of AHIMS site features within the search area

Site features	Total	Percentage
Artefacts (with/without PAD)	164	81%
Potential Archaeological Deposits (PAD)	31	15%
Rock Shelter with Art and Artefacts	1	0.5%
Rock Shelter with Artefacts (with/without PAD)	3	1.5%
Rock Shelter with PAD	2	1%
Total	201	100%

It must be noted that care should be taken when using the AHIMS database to reach conclusions about site prevalence or distribution. The distribution of registered sites does not reflect patterns of occupation, but rather is often indicative of survey coverage and conditions.

MCO also maintains a database of all Aboriginal sites at the MCC. The MCO Aboriginal Sites Database was found to be in accord with AHIMS.

32 Aboriginal cultural heritage sites are registered in AHIMS within the UG2 Approved Mining Area. These are listed in Table 3.

Table 3: Previously Recorded Aboriginal cultural heritage sites within the UG2 Approved Mining Area

Site name	AHIMS ID #	Site Type	Description
S1MC054	36-3-0859	Artefacts	Three stone artefacts, recorded by Hamm (2006a)
S1MC055	36-3-0860	Rock Shelter with Artefacts	A rock shelter with eight stone artefacts, recorded by Hamm (2006a)
S1MC056	36-3-0861	Rock Shelter with Artefacts	A rock shelter with one stone artefact, recorded by Hamm (2008)
S1MC057	36-3-0862	Artefacts	16 stone artefacts, recorded by Hamm (2006a)
S1MC074	36-3-0879	Isolated Artefact	A single stone artefact recorded by Hamm (2006a)
S1MC075	36-3-0880	Isolated Artefact	A single stone artefact recorded by Hamm (2006a)
S1MC076	36-3-0881	Isolated Artefact	A single stone artefact recorded by Hamm (2006a)
S1MC077	36-3-0882	Isolated Artefact	A single stone artefact recorded by Hamm (2006a)
PAD 4 Moolarben Coal	36-3-0883	PAD	Originally recorded by Hamm (2006a)
PAD 5 Moolarben Coal	36-3-0884	Rock Shelter with PAD	Originally recorded by Hamm (2006a)

Site name	AHIMS ID #	Site Type	Description
PAD 8 Moolarben Coal	36-3-0954	Rock Shelter with Artefacts and PAD	Originally recorded by Hamm (2006a)
PAD 9 Moolarben Coal	36-3-0955	Rock Shelter with PAD	Originally recorded by Hamm (2006a)
PAD 10 Moolarben Coal	36-3-0956	Rock Shelter with PAD	Originally recorded by Hamm (2006a)
PAD 11 Moolarben Coal	36-3-0957	Rock Shelter with PAD	Originally recorded by Hamm (2006a)
S2MC236	36-3-0016 & 36-3-0134	Rock Shelters with Art and Artefacts	A highly significant rock shelter with rock art and artefacts. UG2 was redesigned to reduce the risk of impact to this site.
S2MC237	36-3-1382	Isolated Artefact	A single stone artefact recorded by Hamm (2008a)
S2MC238	36-3-1383	Artefacts	A large stone artefact scatter comprising 104 stone artefacts, recorded by Hamm (2008a)
S2MC239	36-3-1384	Artefacts	Three stone artefacts, recorded by Hamm (2008)
S1MC407	36-3-3300	Artefacts	Open artefact scatter identified by AECON (2015)
S1MC406	36-3-3302	Artefacts	Artefact scatter with 30 artefacts located on and around an access track.
S1MC409	36-3-3303	Rock Shelter with PAD	A small low hanging rock shelter with PAD approximately 2m x 2m in size, no artefacts evident.
S2MC411	36-3-3320	Artefacts	Artefact scatter (11) located on a lower slope on the N side of a first order drainage/gully, stretching to 80m E-W and 40m N-S. Site includes quartz cores, complete and broken flakes and retouched flake.
S2MC412	36-3-3321	Isolated Artefact	An isolated quartz geometric microlith located on a lower slope on the S side of a first order drainage/gully.
S2MC413	36-3-3322	Isolated Artefact	A quartz flake located on a northerly lower slope on the S side of a first order drainage/gully.
S2MC414	36-3-3323	Isolated Artefact	A quartz retouched flake located on a easterly lower slope just west of an east facing plateau.
S2MC415	36-3-3324	Isolated Artefact	A crystal quartz core located on a N-S ridge.
S2MC419	36-3-3448	Artefacts	Two stone artefacts located on an eroded slope
S2MC418	36-3-3449	Isolated Artefact	An isolated quartz flake located on a slope within scrub vegetation.
S2MC416	36-3-3450	Artefacts	A chert complete flake, a quartz core (MD:38) were located approximately 30 m apart on a revegetated slope.
S2MC417	36-3-3451	Artefacts	Artefact scatter of 26 stone artefacts on north-east mid slope. Includes quartz cores, quartz complete and broken flakes, basalt flakes, a basalt core, crystal quartz complete and broken flakes, a chert core and a chert flake. Soils are a shallow sandy loam with bedrock exposed.
S2MC420	36-3-3452	Artefacts	Artefact scatter consisting of 6 artefacts located on a sandy rise/saddle.
S1MC438	36-3-3454	Isolated Artefact	One basalt complete flake It is located on a gentle upper slope south of OC2 pit wall

Source: Moolarben Coal Mines Site Database (February 2021). AHIMS – Aboriginal Heritage Information Management System.

Of the 32 previously recorded Aboriginal cultural heritage sites registered in AHIMS within the UG2 Approved Mining Area:

- A highly significant Rock Shelter with Art, Artefacts and Potential Archaeological Deposit, S2MC236 (AHIMS ID#36-3-0016, 36-3-0134), has been identified as requiring avoidance. As part of the outcomes of the original Environmental Impact Statement (EIS) for the UG2 Approved Mining Area, a Rock Shelter Management Area was implemented and the longwall layout was redesigned to provide additional support to reduce the likelihood of subsidence impact (Figure 2).
- The other 31 sites remain *in situ* within the UG2 Approved Mining Area, and on this basis will be considered in this AR.

There are no previously recorded Aboriginal heritage sites within the UG2 Extended Mining Area in AHIMS.

4.1.2 Other registers

Searches of the Australian World Heritage Database, the Commonwealth Heritage List, National Heritage List, State Heritage Register, State Heritage Inventory, the Mid-western Regional Council Local Environmental Plan (LEP) (2018) were conducted on 22 March 2021 and concluded that there are no recorded historical or Aboriginal heritage items within the Subject Area.

Table 4: Listed heritage items in proximity to the Subject Area

Heritage Register	Items in the Subject Area	Items nearby to the Subject Area
Australian World Heritage Database	Nil	Nil
Commonwealth Heritage List (CHL)	Nil	Nil
National Heritage List (NHL)	Nil	Nil
State Heritage Register (SHR)	Nil	Nil
State Heritage Inventory (SHI)	Nil	Nil
Schedule 5 of the LEP	Nil	Munghorn Gap Nature Reserve

Munghorn Gap Nature Reserve is listed as a Landscape Item immediately adjacent the Subject Area in Schedule 5 of the LEP. The reserve has been noted by the RAPs during previous stages of environmental assessment of the MCC as having significant cultural values. The Goulburn National Park and Munghorn Gap Nature Reserve Plan of Management (NSW National Parks and Wildlife Service [NPWS] 2003) states that the Goulburn National Park and Munghorn Gap Nature Reserve are areas of contemporary significance to Aboriginal people.

After the preliminary study undertaken for an assessment of a proposed dam in 1981 a total of 343 sites were recorded within the parks and reserves (Haglund 1981). These sites include a wide variety of evidence about Aboriginal peoples living in this landscape. This richness in sites is thought to be related to the use of the river valley as a major trading route between the coast and the western plains. The sites conserved in the park and reserve represent a significant cultural resource for the Aboriginal communities of the area, archaeological research and education. The recorded sites represent a small proportion of the total amount of information present within the park, as only a sample of the area was included in the surveys.

4.2 Previous heritage and archaeological assessments

4.2.1 Previous assessments in the Subject Area

The Subject Area has previously been assessed for Aboriginal heritage assessments as part of investigations for the Stage 2 Environmental Impact Assessment and a number of other assessments for activities within the MCC. Prior to this assessment, approximately 75% (243 ha) of the Approved Mining Area and 6% (6 ha)

of the Extended Mining Area had been surveyed. Previous heritage assessments within the Subject Area are summarised below.

Proceedings of Royal Society of Victoria, Vol II, pg. 150 Plate VIII., Fig. 5 (Matthews, R.H. 1985)

S2MC236, a highly significant and important rock shelter site with art, located within the Rock Shelter Management Area above the UG2 Approved Mining Area, was noted by Matthews in 1895.

“This large rock shelter is situated in an escarpment of sandstone rock, about three-quarters of a mile southerly from Portion No. 4, of 40 acres, in the Parish of Wilpinjong, County of Phillip. Its length is 79 feet, 25 feet deep from the front inwards, 6 feet 6 inches high where the roof meets the back wall, and increases in height outwards towards the front. The cave faces the north-east”.

A photograph from this publication has been provided by Mr. Bliss from Wellington Valley Wiradjuri Aboriginal Corporation which is reproduced in Appendix B of the ACHA.

Mankind Vol. 3 No. 6 1944 (McCarthy 1944)

S2MC236 was also reported to Fred McCarthy by a Mr J Milliken, Resident Engineer, in the mid 1940’s. McCarthy reports the site in his journal article for Mankind Vol. 3 No. 6 1944 (McCarthy 1944). It is described as Site Number 152, Murragamba, Gulgong Parish, Cave at Murragamba via Ulan. It contains hands, lizard and emu tracks in red. Its condition then was described as faded and vandalised. The site was later re-recorded by Bluff in 1987 and given a new NPWS site number 36-3-0134.

Ulan Rock Art Conservation and Monitoring Report (Lambert 1999)

The then NSW Department of Climate and Conservation investigated S2MC236 as part of a Ulan rock art conservation project (see Lambert 1999). Lambert reported that: “Being a remote site on private property, visitation levels are low and there is no recent visitor damage. The site is in need of management to control illegal practice of writing on the shelter walls”. The site is described as Wollar 1 but there was some confusion whether it had been previously recorded and registered. Lambert also commented that: “The cave provides adequate protection from surface water and no intervention in the form of artificial drip-lines are proposed. The art appears stable and in good condition” (Lambert 1999:4). There was a discussion on how the site should be fully recorded given the amount of graffiti and its history. The local landowners expressed a view that the graffiti should not be removed without consultation with the local farming community families who might have an historical connection to the site.

Moolarben Stage 1 Aboriginal Cultural Heritage Assessment (Hamm 2006a)

As part of the Moolarben Stage 1 ACHA, a number of survey transects were undertaken to inform assessments of OC2 and OC3 in the northern part of what became the UG2 Approved Mining Area. Aboriginal heritage sites were identified within the Subject Area, including Rock Shelters with Artefacts, Open Artefact sites and Potential Archaeological Deposit (PAD) sites (see Table 3). The assessment noted a number of springs as potential resources to the north and west of UG2 and hypothesised that the Moolarben/Carr’s Gap ridgeline described above may have been used as a transit feature, especially at the northern end of the ridge where it forms a natural saddle allowing Aboriginal people to traverse across to both Moolarben and Murragamba Creek catchments (Hamm 2006a, 2008b:100)

Moolarben Coal Project Aboriginal Cultural Heritage Assessment Report Stage 2 (Hamm 2008a)

Archaeological Risk Assessment Services Pty Ltd (ARAS) was engaged to undertake an assessment of the Aboriginal cultural heritage values of the proposed Stage 2 Moolarben Coal Project (MCP) area. The Stage 2 MCP investigation area consisted of two proposed underground mines (UG1 and UG2) and an open cut mine (OC4).

An area of 37 km² was investigated for Aboriginal heritage values (Hamm 2008a). This assessment work identified 258 new Aboriginal cultural heritage sites: 102 isolated artefacts, 150 artefact scatters, five (5) rock shelters with artefacts, one (1) grinding groove site, 33 PADs and 4,825 stone artefacts. Aboriginal cultural heritage sites were found to concentrate around the central and southern portion of Murrumbidgee Creek within 100 m of the creek channel, within 100 m of the “Eastern Creek” tributary of Wilpinjong Creek, within 100 m of the headwaters of the Wilpinjong Creek (northern catchment) and the Moolarben Ridge south of Carr’s Gap and the Trig station flank of the ridge (Hamm 2008a). Of the sites identified in UG2, Hamm (2008a) noted that with the exception of S2MC236 and S2MC238, archaeological material recorded was eroded or scalded patches of bare soil with exposed artefactual material. Some material was exposed due to deep ploughing along the margins of Murrumbidgee Creek, whilst other sites were located on the margins of foothills. Most sites were recorded associated with flat ground with some minor ridge crest occupation evidence.

The assessment of Aboriginal cultural values was by expression of interest through letters and community meetings. Several people were interviewed about places of cultural significance near the proposed Stage 2 MCP development. Comments by RAPs are provided in full in Hamm (2008b). In addition, a number of interviews were conducted as part of the Stage 2 assessment (Appendix 4, Hamm 2008b). These were not available during the production of this ACHA.

Parts of the Munghorn Gap Nature Reserve located to the south-east of Stage 2 MCP development area were considered to be significant from a contemporary Aboriginal cultural perspective (Hamm 2008a). Warranha Ngumbaay and Aleisha Lonsdale expressed concerns about the proximity of impacts to the Munghorn Gap Nature Reserve and concerns about access to sites and the cultural landscape. The Murrumbidgee Creek Valley and adjacent Moolarben Ridge (Carr’s Gap Ridge) were also identified by the RAPs as significant cultural landscape features (Hamm 2008a).

Aboriginal cultural heritage site, S2MC236 (AHIMS ID#36-3-0016, 37-3-0134) was assessed to be of high cultural significance at a regional scale (Hamm 2008b). Hamm (2008a) noted that parts of the site were in fair condition but vandalism, weathering, wasp nests and dust had damaged a high proportion of art located on vertical walls (Plates 1-3). A site visit was organised with RAPs as part of the assessment. Feedback from the site visit was then incorporated into the ACHA for the Stage 2 MCP (Hamm 2008b). Longwalls were subsequently redesigned to reduce impact and the Rock Shelter Management Area formalised, with management measures put in place in the HMP (MCO 2020).



Plate 1: S2MC236 (AHIMS ID#36-3-0134) general location (Source: Hamm 2008b).



Plate 2: S2MC236 (AHIMS ID#36-3-0134) showing site and art panels (Source: Hamm 2008b).



Plate 3: Art stencils at S2MC 236 (AHIMS ID#36-3-0136)
(Source: Hamm 2008b).

Moolarben Preferred Project Report Aboriginal Archaeological and Cultural Heritage Addendum (AECOM 2011a)

AECOM Australia Pty Ltd (AECOM) was commissioned on behalf of MCO to review the ACHA prepared for the EA by ARAS for the Stage 2 MCP (Hamm 2008a) and provide additional assessment associated with proposed project changes.

With respect to UG2, while S2MC236 and the Rock Shelter Management Area was not visited during the field survey undertaken for the Preferred Project Report (AECOM 2011a), the recommendations for the protection of this significant art site were reviewed by AECOM (2011a) and considered appropriate. AECOM (2011a) further noted that Hamm also identified an additional rock shelter 50 m to the north of S2MC236 and incorporated the rock shelter into that site, which was referred to as S2MC236 in the Stage 2 EA report. It was recommended that the site complex S2MC236 be monitored for indirect impacts from vibration and blasting before, during and after proposed open cut mining operations within the Project Boundary (outside of the UG2 Approved Mining Area).

The report noted a basalt outcrop at Carr's Gap and noted that basalt and other heavy volcanic were commonly used as a raw material resource for making hand axes (AECOM 2011:46). Examples of this resource are present within the UG2 Approved Mining Area, the UG2 Extended Mining Area and are also noted within the Munghorn Gap Nature Reserve.

Moolarben Coal Project – Stage 1 Optimisation Modification, Near Ulan, Central Tablelands of New South Wales: Aboriginal Cultural Heritage Assessment (Kuskie 2013b)

South East Archaeology completed archaeological survey of 180 ha in and adjacent to UG2. Five (5) Aboriginal sites, including three (3) isolated artefacts and two (2) rock shelters with artefacts, and 28 rock shelters with PAD were identified during the survey. Of these sites, S2MC340 (AHIMS ID#36-1-0689), S1MC342 (AHIMS ID#36-3-2624), S1MC343 (AHIMS ID#36-3-2625), S1MC344 (AHIMS ID#36-3-2626), S1MC345 (AHIMS ID#36-3-2627), S1MC346 (AHIMS ID#36-3-2628), S1MC352 (AHIMS ID#36-3-2634) and S1MC354 (AHIMS ID#36-3-2636) were within the approved MCC footprint and have been subject to salvage and/or clearance for impact.

A model of occupation was developed for the study area. The area was found to have moderate to steep gradient and was distant from higher order watercourses. As a result it was hypothesised that Aboriginal use of the study area was more likely to have related to hunting and gathering activities along with

transitory movement between locations and procurement of stone materials and would have generally been of low intensity (Kuskie 2013b).

Cultural areas and values identified by RAPs included the study area as a whole, Moolarben Ridge south of Carr's Gap, flora and fauna resources and the archaeological sites.

Assessment of potential Aboriginal Shelter sites S1MC345 and S1MC352 (AECOM 2015a)

AECOM (2015a) assessed the archaeological potential of two (2) rock shelters within the UG2 Approved Mining Area, S1MC345 and S1MC352. On the basis of existing site data and the visual inspections undertaken, AECOM concluded that the PAD at both rock shelters had low research value due to the gradient of the floor, minimal habitable floor space, disturbance factors including animal activity, including substantial wombat burrowing and erosion.

Aboriginal archaeological due diligence assessment for Moolarben Coal Project Stage 1 Modification 9 Project Approval (AECOM 2015b)

AECOM Australia Pty Ltd (AECOM) was commissioned by MCO to undertake an Aboriginal archaeological due diligence assessment of six spatially discrete parcels of land totalling approximately 160 ha to be utilised as a blasting buffer zone at Moolarben Coal Mine (MCM). This assessment surveyed parts of the UG2 Approved Mining Area.

During the archaeological survey two (2) new artefact scatters (S1MC406 and S1MC407) and one (1) rock shelter with PAD (S1MC409) were identified within the UG2 Approved Mining Area. The sites were assessed to have low archaeological research value.

Moolarben Coal Complex – Underground 2 (UG2) Exploration Drilling Program within the boundary of ML 1691 and ML 1715, Aboriginal objects due diligence survey and assessment. (Niche 2018)

Niche Environment and Heritage (Niche) was commissioned by MCO to conduct an Aboriginal objects due diligence survey for an Exploration Drilling Program including 21 drill sites and associated new access tracks within the southern part of the UG2 Approved Mining Area and within the boundaries of ML 1691 and ML 1715. Eleven (11) Aboriginal heritage sites were located during the field survey. The sites comprised open artefact scatters and isolated stone artefacts; S2MC411 (AHIMS ID#36-3-3320), S2MC412 (AHIMS ID#36-3-3321), S2MC413 (AHIMS ID#36-3-3322), S2MC414 (AHIMS ID#36-3-3323), S2MC415 (AHIMS ID#36-3-3324), S2MC419 (AHIMS ID#36-3-3448), S2MC418 (AHIMS ID#36-3-3449), S2MC416 (AHIMS ID#36-3-3450), S2MC417 (AHIMS ID#36-3-3451), S2MC420 (AHIMS ID#36-3-3452)

Niche 2019 Moolarben Coal Complex – ML1715 2019 Exploration Drilling Program, Aboriginal objects due diligence survey and assessment.

Niche was commissioned by MCO to conduct an Aboriginal objects due diligence survey for an Exploration Drilling Program including five (5) drill sites and associated new access tracks within ML1715. No further Aboriginal heritage sites were identified.

The assessments within the UG2 Approved Mining Area form a small number of heritage assessments that have occurred in the wider region. Section 4.2.2 of this report provides additional detail regarding previous archaeological work in the region, placing the assessments of the Subject Area in a wider context.

4.2.2 Local archaeological assessments

Table 6 provides a summary of the archaeological assessments that have been undertaken to date at MCC. These are further considered within this AR.

Table 5: Summary of past Aboriginal archaeological assessments at the Moolarben Coal Complex

Author	Date	Title
Hamm	2006a	Moolarben Coal Project – Aboriginal Cultural Heritage Assessment Report
Hamm	2006b	Responses to Issues Raised in Respect of the Moolarben Coal Project Aboriginal Cultural Heritage Assessment Report
Hamm	2008a	Moolarben Coal Project – Aboriginal Cultural Heritage Assessment Report Stage 2
Hamm	2008b	Aboriginal Heritage Plan for MCP Stage 1 Development Areas: Open Cut 1 and Main Infrastructure Area
Urban Tree Management Australia	2008	Report: Aboriginal Cultural Assessment of Scarred Tree (ref. 36-3-0798: SIMC1) at Ulan, New South Wales for Moolarben Coal Project Stage 1
Hamm	2009a	Aboriginal Cultural Heritage & Archaeological Assessment for Moolarben Coal Project Stage 1 Infrastructure Area & Proposed Water Sharing Pipeline Modification Project in Support of a section 75w (2) Approval
Hamm	2009b	Aboriginal Cultural Heritage & Archaeological Assessment for Moolarben Coal Project Stage 1 Northern Borefield Area
Hamm	2009c	Moolarben Coal Project Executive Summary Report
Coffey Natural Systems	2009	Response to Submissions Report – Part A Moolarben Coal Project – Stage 2
Hamm	2010	Disturbance Report for Moolarben Coal Project Stage 2
Hamm and Foley	2010	Cultural Heritage Management Report on Moolarben Coal Project Stage 1: Open Cut & Main Infrastructure Area
Kuskie	2010b	Moolarben Coal Project Stage 2: Aboriginal Heritage Advice on Potential Impact to Aboriginal cultural heritage sites
Moolarben Coal	2010	Response to Submissions Section 75W Modification Application Moolarben Coal Project – Stage 1 (05_0117 MOD 7) Northern Borefield
AECOM	2011a	Moolarben Preferred Project Report: Aboriginal Archaeological and Cultural Heritage Addendum
AECOM	2011b	Archaeological Collection & Excavation: Northern Borefield, Moolarben Coal Operations, Ulan, NSW
AECOM	2011c	Due Diligence Assessment of Proposed Exploration Drill Sites EL 6288
AECOM	2012	Due Diligence Assessment of Proposed Exploration Drill Sites EL 6288
Hansen Bailey	2012	Moolarben Coal Project Stage 2 Preferred Project Report Response to Submissions
Kuskie	2012a	Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Geotechnical Investigation Areas
Kuskie	2012b	Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Proposed Ulan- Wollar Road and Country Energy 66kv Powerline Realignment
Kuskie	2012c	Moolarben Coal Project: Preliminary Aboriginal Heritage Assessment of Proposed Temporary Workers Accommodation Near Ulan, Central Tablelands of New South Wales
Kuskie	2013a	Moolarben Coal Project Stage 1 – Preliminary Report on Aboriginal Heritage Survey of Open Cut 2 Drilling Areas
Kuskie	2013b	Moolarben Coal Project – Stage 1 Optimisation Modification, Near Ulan, Central Tablelands of New South Wales: Aboriginal Cultural Heritage Assessment
Kuskie	2013c	Moolarben Coal Project Stage 2: Aboriginal Heritage Assessment of Proposed Ulan – Wollar Road and Essential Energy Powerline Realignments, Near Ulan Central Tablelands of New South Wales
Kuskie	2013d	Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Open Cut 4 Drilling Area
Kuskie	2013e	Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Proposed Antenna at Carr’s Gap

Author	Date	Title
Kuskie	2013f	Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Proposed 66kV Powerline
Kuskie	2013g	Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Underground 1 Drilling Areas
Kuskie	2013h	Moolarben Coal Project Stage 2 – Report on Aboriginal Heritage Salvage of Site S2MC263 (OEH #36-3-2603) Along the Ulan – Wollar Road Realignment
Kuskie	2013i	Moolarben Coal Project Stage 2 – Aboriginal Heritage: Reassessment of Site S1MC053 (OEH #36-3-0858)
Niche	2014a	Moolarben Coal Mine OC4 South-West Modification Aboriginal Cultural Heritage Assessment
Niche	2014b	Moolarben Coal Complex UG1 Optimisation Modification Aboriginal Cultural Heritage Assessment
Kuskie	2014a	Moolarben Coal Project, Central Tablelands of New South Wales: Stage 1 – Report on Additional Aboriginal Heritage Survey and Salvage of Proposed Core Shed
Kuskie	2014b	Moolarben Coal Project – Preliminary Report on Aboriginal Heritage Survey of EL7073 Exploration Drilling in September 2014
Kuskie	2014c	Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Underground 1 Drilling Areas in October 2014
AECOM	2014	Aboriginal archaeological due diligence assessment for Underground 4 (UG4) south drilling works
Kuskie	2015b	Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Proposed Murragamba Road Realignment February 2015
Kuskie	2015c	Stage 1 Open Cut 2 – Report on additional Aboriginal heritage survey and salvage
AECOM	2015a	Aboriginal archaeological due diligence assessment for six boreholes and associated access tracks in Open Cut 4 (OC4) March 2015
AECOM	2015b	Aboriginal archaeological due diligence assessment for the Southern RIM Area drilling program March 2015
AECOM	2015c	Aboriginal archaeological due diligence assessment for the Northern RIM Area drilling program March 2015
AECOM	2015d	Aboriginal archaeological due diligence assessment for Moolarben Coal Project Stage 1 Modification 9 Project Approval May 2015
AECOM	2015e	Aboriginal archaeological due diligence assessment for the proposed Stage 2 coal conveyor May 2015
AECOM	2015f	Aboriginal archaeological due diligence assessment for Moolarben Coal Project Stage 2 Project Approval May 2015
AECOM	2015g	Assessment of potential Aboriginal Shelter sites S1MC345 and S1MC352 June 2015
Niche	2015a	Aboriginal Cultural Heritage Assessment - Moolarben Coal Complex UG1 Optimisation Modification June 2015
Niche	2015b	Paleo A, Paleo B, Paleo C, NW01 and NW02 Exploration Boreholes Aboriginal Objects Due Diligence Assessment December 2015
Niche	2016a	Aboriginal Cultural Heritage Conservation Fence Aboriginal Heritage Survey and Assessment March 2016
Niche	2016b	Dun Dun East Biodiversity Offset Area, Hargraves, NSW Aboriginal Cultural Heritage Values Assessment.
Niche	2016c	Moolarben Coal Complex- Relocation of Telstra Services Aboriginal heritage pre-surface disturbance survey April 2016
Niche	2016d	Moolarben Coal Complex Longwalls 101 – 103 Aboriginal Heritage Survey Report June 2016
Niche	2016e	Moolarben Coal Complex – Fire Trail Aboriginal objects due diligence assessment June 2016
Niche	2016f	Moolarben Coal Complex – Open Cut 3, Mining Lease Drilling Programme, Aboriginal cultural heritage survey July 2016

Author	Date	Title
Niche	2016g	Moolarben Coal Complex – Open Cut 4 Mining Lease Drilling Programme, Aboriginal cultural heritage survey assessment July 2016
Niche	2016h	Moolarben Coal Complex – Open Cut 3 Exploration Lease Drilling Programme, Aboriginal cultural heritage survey assessment October 2016
Niche	2017a	Moolarben Coal UG1 Longwalls 101-103 Extraction Plan Aboriginal Cultural Heritage Technical Report March 2017
Niche	2017b	OC3 LOX Lines and Access Tracks, Extra Access Lines Aboriginal Heritage Assessment January 2017
Niche	2017c	Moolarben Coal Complex – Underground 3 (UG3), Exploration Drilling Programme, Aboriginal cultural heritage due diligence survey February 2017
Niche	2017d	Niche 2017 – Moolarben visual screen areas pre-clearance salvage
Niche	2017e	Moolarben Coal Complex Open Cut Optimisation Modification Aboriginal Cultural Heritage
Niche	2017f	Salvage of Aboriginal site S1MC254 (AHIMS ID 3-3-1069), Northern Borefields Area of Stage 1.
Niche	2017g	Moolarben Coal Operations – Cliff Line 3 Aboriginal Heritage Site Inspection
Niche	2018a	ML 1715 Sill Drilling Program, Aboriginal objects due diligence survey and assessment.
Niche	2018b	Exploration Drilling Program within the boundary of EL 6288, Aboriginal cultural heritage due diligence survey and assessment.
Niche	2018c	Exploration Drilling Program within the boundary of EL 7073, Aboriginal cultural heritage due diligence survey and assessment.
Niche	2018d	Exploration Drilling Program within the disturbance boundary of ML 1691, Aboriginal cultural heritage due diligence survey and assessment.
Niche	2018e	Exploration Drilling Program within the disturbance boundary of ML 1715, Aboriginal cultural heritage due diligence survey and assessment.
Niche	2018f	Exploration Drilling Program within ML 1691, Aboriginal cultural heritage due diligence survey and assessment.
Niche	2018g	OC4 salvage of Aboriginal cultural heritage sites S2MC353 and S2MC356.
Niche	2018h	Open Cut 4 additional survey of unsurveyed areas – Clearance Report
Niche	2019a	ML1715 2019 Exploration Drilling Program, Aboriginal objects due diligence survey and assessment.
Niche	2019b	Exploration Drilling Program within the boundary of EL 6288, Aboriginal cultural heritage due diligence survey and assessment.
Niche	2019c	Aboriginal Cultural Heritage Assessment Report Moolarben Coal Operations UG4 Ancillary Works Modification, Ulan NSW
Niche	2019d	Addendum to Aboriginal Cultural Heritage Assessment Moolarben Coal Operations UG4 Ancillary Works Modification Ulan NSW
Niche	2020a	Moolarben Coal Operation Heritage Salvage Program 2020
Niche	2020b	Moolarben Coal Operations Exploration Drilling Program EL6288 OC3 – Aboriginal Objects Due Diligence Assessment
Niche	2020c	EL6288 Stage 1A and 2 Exploration Drilling Program
Niche	2020d	Moolarben Coal Operations EL7073 Infills Exploration Drilling Program – Aboriginal Objects Due Diligence Assessment
Niche	2020e	ML1628 UG4 Exploration Drilling Program
Niche	2020f	Moolarben Coal Project Stage 1, Open Cut 3 (05_0117) Additional Aboriginal Heritage Survey and Salvage Compliance Report

Currently there are over 550 Aboriginal heritage sites identified within the approved MCC and approximately Aboriginal heritage sites in the MCC Aboriginal heritage database. Artefact sites (including artefact scatters and Isolated Artefacts) are the most frequent site type with occasional grinding groove sites, rock shelters with art, artefacts and/or PADs also being present.

The MCC is situated within the wider region of the Central Tablelands, which has been subject to intense archaeological study as a result of mining and land development in the region. A summary of regional archaeological assessments is provided in the Section below.

4.2.3 Regional archaeological assessments

The earliest evidence of Aboriginal occupation in the region was found at Granites 2 Rock Shelter, located approximately 150 km south-west of the Subject Area, and dates to 7,000 years Before Present (BP) (Pearson 1981). A number of other archaeological excavations have been undertaken at MCC and in the nearby area and resulted in dates of occupation in the last 5,000 years (Kuskie 2009).

A number of archaeological models for the distribution of material evidence of Aboriginal use of the landscape have been developed for the region. The purpose of archaeological models is to assist in the prediction of what Aboriginal cultural heritage sites may be present in the landscape and where they might be located.

The first archaeological model of the region was developed by Pearson (1981) through the analysis of sites in the Upper Macquarie. He identified a range of site types typical to the region including open artefact sites, scarred trees and grinding grooves, as well as the presence of ceremonial sites and burial sites.

From his data Pearson (1981) proposed that:

- Most sites would occur between 10 m and 500 m from water, with the largest sites occurring nearest to water.
- Good soil drainage, views over watercourses, level ground with rock shelter from winds and elevation above cold air were important factors in site location.
- The majority of sites were in places that would originally have been open woodlands with an adequate source of fuel.
- Burials and grinding grooves would be located as close to habitation as possible.
- Grinding grooves required the presence of suitable stone, such as sandstone.
- Burials were most likely to occur where soils were deep enough for internment.
- Ceremonial sites such as earth rings and stone arrangements would be situated away from campsites, potentially in isolated places, on small hills or knolls but also on flat land.
- There was no obvious patterning to the location of scarred and carved trees beyond proximity to water and occupation sites.
- Quarries may occur where suitable sources of stone were present and accessible.
- Camp sites were rarely used by Aboriginal people in the past for longer than three nights and that sites with extensive archaeological deposits represented accumulation of material over multiple visits.

This model has since been revised and refined as part of the many archaeological assessments that have been conducted as part of the environmental assessment and approval process for the three mines located within 10 km of the Subject Area: Ulan Coal Mine, Wilpinjong Coal Mine and the MCC.

Ulan Coal Mine

The Ulan Coal Mine is an open cut and underground coal mine located adjacent to and north-west of the MCC, near the village of Ulan. The Ulan Coal Mine has been operational since the 1920s. In 2009, the Ulan Coal Mine sought a consolidated Part 3A Approval. Archaeological assessment of the Ulan Coal Mine commenced in the 1980s (Haglund 1980) with assessments occurring over subsequent years (Table 6).

Table 6: Summary of Assessments at the Ulan Coal Mine (Source: Kuskie 2013a: 15)

Author	Date	Title
Haglund	1980	Preliminary Archaeological Survey of the Coal mining Area at Ulan, NSW
Haglund	1981a	Archaeological Survey and Sampling at the Site of the Ulan Coal Mine, Ulan, NSW
Haglund	1981b	Ulan Coal Mine: Archaeological Investigation in Connection with Proposed Changes in Development Plans
Corkill	1991	Survey for Aboriginal Archaeological Sites at Ulan Colliery, New South Wales: proposed Overland Conveyor and Creek Site Development
Haglund	1992	Sample Surveys in Relation to Proposed Mine Extension in the Ulan Area, NSW
Haglund	1996a	Salvage Excavation Completed for Ulan Coal Mines Ltd: NPWS Site 36-3-177
Haglund	1996b	Archaeological Inspection and Monitoring of Track and Drill Site East of Ulan Creek
Edgar	1997	Ulan Open Cut Mine: Trench Through Proposed Highwall Zone 3: Aboriginal Heritage Aspects
Haglund	1999a	Addendum to Ulan Coal Mines Second Longwall Project Environmental Statement
Haglund	1999b	Ulan Coal Mines Second Longwall Project Environment Statement: Preliminary Survey for Aboriginal cultural heritage sites
Haglund	1999c	Ulan Coal Mines Pty Ltd: Archaeological Review and Inspection in Relation to Potential High Wall Mining – Areas West and North-west of Trench A
Haglund	1999d	Report on Aboriginal heritage Studies Relating to SEPP No. 34 Application by Ulan Coal Mine
Therin	2000	Spring Gully 5 Salvage Excavation Usewear and Residue Report
Kuskie	2000	An Assessment of Two Aboriginal Grinding Grooves Sites at Ulan Coal Mine, Central Tablelands, New South Wales
Haglund	2001a	Salvage Excavation Completed for Ulan Coal Mines Ltd: Site SG5 Aboriginal Shelter Site Vol I
Haglund	2001b	Salvage Excavation Completed for Ulan Coal Mines Ltd: Site SG5 Aboriginal Shelter Site Vol III
White	2001a	Salvage Excavation Completed for Ulan Coal Mines Ltd Site SG4 Aboriginal Shelter Vol II
White	2001b	A Comment on the stone artefact assemblage from squares E 7 and E8 at Site SG6, Ulan, NS
Kuskie and Webster	2001	Archaeological Survey of Aboriginal Heritage within Longwall Panels 18-22, Mining Lease 1468 and 1341, Ulan Coal Mine, Central Tablelands, New South Wales, Volumes 1 and 2
Kuskie	2002	An Archaeological Assessment of a Proposed Basalt Quarry within Mining lease 1468, Ulan Coal Mine, Central Tablelands New South Wales
Kuskie and Clarke	2003	Proposed Open Cut Mine extension, Additional Infrastructure and Consolidation Consents at Ulan Coal mine New South Wales: Aboriginal heritage Assessment (Vol. 1)
Kuskie	2004	Proposed Open Cut Mine Extension, Additional Infrastructure and Consolidation Consents at Ulan Coal mine New South Wales: Aboriginal heritage Assessment (Vol. 2)
Kuskie and Clarke	2005a	Proposed Open Cut Mine Extension, Additional Infrastructure at Ulan Coal Mine: Aboriginal heritage Assessment
Kuskie and Clarke	2005b	Archaeological Survey of Aboriginal heritage within SMP Application Area (Longwall Panels 23-25 and W1) of Mining Lease 1468, Ulan Coal Mine, Central Tablelands. Vol A and Vol B
Kuskie and Clarke	2007	Archaeological Survey of Aboriginal Heritage within SMP Application Area (Longwall Panels W2 and W3) of Mining Lease 1468, Ulan Coal Mine, Central Tablelands, New South Wales: Volume A and Volume B
Kuskie	2008	Ulan Coal Mines Limited: Project Waratah: Preliminary Aboriginal Heritage Assessment
Kuskie	2009	Ulan Coal Continued Operations Aboriginal Heritage Impact Assessment
Kuskie	2010a	Ulan Coal Continued Operations Aboriginal Heritage Impact Assessment – Supplementary Report for North 1 panels Project Modification
Kuskie	2012a	Ulan Coal Continued Operations Project: Test excavations of Aboriginal Shelter Sites within the North 1 Panels - Interim Report
Kuskie	2015	Ulan Coal Mines Limited, Central Tablelands of New South Wales: Ulan West Modification- Aboriginal Cultural Heritage Assessment

Author	Date	Title
Kuskie	2018	Ulan Coal Mines Limited, Central Tablelands of New South Wales: Modification 4- Aboriginal Cultural Heritage Assessment

Updated in 2016, the Ulan Coal Mine Aboriginal Cultural Heritage Sites Database included 1,537 Aboriginal cultural heritage sites within the Ulan Coal Mine, including 368 rock shelters with PADs. The most frequent Aboriginal site features known within the Ulan Coal Mine were artefact scatters and open sites, rock shelters with PADs and isolated artefacts.

Open artefact sites range in size at the Ulan Coal Mine from one (1) stone artefact to 990 stone artefacts (Kuskie 2009: 109). The bulk of open artefact sites contain less than 10 artefacts and most sites occur within a 50 square metre (m²) area or less (Kuskie 2009: 109).

The stone artefact assemblage at the Ulan Coal Mine as of 2009 consisted of over 9,000 items (Kuskie 2009: 118). Most artefacts were made from quartz (70%), with tuff and chert being the next most common raw material type. Acidic volcanics, basalt, bone, breccia, chalcedony, glass, granite, ironstone, lithic sandstone, quartzite, rhyolite, sandstone, shell, silcrete, siltstone and petrified wood stone artefacts were also present in small quantities. The bulk of the artefact assemblage comprised complete and broken flakes, angular fragments, cores and core fragments. Retouched and utilised flakes, backed artefacts, hammer stones, anvils and axes were also present.

An analysis of the spatial distribution of Aboriginal heritage sites and artefacts was completed for the archaeological resources at the Ulan Coal Mine. This involved the separation of the landscape into distinct landform and slope classes (Kuskie 2018: 48). Approximately 64% of the Ulan Coal Mine consisted of simple slopes, with depression drainages and ridge crests being the next most consistent landform and slope class (Kuskie 2018: 48).

It was noted that overall, artefacts occurred at a very low mean density across the analysis area at 0.004 artefacts per square metre of effective survey coverage (Kuskie 2018: 56). The spatial distribution and nature of evidence is largely consistent with 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. Very few sites or artefacts were identified in the north-eastern corner of the analysis area, which is consistent with the occupational model of the site given the absence of higher order water sources (Kuskie 2018: 56).

Rock shelters were found to occur on scarps, simple slopes, spur crests and drainage depressions with sandstone rock formation. Artefact densities were found not to increase in density with proximity to water (Kuskie 2009: 135).

As a result of the previous archaeological assessment of the Ulan Coal Mine (Table 6), including spatial analysis of the distribution of sites and a review of the historical sources, an archaeological model was developed and has been refined (Kuskie and Clarke 2005b, 2007, Kuskie 2009, Kuskie 2018). This model has subsequently been applied to the Wilpinjong Coal Mine and the MCC and is presented in more detail in Section 6.

Sites of traditional cultural significance (such as mythological sites) were not identified by the Aboriginal representatives involved (Kuskie 2018: 58). The Aboriginal stakeholders also did not disclose any specific

knowledge of other cultural values/places, although the possibility that these exist was not excluded (Kuskie 2018: 58).

Wilpinjong Coal Mine

The Wilpinjong Coal Mine is an open cut mine located adjacent to and east of the MCC. The Wilpinjong Coal Mine was approved under Part 3A of the *Environmental Planning and Assessment Act* (EP&A Act) and has been operational since 2006. During this time, a large number of Aboriginal archaeological assessments are known to have occurred (Table 7).

Table 7: Summary of Assessments at the Wilpinjong Coal Mine (Source: Kuskie 2013b)

Author	Date	Title
Navin Officer Heritage Consultants Pty Ltd	2005	Wilpinjong Coal Project Appendix F Aboriginal Cultural Heritage Assessment
Boer-Mah	2006	Lithics Report for Surface Salvage and Salvage Excavation at Wilpinjong Mine, N.S.W: June 2006. Prepared for Kayandel Archaeological Services
Navin Officer Heritage Consultants Pty Ltd	2006a	Wilpinjong Coal Project: Archaeological Salvage and Post EIS Investigations
Navin Officer Heritage Consultants Pty Ltd	2006b	Baseline Recording of Three Aboriginal Rock Arts Sites WCP 72, 152 and 163 at Wilpinjong, NSW
Kayandel Archaeological Services	2006a	Aboriginal Heritage Rapid Survey
Kayandel Archaeological Services	2006b	Wilpinjong Coal Project: Aboriginal Heritage Surface Salvage Summary Report. September 2006
Kayandel Archaeological Services	2006c	Proposed Electricity Transmission Line: Ulan Substation to Wilpinjong Coal Project: Aboriginal Cultural Heritage Assessment. March 2006
Kayandel Archaeological Services	2006d	Wilpinjong Coal Project: Aboriginal Cultural Heritage Survey: Supplemental Survey of Escarpment Areas and Report of Findings. November 2006
Kayandel Archaeological Services	2007a	Kayandel Archaeological Services. 2007. Archaeological Survey Report and Mapping for Proposed Borehole Locations: Aboriginal Pedestrian Survey. May 2007. Prepared for Wilpinjong Coal Pty Ltd
Kayandel Archaeological Services	2007b	Wilpinjong Coal Project: Aboriginal Heritage: Surface Salvage of Sites. August 2007. Prepared for Wilpinjong Coal Pty Ltd
Kayandel Archaeological Services	2007c	Wilpinjong Coal Project. Aboriginal Heritage Surface Salvage Summary. Report. September 2007
Kayandel Archaeological Services	2008a	Surface Salvage Report: Wilpinjong Coal Mine, Mudgee: December 2008. Prepared for Wilpinjong Coal Ltd Pty
Kayandel Archaeological Services	2008b	Slate Gully Drillhole Assessments. Report not available for review
Kayandel Archaeological Services	2009a	Test excavations of the Pit 5 Extension. Report not available for review
Kayandel Archaeological Services	2009b	Wintersun Hill / Bald Knobb Test Excavations. Report not available for review
Kuskie	2013b	Wilpinjong Coal Mine, Central Tablelands of New South Wales - Modification: Aboriginal Cultural Heritage Assessment
Brennan	2013	Wilpinjong Coal Mine, Rock Art Conservation and Monitoring Project: Field Inspection Report and Recommendations. Unpublished report to Wilpinjong Pty Ltd
Apex Archaeology	2014	Wilpinjong Coal Mine: Aboriginal Archaeological Excavation Report WCP126, WCP214 and WCP216
Apex Archaeology	2014	Wilpinjong Pit 7 SOW – Mining Lease 1573 Excavation report: WCP92

Kuskie	2015	Wilpinjong Coal Mine, Central Tablelands of New South Wales – Extension Project: Aboriginal Cultural Heritage Assessment.
Navin Officer Heritage Consultants Pty Ltd	2017	Wilpinjong Coal Mine, Aboriginal Cultural Heritage Clearance Works- Area 20 and Area BJ.
Kuskie	2018	Wilpinjong Coal Mine, Central Tablelands of New South Wales: Aboriginal Cultural Heritage Investigation of Biodiversity Offset Areas 1-5.
Niche Environment and Heritage	2019	Wilpinjong Caretakers Cottage Archaeological Excavation Report.

In 2005 Navin Officer Heritage Consultants Pty Ltd (Navin Officer) undertook the primary environmental assessment, identifying 224 Aboriginal cultural heritage sites and PADs at the Wilpinjong Coal Mine, and subsequently completed a series of salvage excavations, and surface collections and rock art recording of some rock shelter sites (Navin Officer 2005, 2006a, 2006b). An Aboriginal and Cultural Heritage Management Plan was developed for the Wilpinjong Coal Mine (WCPL 2008). Between 2006 and 2009, Kayandel Archaeological Services (2006a, 2006b, 2006c, 2006d, 2007a, 2007b, 2007c, 2008a, 2008b, 2009a, 2009b; Boer-Mah 2006) completed a number of surface collections and test excavations.

Subsequently, South East Archaeology undertook a review of archaeological assessments at the Wilpinjong Coal Mine as part of a proposed modification to the Wilpinjong Coal Mine, and provided an updated Aboriginal cultural heritage sites database, an analysis of some stone artefacts recorded during an archaeological survey for the proposed modification and an updated distribution and occupation model (Kuskie 2013a, 2013b).

As of 2019, the Wilpinjong Coal Mine Aboriginal cultural heritage sites Database contained 702 Aboriginal cultural heritage sites (WCPL 2019, Table 4: 25). Aboriginal site types known to occur at the Wilpinjong Coal Mine include individual stone artefacts, stone artefact scatters, scarred and carved trees, a stone quarry, a ceremonial site, grinding grooves, resources sites such as waterholes and rock shelters with art, stone artefacts, archaeological deposit or PADs. A number of areas of contemporary cultural significance have been identified including Castle Rock and the high-density archaeological deposits at Cumbo Creek.

The stone artefact assemblage at the Wilpinjong Coal Mine was found to be waterworn and terrestrial quartz dominant. The dominance of quartz is thought to relate to the accessibility of quartz conglomerates in the local geological landscape. Tuff and chert were also present in the stone artefact assemblage and very small frequencies of acidic volcanic stone, jasper, petrified wood, porphyritic rhyolite and quartzite (Kuskie 2013b: 56).

The types of artefacts in the assemblage were also found to be consistent with the Ulan Coal Mine stone artefact assemblage (Kuskie 2013a, 2013b: 58). Complete and broken flakes were the most common artefact types followed by angular fragments, cores and core fragments. Retouched or utilised flakes were also present while backed artefacts such as bondi points and geometric microliths made up a less than 2% of the overall assemblage. A tula slug and hammerstone were also present (Kuskie 2013a, 2013b: 58-59).

The revised archaeological model presented by Kuskie (2013a, 2013b) is consistent with the current models for the archaeological resources at the Ulan Coal Mine.

The most recent comprehensive field survey at the Wilpinjong Coal Mine was undertaken by South East Archaeology between November and December 2018 as part of a Biodiversity Offset in Areas 1-5 (Kuskie 2018). This survey identified 42 additional sites within or adjacent to the Biodiversity Offsets Areas 1 - 5, comprising:

- Four (4) Rock Shelters with PADs;
- Thirty two (32) open artefact sites;
- Two (2) waterholes/wells;
- Three (3) Rock Shelter with artefacts; and
- One (1) ochre source.

4.2.4 Summary

The previous archaeological work at the Ulan, Moolarben and Wilpinjong Coal Mines represents an intensive amount of study.

Heritage assessments across Moolarben, Ulan and Wilpinjong describe a rich cultural landscape to which the RAPs have identified a strong cultural and spiritual connection. The level of archaeological assessment across a robust dataset with which to assess the archaeological values of the Subject Area. The above information is summarised and synthesised with the landscape context in Section 6 to form the predictive model of the archaeological resource in the Subject Area in Section 7.

5. Landscape context

5.1 Overview

Understanding the past and present environmental contexts of a Subject Area is requisite in any Aboriginal archaeological and cultural heritage investigation (DECCW 2010a). The landscape context may provide insight as to areas of land that may have been more intensively used by Aboriginal people in the past due to the presence of resources such as water, stone, plants and animals and other raw materials or landscape features associated with sustenance, rock shelter, tool manufacture and cultural activities. Furthermore, the landscape provides the context within which the material remains of past Aboriginal occupation may be preserved and detectable due to the movement of soil through geomorphic processes such as erosion or its removal from the landscape through past land use and disturbance (DECCW 2010a: 8). By considering these factors, an Aboriginal cultural heritage investigation may develop a sampling strategy for identifying any tangible Aboriginal heritage values within the Subject Area. It allows for an understanding of what activities would likely have taken place across the Subject Area in the past and the likelihood that any trace of these would have survived below the surface. The following section provides details of the environmental characteristics of the Subject Area.

5.2 Topography

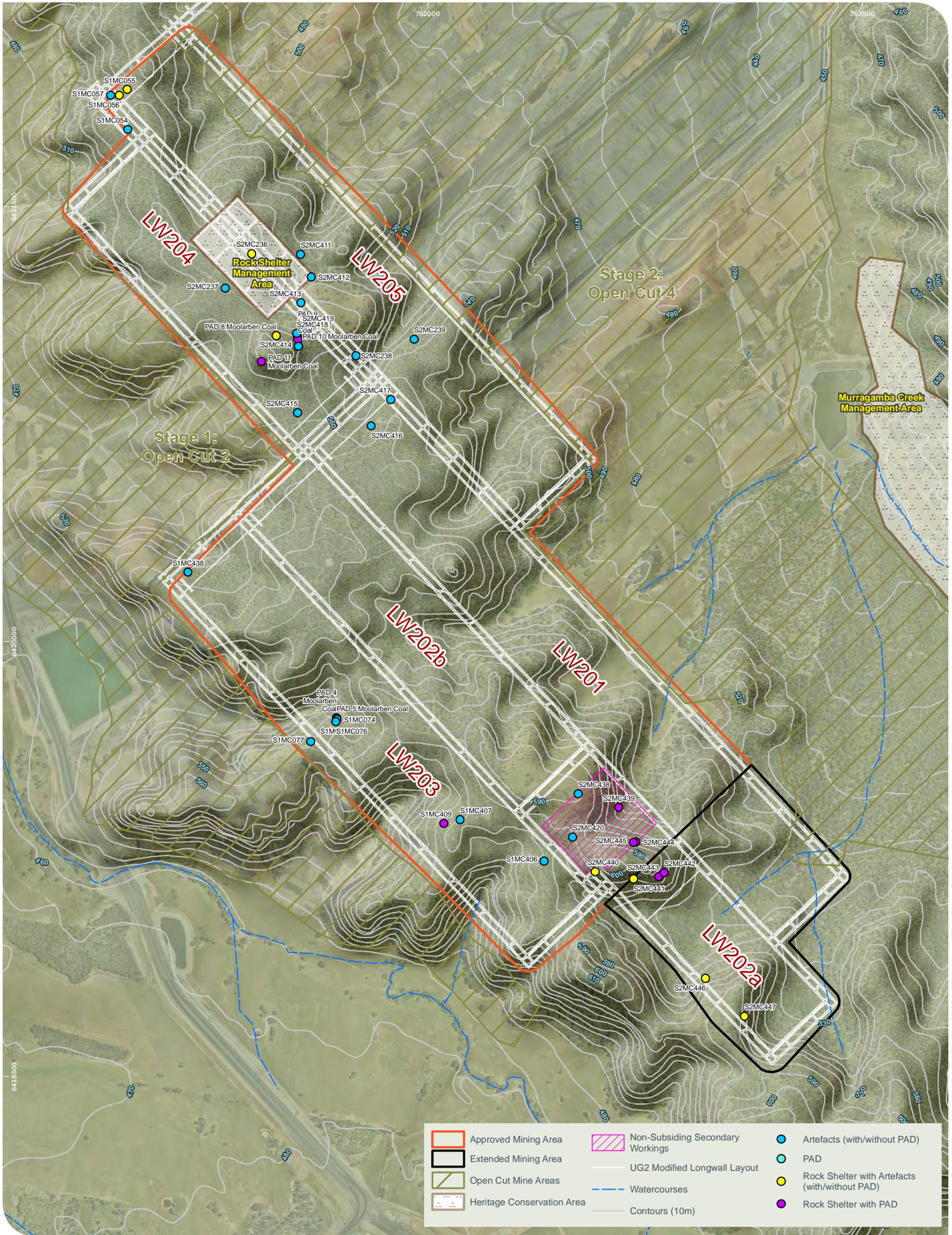
The topography of the Subject Area ranges between undulating hills, ridge affected terrain and sandstone plateaus. Slopes can range from gently to steeply inclined, with slopes of 2% – 40% within the Subject Area. These slopes can range between 300 m to 1000 m in length. Local relief varies between 20 m – 240 m and drainage lines can be spaced between 300 m – 1200 m apart (Figure 3).

Generally, the area is dominated by sandstone ridgelines and associated gullies which form part of the system identified in previous heritage assessments as the Moolarben ridge system. Elevations around the Subject Areas are at approximately 550 m ASL. Steep sided gullies were used by Wiradjuri people to assist in hunting strategies.

5.3 Geology

The Subject Area is situated in the north-western part of the Sydney Basin and is characterised by Late Permian age Illawarra Coal Measures (mudstone, claystone, coal (including the Ulan Seam mined by MCO), torbanite and rhyolitic tuff) which is overlain by the Narrabeen Group (sandstone, conglomeratic sandstone, chert, shale coal and torbanite) (Dubbo 1:250k Geological Series Sheet SI 55-4).

Outcrops of these stone where they occur may provide sources of raw material for the manufacture of stone tool. No quarries have previously been identified within the Subject Area. Basalt outcrops also occur in the Subject Area, and in the nearby Munghorn Gap Nature Reserve, and may have been a source of material for the basalt artefact identified in Aboriginal heritage sites in the local area (Figure 4).



Drawn by: Penelope; Geospatial File: C:\paula\p\projects\6420\6420_UG2_MOD_ACHA_NSW\Mapa\report\APR6462_Figure_4_TerrainSlope.mxd Last updated: 15-Oct-21 11:34:56 AM



Plate 4: Basalt outcrop within the Subject Area.



Plate 5: Second basalt outcrop within the Subject Area.

5.4 Soils

There are four soil landscapes situated with the Subject Area, as mapped by Murphy and Lawrie (1998). The soil landscapes identified within the Subject Area include the Munghorn, Ulan, Lees Pinch and Bald Hill soil landscapes (Figure 5). Soil landscapes provide a proxy for both available resources, through associated vegetation and stone outcrops, and assist in understanding the suitability of the terrain and understanding soil profiles and other factors which influence the preservation of Aboriginal objects.

Munghorn Plateau soil landscape is typically characterised by low undulating hills forming plateaux with slopes between 3% and 10%. Like the Lees Pinch Soil Landscape, soils in the Munghorn Plateau Soil Landscape include shallow siliceous sands with yellow earths and yellow podzolic soils. Rock outcrops are often present, but sandstone formations such as overhangs and pagodas are not found in this soil landscape area. Approximately 60% of the Subject Area is contained within the Munghorn Plateau soil landscape. The archaeological expectation for this soil landscape is that it may accumulate Aboriginal objects, but these will be sparse outside of Rock Shelters and in open contexts will not be preserved in situ in the skeletal soils which erode readily.

The Ulan soil landscape is typically found in association with low undulating rises and creek flats on slopes between 2% and 10%. Yellow podzolic soils are present on the lower slopes and drainage lines with yellow and brown earths, earthy sands and occasional occurrences of yellow solodic soils with salt sands. The Ulan Soil Landscape has moderate to high levels of erosion. The archaeological expectation of the Ulan soil landscape is that, as a soil landscape associated with alluvial formation processes it has both the attractiveness of a high resource, well-watered and well-drained area for past Wiradjuri land use and the capacity to accumulate Aboriginal objects and bury them in situ, meaning it has good sub-surface potential.

The Lees Pinch soil landscape is comprised of sandstone plateaux and hillslopes with occasional boulder outcrops. Slope gradients are between 15% and 40% being moderately inclined to steep. The soils are shallow siliceous sands, with the topsoil being loamy sand, subsoil being a clayey sand and then a weathered sandstone C horizon at shallow depth (typically less than 50 centimetres [cm]). Rock outcrops, boulders and sandstone cliffs may be present in some areas. The archaeological expectation for this soil landscape is the same as for the Munghorn Plateau landscape, with the notation that Rock Shelters are likely to be more common on the steeper slopes of this soil landscape.

The Bald Hill soil landscape is associated with scattered remnants of basalt hills between Dubbo and Gulgong in the north of the map sheet and each occurrence occupies only a small area (1 km to 3 km in diameter). Its topography is comprised of low hillocks with elevations from 460 m to 600 m. Slopes are moderately to steeply inclined, between 10% to 35% and range between 400 m to 800 m long. Bald Hill soil is classed as euchrozems on crests and euchrozems-chocolate soils on mid-slopes with rock outcrop and floaters. Its basalt caps provide potential sources of volcanic material. Euchrozems are comprised of a clay loam which transitions to a dark reddish brown medium clay. Shallow, stony loams are situated on steeper slopes near crests and brown clays are often located with linear gilgai on lower slopes.

5.5 Hydrology

Water is considered a key resource within any landscape for use and occupation. Murrumbidgee Creek is situated northeast of the Subject Area and possesses several un-named first and second order tributaries which run east the Subject Area. Moolarben Creek is situated west of the Subject Area and un-named first and second order tributaries from Moolarben Creek also run west from the Subject Area. Several springs are noted to the north and west of the Subject Area (Hamm 2008a).

Climate has played a significant factor in the formation of the landscape and the availability of resources, particularly water. In the late Pleistocene, during the last glacial maximum from about 24,000 to 17,000 years ago, the climate was cooler and drier. It is hypothesised that potable water may not have been as frequently available during this time, with occupation more likely to focus on areas with more reliable watersources and conditions (Kuskie 2013b). Conditions and availability of water would have improved into the Holocene. Climate data collected at the Gulgong weather station, approximately 20 km to the west of the Subject Area, indicates that the Subject Area is situated in an area with an average rainfall of 630 to 650 millimetres (mm) with warm to hot summers and cold winters. Winter frosts occur. Greater variation in seasonal weather may have resulted in more seasonal changes to Aboriginal past land-use; however, to date there is no archaeological evidence of this occurring. Whilst conditions and temperatures are wide ranging, the conditions in the region of the Subject Area can be summarised as being moderate and would have been very suitable for year-round occupation of the region by Wiradjuri people.

5.6 Ecology

The slopes surrounding the Subject Area are covered by re-growth woodland and natural woodland vegetation, while the flats and undulating landforms have been historically cleared for pasture and heavily impacted by various agricultural activities and the development of mine related infrastructure (Figure 6). Vegetation is further described in Table 10.

Plants of traditional or historical value to the Aboriginal community “highlight one part of the natural environment that demonstrates the Aboriginal cultural affiliation with the landscape” (Purcell 2002: 200). The Wiradjuri people of the Moolarben area would have made extensive and obvious use of the natural resources occurring there. The Moolarben area is located within a particularly biodiverse region, as it incorporates ecological traits and species of both the sandstone environments (woodlands and forests on sandstone ridges and plateau) to the east and the western slopes and plains (red soils, large rivers and pine woodland and forests) to the west. This richness and diversity means the Moolarben area would have been a valuable utilitarian, social and cultural asset for the Wiradjuri. Species of traditional and ongoing interest in the Wiradjuri economy include possums, kangaroos, wallabies, emus, wombats, lizards, snakes, goannas, birds, insects and a range of plant species (Pearson 1981: 335).

Many of these resources would have been available in the local landscape of the Subject Area, and motifs directly or abstractly representing many of these species are found in the Wiradjuri rock art of the Ulan area, speaking to both the social, utilitarian and possibly ceremonial importance of some of these plants and animals.



Plate 6: Open woodland on slopes looking towards cleared gully within the Subject Area.



Plate 7: Kurrajong, seen across the Subject Area has a range of cultural uses.



Plate 8: Nguuguung (Tawny frogmouth) observed in Subject Area.



Plate 9: Sydney coastal fig trees seen on upper slopes within the Subject Area.

5.7 Past land use and disturbance

As a whole, the Subject Area has had relatively little disturbance. Past land use and disturbance within the Subject Area includes vegetation clearance, predominately associated with the creation of access tracks and pastoral activities within gullies, open depressions, ridge crests and lower slopes. Graffiti can be found in a number of sandstone overhangs. Exploration drilling, slate quarrying or overburden placement and creation of rural infrastructure such as dams has also occurred in localised parts of the Subject Area. Burnt vegetation and fire affected sandstone overhangs within the Subject Area speak to a history of bush fires, vegetation clearance and lightning strikes. As a result of this past land use, culturally modified trees are less likely to have survived however, other material evidence of Aboriginal land use is likely to have survived, such as open artefact scatters on flat to gently inclined terrain such as gullies, valleys, ridgetops and saddles and sandstone overhangs suitable for habitation and art. The integrity of rock shelters and overhangs may be impacted by the history of vegetation clearance, grazing, rural use, fire and natural weathering.

5.8 Summary

The dominant environmental features of UG2 area which may have influenced local Aboriginal occupation patterns, as described by Hamm (2008a) are:

- Moolarben Ridge south of Carr's Gap Trig Station.
- A series of gullies which have been formed as a result of erosion and run-off to the west of Murragamba Creek Valley with some rock shelter outcrops located on the edges of the gully features all facing east.
- Some sandstone tors and pinnacles located on the top of the ridge and lower mid slopes.

The ridgeline described above may have been used as a transit feature, especially at the northern end of the ridge where it forms a natural saddle allowing Aboriginal people to traverse across to both Moolarben and Murragamba Creek catchments (Hamm 2008a).

The landscape context presented above is synthesised with the previous archaeological work undertaken within the Subject Area and region as described in Section 6 to form the predictive model outlined in Section 8.

6. Regional character

The Subject Area sits in the far north-eastern area of the Wiradjuri Nation, whose land extended across an extensive portion of NSW incorporating the Lachlan, Macquarie and Murrumbidgee Rivers and taking in the woodlands of the Riverina, the western slopes and plains including Griffith and Wagga Wagga and as far west as Mossgiel, south to the Murray River, east to the Great Diving Range and north to Dubbo and Mudgee. The Wiradjuri Nation shared boundaries with Kamilaroi, Gweagal and Wonnarua speaking peoples.

The area around Moolarben is a region of high biodiversity, incorporating aspects of both the Wollemi forests to the east, and the red-soil slopes and plains woodlands to the west. Munghorn Gap Nature Reserve, to the south-east of the Subject Area captures the western most occurrences of Sydney Basin vegetation groups. This area provides a diverse range of resources for groups to use, maintain and manage. Oral histories, family accounts and stories, ethnographic and historic records and the archaeological records provide detail on the complex Wiradjuri belief systems, experiences and continuing connections and responsibilities to Country that have encompassed life from creation to modern times.

Material evidence of Aboriginal occupation of Australia dates back at least 65,000 years based on results from Madjedbebe, a rock shelter located in northern Australia (Clarkson et al. 2017). The earliest material evidence of Aboriginal occupation in the Moolarben region was found at Granites 2 Rock Shelter, located approximately 150 km south-west of the subject area, and dating to 7,000 years before present (BP) (Pearson 1981). A number of other archaeological excavations have been undertaken in the nearby area and provided dates of occupation in the last 5,000 years (Niche 2016, Kuskie 2009).

Pearson (1981: 81) hypothesises three possible Wiradjuri speaking clans living at Bathurst, Wellington and Mudgee – Rylstone. The Subject Area most likely lies within the Mudgee - Rylstone group's area. Based on his review of historical sources, Pearson (1981: 75) suggested that at contact most day to day activities were undertaken by groups of up to 20 individuals who came together into larger groups at certain times of the year to utilise a resource or undertake law or ceremonial activities.

During the 1820s, increasing European settlement along the Cudgegong River and from Mudgee to Wellington would have resulted in increasing upheaval to traditional Aboriginal practices. Hostilities between the local Aboriginal population and non-indigenous settlers peaked between 1824 and 1826 with the advent of martial law by Governor Brisbane and resistance from Windradyne, a Wiradjuri man (Haglund 1999). Settlement increased with the gold rush between the 1850s and 1870s, causing further displacement of the local Aboriginal population.

Today, Wiradjuri people continue to live in the district and maintain strong cultural and spiritual connection to Country and their cultural heritage. The continuation of culture is seen in everyday life and practice, for example in the time and investment of the RAPs in the management of their culture at MCC, in the achievements of Wiradjuri people throughout the district and through the revitalisation of the Wiradjuri language has been taking place over the last 10 years with the publication of A First Wiradjuri Dictionary and Wiradjuri being taught at schools and TAFE in Parkes and Forbes (Senior and Rudder 2005).

The Ulan area has been the subject of intensive archaeological and cultural heritage assessment over the last 20 years, driven mostly by the development of the Ulan, Moolarben and Wilpinjong Coal mines. The archaeological record, therefore, is reasonably well understood, and the archaeological expectations of

proposed subject areas can be readily and confidently characterised based on the extensive previous findings.

Sites containing stone artefacts are the most common type of site known in the region. They may vary in numbers of artefacts from numerous Isolated Artefacts, small concentrations of stone artefacts to extensive, dense concentrations of stone artefacts. While these may occur anywhere, stone artefacts will be more common in flat to gently inclined areas such as valley floors, open depressions, lower slopes, ridge tops and within rock shelters, and sometimes can form extensive, high artefact density sites with both surface and sub-surface artefacts.

Rock shelters vary largely in terms of contents, nature, research potential and their position within the topography. Rock shelters sites are a very common site type in the sandstone hills and ranges, occurring where there are cliffs, scarps or large boulder falls that form rock shelters. The Rock Shelter sites contain either individual features or a combination of features including: archaeological artefacts and deposit; pigment rock-art; axe grinding grooves; grinding slabs. Less common site types include scarred trees and axe grinding grooves, which occur in creek beds and sometimes in Rock Shelters.

Kuskie (2009) has posited a model of past Wiradjuri land-use which uses the concept of “resource zones” to interpret past use of the landscape. The model states that most evidence of occupation will date within the last 5,000 years though may have extended 30,000 – 40,000 years BP. The model determines three zones of resources: primary resource zones, secondary resource zones and a third zone that encompasses the land beyond primary and secondary resource zones (Kuskie 2009: 22).

Primary resource zones: areas of more abundant and diverse resource rich zones in north-east Wiradjuri territory including the junction of the higher order watercourses such as Goulburn and Talbragar Rivers would most likely be a focus of occupation. These zones may have supported nuclear and extended family base camps, community base camps and congregations of larger groups. This zone may have been subject to longer stays and more frequent occupation than other areas, such as secondary resource zones. The model states that these zones would contain substantially higher counts and densities of artefacts, a greater range of stone materials and artefact types and a higher number of activity areas would be present.

Secondary resource zones: these are areas where resources such as watercourses, swamps and wetlands occur in close proximity of higher order watercourses and associated flats and terraces. Examples of secondary resource zones in the Ulan area include higher order parts of Moolarben Creek. In the model these zones were utilised for regular but sporadic seasonal encampments of small parties, but occupations of the encampments would typically have been for short periods. Compared to the surrounding areas this resource zone will host moderately higher counts and densities of artefacts, a number of activity areas, and a relatively broad range of raw materials and artefact types (but much lesser range than sites in primary resource zones).

Outside primary and secondary zones: occupation is anticipated to be hunter gatherer activities with small parties of men, women or children. Movement across the landscape would be transitory between resource locations and may include special purpose journeys for ceremonial purpose or the procurement of stone. Utilisation of landforms such as simple slopes, ridge crests, spur crests and lower order watercourses would be far less intense than that found in primary and secondary resource zones.

Much of the surveyed area is in contexts that do not conform to primary or secondary resource zones under the model of occupation outlined above. In this model, activities that may have occurred in the

landscape include hunting and gathering activities, along with transitory movement between locations and procurement of stone materials, which would have been of a generally low intensity (Kuskie 2018: 57).

The bulk of these activities would be supported through the presence of material evidence, through the stone artefact assemblage. For instance, food procurement and processing might be evident through the presence of use wear residue on stone tools. Ceremonial activities may be evident by the presence of carved trees, bora grounds and stone arrangements.

Reassessment of the predictive model by Kuskie in 2018 highlights that the potential for bora/ceremonial, carved tree, scarred tree, rock engraving, Rock Shelter and stone arrangements can be reassessed as very low. The model predicts that most stone artefacts will be made of quartz due to its ease of access and availability in the local landscape (Kuskie 2018: 58). The model hypothesises that the relative intensity of use of each of the materials will be dependent on the proximity of the original source of the stone. As a result of the abundance of available local stone, the stone is less likely to exhibit intensive reduction as evidence of conservation of material.

This predictive model is applied to the Subject Area in Section 7.

7. Predictive model

Predictive model for Moolarben, Wilpinjong and Ulan, as defined by Kuskie (2009, 2018) and introduced as part of the character of the archaeological resource of the region in Section 6, is applicable to the Subject Area.

Activities that may have occurred in the Subject Area landscape include food procurement and processing, food consumption, maintenance and production of tools, the building of shelter, children's play and learning, creative activity, ceremonial activity, spiritual activity, burials and social and political activity by Aboriginal people.

The bulk of these activities would produce archaeological evidence; in particular stone artefact assemblages and the traces of use that can be directly or indirectly inferred from the artefacts. For instance, food procurement and processing might be evident through the presence of use-wear and residues on stone tools. Ceremonial activities may be evident by the presence of art, carved trees, bora grounds and stone arrangements.

The Subject Area, including both the UG2 Approved Mining Area and the UG2 Extended Mining Area, has found to have predominately moderate to steep gradient slopes and is distant from higher order watercourses. It forms a high point in the landscape and provides outlook over the surrounding valleys.

In Kuskie's (2009, 2018) predictive model, the UG2 Extended Mining Area and the majority of the UG2 Approved Mining Area fall outside of primary and secondary resource zones. It is hypothesised that Aboriginal use of the Subject Area was more likely to have related to hunting and gathering activities along with transitory movement as part of normal and seasonal movement between resources such as springs, Murragamba and Moolarben Creeks, stone sources and vegetation groups adapted to elevated terrain. Special purposes visits to visit significant sites such as S2MC236 (AHIMS ID#36-3-0134) are also likely. It is hypothesised that the basalt outcrops may have been used for sourcing material to make basalt stone tools, however links between the basalt caps and basalt flakes across MCC are yet to be investigated. Use of the Subject Area is predicted to generally have been of low intensity (Kuskie 2013b), with greater occupation occurring in the nearby secondary resource zones associated with Moolarben and Murragamba Creeks.

Accordingly, the past traces of Aboriginal land use are predicted to reflect this, with the Subject Area containing a moderate number of sites, and sites that contain low to moderate numbers of artefacts and features. The Subject Area has the potential to contain both open sites and closed sites (rock shelters).

Rock Shelters sites are likely to occur on the moderate to steep slopes and on the lower slopes and valley floors within the UG2 Extended Mining Area and within the UG2 Approved Mining Area where there are cliffs, scarps or large boulder falls that form rock shelters. Rock Shelter sites may contain either individual features or a combination of features including: stone artefacts, archaeological or potential archaeological deposit; pigment rock-art; axe grinding grooves; grinding slabs.

Open sites are also likely to occur within the UG2 Extended Mining Area and Approved Mining Area, on flat to moderately inclined land at any topographic point in the landscape. Open sites may contain either individual features or a combination of features including; stone artefacts, archaeological or potential archaeological deposits, pigment rock art, axe-grinding grooves, grinding slabs. Culturally modified trees may occur but are rare across the region.

The archaeological model predicts that most stone artefacts will be made of quartz due to its ease of access and availability in the local landscape. The model hypothesises that the relative intensity of use of each of the materials will be dependent on the proximity of the original source of the stone. Most stone procurement is hypothesised to have occurred during normal daily and seasonal movement without the need for special purpose visits. As a result of the abundance of available local stone, the stone is less likely to exhibit intensive reduction as evidence of conservation of material.

Most stone technology will be basic and non-specific (e.g. complete and broken flakes) with low frequencies of microblade or microlithic technologies, bipolar knapping, backing and use-wear.

Grinding grooves for the sharpening of ground edge axes may occur on exposed sandstone bedrock, but are unlikely to occur in high numbers within the Subject Area. Where they occur in areas of hills and ridges these occurrences would most likely represent occasional activity and short-term activities.

8. Sampling strategy

8.1 Archaeological survey

A review of previous survey coverage has been undertaken against topographic data and aerial imagery identifying that approximately 75% (243 ha) of the UG2 Approved Mining Area and 6% (3 ha) of the UG2 Extended Mining Area have previously been subjected to archaeological survey.

MCO has indicated that the management of the UG2 Approved Mining Area and UG2 Extended Mining Area would be guided by the approved HMP (MCO 2020). Given the level of previous assessment and systematic survey over the UG2 Approved Mining Area, the objective of this archaeological report was to focus on the areas of land identified in the proposed UG2 Extended Mining Area in Figure 2.

A targeted sampling strategy was developed to target landforms in unsurveyed land within and immediately adjacent to the UG2 Extended Mining Area, identified in the UG2 Extended Mining Area in the assessment methodology, over two days including:

- Raised ridgelines with potential impacts from the Project (i.e. including all ridges, cliffs, steep slopes [i.e. rock shelter and grinding groove potential])
- Creek lines with exposed rock (i.e. grinding groove potential).
- Land within 200 m of watercourses.
- Lower slopes and gullies.

Field methods for the survey are presented in Section 9 while the results of the survey, including survey coverage are presented in Section 10.

9. Survey methods

The Aboriginal heritage survey was undertaken between 11 May and 12 May 2021. The list of fieldwork participants is provided in Section 2

The survey was undertaken on foot by four participants and included transects across all landforms within the survey area. The survey targeted ground surface exposures and intensively surveyed rock exposures and formations where they occurred. As ground surface visibility was low due to vegetation cover, survey participants were generally spaced between 10 m and 30 m apart. This method retained the potential for discovering large sites on the ground surface through inspection of areas of exposure, and allowed conspicuous sites such as rock shelters and scarred trees to be readily inspected by the survey team. All potential rock shelters and rock formations within the survey units were inspected for possible art, occupation evidence and grinding grooves.

Located archaeological sites and Aboriginal objects were recorded in accordance with the Code of Practice using standard archaeological practice and according to requirements of AHIMS recording protocol including:

- A hand-held non-differential GPS unit was used to record all tracks and appropriate site data for the survey with spatial data recorded in terms of Datum and grid co-ordinates (i.e. Zone, Easting, Northing).
- Representative photographs were taken of survey units, different visibility levels, exposures and disturbed areas.
- All Aboriginal cultural heritage sites, artefacts and/or features identified during the survey were recorded using a hand-held non-differential GPS unit. The context of sites, artefacts and/or features were additionally photographed, and the following details recorded on recording forms: description, photographic recording.
- Different types and levels of exposure were recorded. Exposure was defined as an estimate of the area which has a likelihood of revealing buried artefacts and/or deposits. Exposure is represented as a percentage of land for which erosion and exposure was sufficient to reveal archaeological evidence on the surface of the ground. Or as Burke and Smith (2004: 78-80) phrase it: exposure refers to what reveals. Exposure types are based on the results of erosional processes (e.g. sheet wash, gully, blow-outs, animal tracks or pads, vehicle or walking tracks etc).
- Archaeological visibility was recorded, defined as the amount of bare ground on the exposures which might reveal artefacts or other archaeological materials. Or as Burke and Smith (2004: 78-80) phrase it: visibility refers to what conceals. Visibility is affected by vegetation, leaf litter, stone ground, introduced material etc.
- Effective survey coverage area was also recorded (the area of the survey unit multiplied by the visibility percentage and exposure percentage and given in either square meters or hectares).

Comments provided by RAPs regarding the cultural values of the UG2 Extended Mining Area are described in detail in Section 3 of the ACHA to which this archaeological report forms an appendix. The RAPs did not identify any sensitive cultural information with regards to the Subject Area during the survey.

10. Survey Results

10.1 Survey coverage

70 ha were surveyed between 11 May and 12 May 2021. The survey achieved a good level of survey coverage across the proposed UG2 Extended Mining Area, increasing survey coverage from 6% to 76% (35 ha) in the UG2 Extended Mining Area and from 76% to 80% (260 ha) in the UG2 Approved Mining Area. This survey coverage is consistent with other Modifications at the MCC.

The survey sampled a range of landforms including ridges, cliffs, crests, slopes, open depressions, drainage lines (creeks) and gullies in line with the intended sampling strategy in Section 9. 100% of steep slopes and cliffs within the UG2 Extended Mining Area were surveyed.

All features, such as potential rock shelters, boulders and tor-like structures that were present were inspected for evidence of past Aboriginal land use. The survey also inspected all areas of ground surface exposure that were encountered, as these areas are most likely to reveal any Aboriginal stone objects that may be present.

Survey conditions were excellent, with cool to hot and sunny conditions. Visibility was generally low (10%), consistent with the terrain, due to vegetation cover, with areas of exposure from animal tracks, sheetwash, erosion and occasional localised areas of disturbance. Vegetation cover was particularly high after a wet season. Obtrusiveness of rock shelters, overhangs and sandstone platforms was good throughout the Subject Area (Plate 10, Plate 11, Plate 12 and Plate 13). Drainage lines were surveyed and had limited exposed stone suitable for grinding grooves.

As required by The Code of Practice survey units, landforms and effective survey coverage are summarised in Table 8 and shown in Figure 7.

Newly recorded Aboriginal heritage sites are summarised in Section 10.2 and described in more detail in Section 10.3. Sandstone overhangs/shelters with no material evidence of Aboriginal use and low integrity due to animal disturbance, small or low habitation space, stone or sloped floors are documented in Annex 3.



Plate 10: General photo of a ridge and slope landforms.



Plate 11: Visibility and exposure in the ridge and slope landforms.



Plate 12: General photo of slope with rock formations and overhangs.

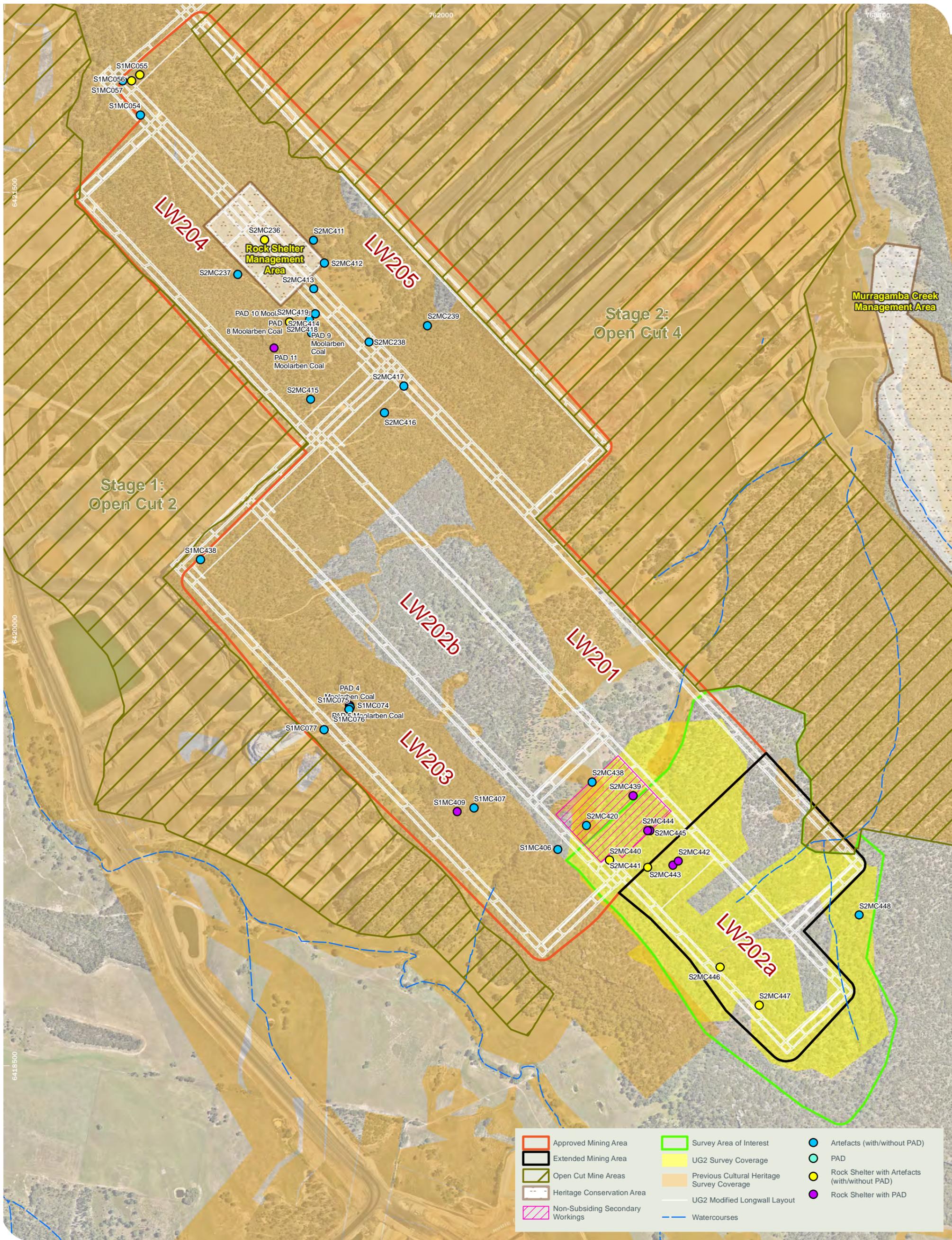


Plate 13: Lower slopes and open depression.

Table 8: Survey coverage and landform summary

Survey coverage	Landform		Grand Total
	Open depression, drainage lines, gullies	Ridges, crests, slopes	
Survey unit	20210512_SU1, 20210512_SU2	20210511_SU1, 20210511_SU2, 20210512_SU1	-
Sum of Area (m ²)	125,435	579,181	704,616
Visibility	10%	10%	10%
Exposure	5%	5%	5%
Area effectively surveyed (m ²)	627	2896	3523
Effective survey coverage	0.5%	0.5%	0.5%
Number of newly identified sites	1	10	11
Number of newly identified artefacts or features	Isolated Artefact (1)*	Rock Shelters with Artefacts and PAD (3) Rock Shelters with Artefact (1) Rock Shelters with PAD (5) Isolated artefact (1)	

*S2MC448 was identified outside the Subject Area.



10.2 Survey results

Altogether, eleven (11) Aboriginal heritage sites were identified during the field survey. These included:

- Three (3) Rock Shelters with Artefacts and PAD.
- One (1) Rock Shelters with Artefacts.
- Five (5) Rock Shelters with PAD.
- Two (2) Isolated Artefacts.

Five (5) of the new identified sites were identified within the extent of the UG2 Approved Mining Area, five (5) were identified in the UG2 Extended Mining Area and one (1) was identified during the survey but outside the Subject Area. Details of the newly recorded Aboriginal heritage sites are presented in Table 9 and shown on Figure 7.

Table 9: Newly recorded Aboriginal heritage sites

Site Name	AHIMS ID	Easting GDA20 Z55	Northing GDA20 Z55	Location	Site Type	Landform	Extent of site	Number of artefacts or features
S2MC438	36-3-3807	762519	6419474	UG2 AME	Isolated Artefact	Ridge crest	1m x 1m	1 retouched chert flake located on basalt outcrop on ridge crest
S2MC439	36-3-3808	762659	6419427	UG2 AME	Rock Shelter with PAD	Upper slope	6m x 5m	1 PAD, no artefacts
S2MC440	36-3-3809	197796	6418089	UG2 AME	Rock Shelter with Artefacts and PAD	Mid slope	8m x 5m	2 quartz flakes, 1 PAD
S2MC441	36-3-3810	762710	6419181	UG2 EMA	Rock Shelter with Artefacts and PAD	Mid slope	14m x 20m	2 quartz flakes, PAD
S2MC442	36-3-3812	762797	641918	UG2 EMA	Rock Shelter with PAD	Upper slope	13.6m x 7.1m	PAD
S2MC443	36-3-3811	762815	6419202.	UG2 EMA	Rock Shelter with PAD	Upper slope	9m x 6m	PAD
S2MC444	36-3-3813	762718	6419307	UG2 AME	Rock Shelter with PAD	Mid slope	17.1m x 8.3m	PAD
S2MC445	36-3-3817	762710	6419307	UG2 EMA	Rock Shelter with PAD	Mid slope	15m x 6m	PAD
S2MC446	36-3-3814	762958	6418838	UG2 EMA	Rock Shelter with Artefact and PAD	Mid slope	7.5m x 8.6m	1 quartz flake
S2MC447	36-3-3815	763093	6418707	UG2 EMA	Rock Shelter with Artefact	Mid slope	13m x 9m	1 quartz flake
S2MC448	36-3-3816	763437	6419017	Outside Subject Area	Isolated Artefact	Open depression	1m x 1m	1 chert scraper located on lower slope

UG2 AMA = UG2 Approved Mining Area, UG2 EMA = UG2 Extended Mining Area.

Rock shelters recorded as Aboriginal heritage sites contained either stone artefacts or had an increased likelihood of containing Aboriginal objects (PAD) due to their position in the landscape, their outlook, had deposit with relatively fair to good integrity with areas of lesser disturbance, suitable habitation space and their proximity to other known Aboriginal objects and resources.

10.3 Description of individual sites

10.3.1 S2MC438 (AHIMS ID#36-3-3807)

S2MC438 (AHIMS ID#36-3-3807), a chert retouched flake, was located on a dirt track on a cleared ridge crest within the UG2 Approved Mining Area, approximately 130 m north-east of S2MC420 (an artefact scatter of six (6) stone artefacts identified during surveys for an exploration drilling program). The landform offered views across Murragamba Creek valley and OC4. Cobbles and outcrops of basalt were exposed across the ridge crest.



Plate 14: S2MC438 (AHIMS ID#36-3-3807), general location.



Plate 15: S2MC438 (AHIMS ID#36-3-3807), chert flake.

10.3.2 S2MC439 (AHIMS ID#36-3-3808)

S2MC439 (AHIMS ID#36-3-3808), a rock shelter with PAD, was recorded on the upper slope of the ridge within the UG2 Approved Mining Area, approximately 140 m east-south east of S2MC438. The rock shelter interior has a sandy deposit approximately greater than 50 cm along the dripline and while no stone artefacts were identified, the rock shelter outlook, proximity to a potential stone resource and other stone artefact sites and depth of the deposit increases the likelihood of subsurface stone artefacts being present. The integrity of the deposit was affected by rabbit burrowing.



Plate 16: S2MC439 (AHIMS ID#36-3-3808), Rock Shelter with PAD, facing north-east.



Plate 17: S2MC439 (AHIMS ID#36-3-3808), Rock Shelter with PAD, facing south.



Plate 18: S2MC439 (AHIMS ID#36-3-3808), Rock Shelter with PAD, facing south.

10.3.3 S2MC440 (AHIMS ID#36-3-3809)

S2MC440 (AHIMS ID#36-3-3809), a rock shelter with Artefacts and PAD, located midslope along a continuous sandstone ridge within the UG2 Approved Mining Area, looking south-west across a gully. Vegetation at the front of the rock shelter is burnt. The rock shelter interior large habitable floor space and has a sandy deposit at least 30 cm deep in parts. Two stone artefacts were located within the drip line and interior of the rock shelter. The integrity of part of the deposit was impacted by wombat burrowing.



Plate 19: S2MC440 (AHIMS ID#36-3-3809), Rock Shelter with Artefact and PADs, general location, facing north-east.



Plate 20: S2MC440 (AHIMS ID#36-3-3809), Rock Shelter with Artefact and PAD, facing north-east.



Plate 21: S2MC440 (AHIMS ID#36-3-3809), rock shelter detail with wombat burrowing at back of rock shelter.



Plate 22: Quartz complete flake located at S2MC440 (AHIMS ID#36-3-3809).

10.3.4 S2MC441 (AHIMS ID#36-3-3810)

S2MC441 (AHIMS ID#36-3-3810), a Rock Shelter with Artefacts and PAD, was recorded mid slope along a continuous sandstone ridge running roughly east-west within the UG2 Extended Mining Area. The rock shelter consists of two adjoining overhangs, connected by a sandy deposit. The rock shelter interiors have a sandy deposit, disturbed in parts by wombat burrowing. Two quartz flakes were located within the dripline of the rock shelters.



Plate 23: S2MC441 (AHIMS ID#36-3-3810), Rock Shelter with Artefacts and PAD, facing south-east.



Plate 24: S2MC441 (AHIMS ID#36-3-3810), Rock Shelter with Artefacts and PAD, facing north-east.



Plate 25: S2MC441 (AHIMS ID#36-3-3810), Rock Shelter with Artefacts and PAD, facing south-east.



Plate 26: S2MC441 (AHIMS ID#36-3-3810), Rock Shelter with Artefacts and PAD, facing north-east.

10.3.5 S2MC442 (AHIMS ID#36-3-3812)

S2MC442 (AHIMS ID#36-3-3812), a Rock Shelter with PAD, is a large sandstone overhang located on the upper slope within the UG2 Extended Mining Area. The overhang has formed through chemical weathering, block fall and exfoliation and has been highly weathered. The overhang consists of banded conglomerate sandstone and fine-grained sandstone. The floor of the overhang is stone with 20 cm fine sandy deposit, however flat to gently inclined land continuous along the same contour line towards S2MC443. The rock shelter has been visited in the past during construction of a fenceline.



Plate 27: General photo S2MC442 (AHIMS ID#36-3-3812), facing north-west.



Plate 28: General photo of view from S2MC442 (AHIMS ID#36-3-3812), facing south-west.

10.3.6 S2MC443 (AHIMS ID#36-3-3811)

S2MC443 (AHIMS ID#36-3-3811), a Rock Shelter with PAD, was located along the same contour line as S2MC442 within the UG2 Extended Mining Area, separated by an old fence line. The large sandstone overhang has formed through chemical weathering, block fall and exfoliation and has been highly weathered. The overhang consists of banded conglomerate sandstone and provides a large habitable floor space with excellent views across the valley to the south east, east and north-east. The floor of the overhang is stone with 15 cm sandy deposit at dripline and at least 30 cm at rear of the rock shelter. S2MC443 (AHIMS ID#36-3-3811) is directly adjacent to S2MC442 (AHIMS ID#36-3-3812). Overhangs are separated by fence line. While no Aboriginal objects were visible at the time of the survey, the outlook, scale of the rock shelter, estimate deposit depth and blockfall at the front of the rock shelter increases the likelihood for Aboriginal objects to be present.



Plate 29: S2MC443 (AHIMS ID#36-3-3811), facing east.



Plate 30: Rock shelter detail S2MC443 (AHIMS ID#36-3-3811).



Plate 31: General photo of S2MC443 (AHIMS ID#36-3-3811), facing north-west.



Plate 32: General photo of view from S2MC443 (AHIMS ID#36-3-3811), facing south.

10.3.7 S2MC444 (AHIMS ID#36-3-3813)

S2MC444 (AHIMS ID#36-3-3813), a Rock Shelter with PAD, consists of large sandstone overhang along a continuous sandstone ridge, located mid-slope withing the UG2 Approved Mining Area, with a pleasant outlook across the gully. The rock shelter contains an approximately 30 cm deep sandy deposit with evidence of animal burrowing and wasp nests throughout the rock shelter. Animal burrowing is likely to have reduced the integrity of the deposit.



Plate 33: S2MC444 (AHIMS ID#36-3-3813), Rock Shelter with PAD, facing south-east.



Plate 34: S2MC444 (AHIMS ID#36-3-3813), Rock Shelter with PAD, facing south-west.



Plate 35: S2MC444 (AHIMS ID#36-3-3813), Rock Shelter with PAD, facing south-west.



Plate 36: S2MC444 (AHIMS ID#36-3-3813), Rock Shelter with PAD, facing south-east.

10.3.8 S2MC445(AHIMS ID#36-3-3817)

Site S2MC445 (AHIMS ID#36-3-3817), a Rock Shelter with PAD, comprises of a large sandstone overhang located within a continuous sandstone outcrop along the midline of steep hills within the UG2 Approved Mining Area. The interior of the rock shelter consists of conglomerate sandstone banding and contains wasps and birds nests within the rock shelter. The rock shelter has a grey sandy deposit on top of a sandstone floor. PAD located within the eastern end of the rock shelter, approximately 4 m from the dripline.



Plate 37: S2MC445 (AHIMS ID#36-3-3817), Rock Shelter with PAD, facing south-west.



Plate 38: S2MC445 (AHIMS ID#36-3-3817), Rock Shelter with PAD, facing west.

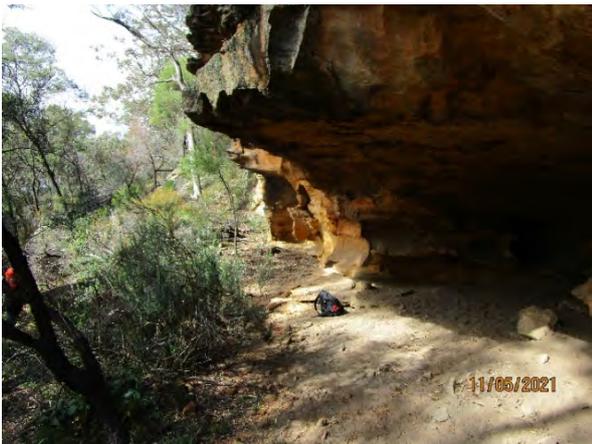


Plate 39: S2MC445 (AHIMS ID#36-3-3817), Rock Shelter with PAD, facing east.



Plate 40: View from S2MC445 (AHIMS ID#36-3-3817), Rock Shelter with PAD, facing north-east.

10.3.9 S2MC446 (AHIMS ID#36-3-3814)

S2MC446 (AHIMS ID#36-3-3814) is a large sandstone shelter and overhang with PAD and artefacts located within a sandstone outcrop along the mid slope of moderately inclined hills within the UG2 Extended Mining Area, overlooking a gully. The rock shelter interior consists of a sloped stone floor that levels out towards the back of the rock shelter. The stone floor has a built-up sandy deposit, approximately 30 cm to 40 cm deep along the dripline. The rock shelter contains wasp nests and is actively being used by animals. A chert backed flake was located in the eroding downslope of the rock shelter. While further stone artefacts are likely within the deposit, the area of PAD is relatively small and the deposit is moderately sloped. Downslope sediment movement and the impact of animal use is also likely to have impacted the integrity of the deposit.



Plate 41: S2MC446 (AHIMS ID#36-3-3814), Rock Shelter with Artefact and PADs, facing south, artefact located in foreground.



Plate 42: S2MC446 (AHIMS ID#36-3-3814), Rock Shelter with Artefact and PAD, facing south-west.



Plate 43: S2MC446 (AHIMS ID#36-3-3814), backed chert flake.



Plate 44: S2MC446 (AHIMS ID#36-3-3814), Rock Shelter with Artefact and PAD, interior detail, facing south.

10.3.10 S2MC447 (AHIMS ID#36-3-3815)

S2MC447 (AHIMS ID#36-3-3815), a rock shelter with an isolated quartz flake located downslope of the shelter, is a large flat roofed overhang with a dead tree at the entrance and a kurrajong tree to the south and a fig downslope within the UG2 Extended Mining Area, just below the crest. The rock shelter had a stone floor and had formed through blockfall, roof has been affected by fire and fungal growth. A quartz complete flake was located downslope of the rock shelter. The deposit is outside the rock shelter.

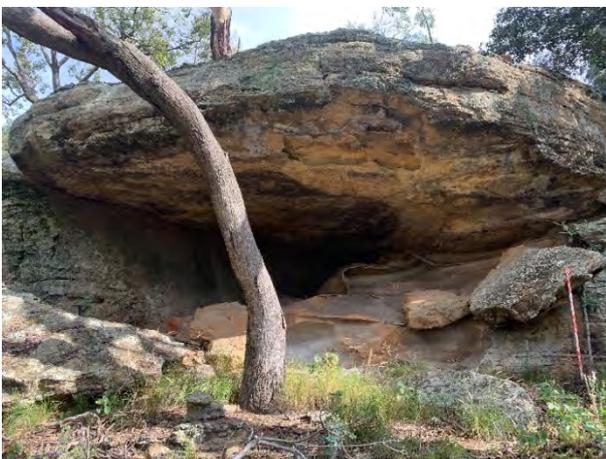


Plate 45: S2MC447 (AHIMS ID#36-3-3815), Rock Shelter with Artefacts, facing north-west.

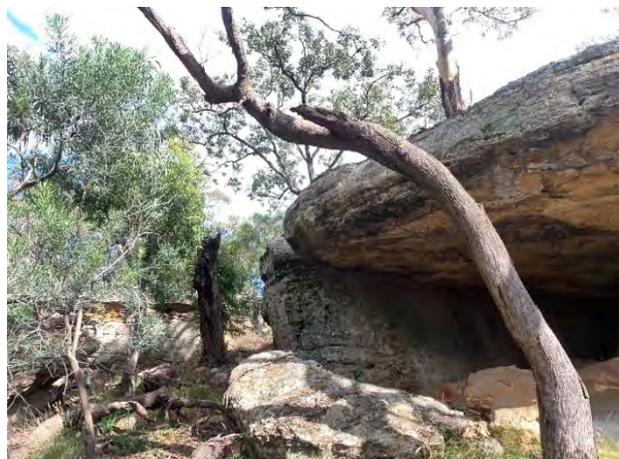


Plate 46: S2MC447 (AHIMS ID#36-3-3815) Rock Shelter with Artefacts, facing south-west.



Plate 47: Quartz flake located at site S2MC447 (AHIMS ID#36-3-3815).



Plate 48: Landscape view from S2MC447 (AHIMS ID#36-3-3815), Rock Shelter with Artefacts, facing south-east.

10.3.11 S2MC448 (AHIMS ID#36-3-3816)

S2MC448 (AHIMS ID#36-3-3816) consists of an isolated chert scraper located on a slate-covered lower slope in open depression outside of the Subject Area. Visibility due to leaf and slate cover was poor but it is likely further surface artefacts are present.



Plate 49: S2MC448 (AHIMS ID#36-3-3816), general location.



Plate 50: S2MC448 (AHIMS ID#36-3-3816), chert scraper, ventral surface.

11. Analysis and discussion

11.1 Site types and features within the Subject Area

As a result of surveys undertaken for the UG2 Modification and other previous surveys, a total of 42 Aboriginal heritage sites, have been identified across the Subject Area (i.e. UG2 Approved Mining Area and UG2 Extended Mining Area). A breakdown of Aboriginal heritage sites by site type and location is provided in Table 10 below.

Table 10: Summary of site types in Subject Area

Site types	Site Names (UG2 Approved Mining Area)	Site Names (UG2 Extended Mining Area)	Count of previously recorded sites	Count of new sites	Total count of sites
Artefacts (with/without PAD)			23	1	24
Artefacts	S1MC054, S1MC057, S1MC406, S1MC407, S2MC238, S2MC239, S2MC411, S2MC416, S2MC417, S2MC419, S2MC420	-	11		11
Isolated Artefact	S1MC074, S1MC075, S1MC076, S1MC077, S1MC438, S2MC237, S2MC412, S2MC413, S2MC414, S2MC415, S2MC418, S2MC438*	-	11	1	12
PAD	PAD 4		1		1
Rock Shelters			9	9	18
Rock Shelter with Artefacts	S1MC055, S1MC056,	S2MC447*	2	1	3
Rock Shelter with Artefacts and PAD	PAD 8, S2MC440*	S2MC441*, S2MC442*, S2MC443*, S2MC446*	1	5	6
Rock Shelter with PAD	PAD 5, PAD 9, PAD 10, PAD 11, S1MC409, S2MC439*, S2MC444*, S2MC445*		5	3	8
Rock Shelter with Art and Artefacts	S2MC236		1		1

*Newly identified sites

The original assessments of significance, values and impact assessment for the UG2 Approved Mining Area were undertaken in 2008 as part of the Stage 2 approval (Hamm 2008a). Since this time, site recording across MCC, Ulan and Wilpinjong have reached over 3100 sites.

69% of sites across MCO, Ulan and Wilpinjong are categorised as artefact sites (with/without PAD). This site type represents the most common across the region. 27% are categorised as rock shelters with one or more features. Of these rock shelter sites, 17% of the 27% are categorised as rock shelters with PAD, 6% are described as rock shelters with artefacts (with/without PAD) and less than 0.5% are rock shelters which contain art.

Rock shelter sites (with/without artefacts, PAD or art) are therefore less common in the local area. Where this site type has good integrity, have research value for their ability to contribute to research questions around how the landscape was utilised.

Aboriginal heritage site S2MC236, a rock shelter with art and artefacts, is a rare site type with exceptional cultural significance within the region.

11.2 Revisiting the predictive model

The predictive model for the survey hypothesised that Aboriginal use of the Subject Area was more likely to have related to hunting and gathering activities along with transitory movement as part of normal and seasonal movement between resources.

The survey results generally reflected this, with eleven Aboriginal heritage sites being recorded including rock shelters with artefacts (with/without PAD), rock shelters with PAD and two (2) isolated stone artefacts. Of the 57 overhangs recorded, four (4) contained visible stone artefacts, which further supports the predictive model. The greatest number of artefacts recorded in rock shelters was two.

The scale, outlook and suitability of rock shelters for occupation and use was noted throughout the UG2 survey area by survey participants. Multiple overhangs were of a sufficient size and had surfaces that would have been suitable for art. Despite this, no art was located and relatively few rock shelters contained visible stone artefacts. It was the sense of the survey participants that the absence of evidence may be the result of weathering, impacts from fire and exfoliation of surfaces within rock shelters.

11.3 Archaeological research questions and opportunities

The RAPs have identified that the Moolarben Ridge south of Carr's Gap has significant cultural value (Hamm 2008a, Kuskie 2013b). Where archaeological investigation is considered of value to understanding or providing detail to stories of Aboriginal life at Moolarben, one of the research questions posed for the Stage 2 project identified by Hamm (2008a) included:

- Are there dateable rock shelter sites that may provide discrete time-lines to when the Moolarben and Murrumbidgee Creek Valleys were first occupied?

The landscape resources within the Subject Area also have the potential to be investigated through archaeological methods to provide additional supporting information regarding Aboriginal use of the landscape including:

- Sourcing studies and comparative analysis of basalt stone tools including flakes, hatchets and axes with basalt outcrops to identify patterns of mobility and trade within the local and wider area
- Usewear and residue analysis of grinding stones using relatively less destruction methods.
- Continued contributions to raw material use, stone artefact reduction strategies and technology across the Moolarben landscape.

The basalt outcrops are less likely to experience subsidence-induced impacts and will continue to be able to answer questions regarding stone material sourcing after the proposed impacts. Rock shelters are more likely to experience subsidence-induced impacts.

To date, limited archaeological investigation of rock shelters within the Subject Area has been undertaken. This is primarily because conservation outcomes have been pursued for S2MC236 with the creation of the Rock Shelter Management Area and many of the other rock shelters and overhangs have low numbers of visible artefacts, have small habitable floors or have been disturbed from animal activity such as wombats and rabbits (see Kuskie 2013b, AECOM 2015a).

However, where rock shelters with PAD (with or without artefacts) with potential research values cannot be avoided and as the mine progresses and where subsidence induced impacts occur and renders these resources unsafe to investigate, there is a decreasing opportunity to investigate PADs and resources associated with the Moolarben Ridge. This limits future opportunities to investigate questions around whether the absence of visible stone artefacts is the result of poor visibility or of differing cultural uses. It creates the loss of opportunity to recover dateable samples to understand the chronology of ridge and valley occupation at Moolarben.

The *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) notes that information gaps are not uncommon and should be acknowledged. They may require further investigation to adequately identify the values present across the subject. Investigation of rock shelters with PAD with good integrity should therefore be considered for archaeological investigation in conjunction as to whether archaeological excavation is considered a necessary harm by the stakeholders to identify values relative to the likelihood of subsidence-induced impacts, as per the management measures in the HMP (2020). This is considered further in Section 13 against the proposed impacts.

12. Scientific values and significance assessment

12.1 Assessment framework

The Burra Charter (Australia ICOMOS 1999) defines the basic principles and procedures to be observed in the conservation of important places. It provides the primary framework within which decisions about the management of heritage sites in Australia should be made. The Burra Charter defines cultural significance as being derived from the following values summarised in Table 11 below.

Table 11: Scientific values as outlined by the Burra Charter

Value type	Description
Aesthetic Value	Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use.
Historic Value	Historic value encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the setting are substantially intact, than where it has been changed or evidence does not survive. However, some events or association may be so important that the place retains significance regardless of subsequent treatment.
Scientific Value	The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness (conservation value), and on the degree to which the place may contribute further substantial information.
Social Value	Social or cultural value refers to the spiritual, traditional, historical or contemporary associations and attachments the place or area has for Aboriginal people. Social or cultural value is how people express their connection with a place and the meaning that place has for them. Places of social or cultural value have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events. Communities and individuals can experience a sense of loss should a place of social or cultural value be damaged or destroyed.

12.2 Other approaches

The categorisation into aesthetic, historic, scientific and social values is one approach to understanding the concept of cultural significance. However, more precise categories may be developed as understanding of a particular place increases.

The NSW DECCW guidelines for the significance assessment of Aboriginal archaeological sites are contained within the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1997). The Kit identifies with two main streams in the overall significance assessment process: the assessment of cultural/social significance to Aboriginal people and the assessment of scientific significance to archaeologists.

This approach encapsulates those aspects of the Burra Charter that are relevant to Aboriginal archaeological sites. The guidelines specify the following criteria for archaeological significance, as paraphrased in Table 12.

Table 12: Criteria specified for archaeological significance

Criteria	Description
Research potential	It is the potential to elucidate past behaviour which gives significance under this criterion rather than the potential to yield collections of artefacts. Matters considered under this criterion include – the intactness of a site, the potential for the site to build a chronology and the connectedness of the site to other sites in the archaeological landscape.
Representativeness	As a criterion, representativeness is only meaningful in relation to a conservation objective. Presumably all sites are representative of those in their class or they would not be in that class. What is at issue is the extent to which a class of sites is conserved and whether the particular site being assessed should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole. The conservation objective which underwrites the ‘representativeness’ criteria is that such a sample should be conserved.
Rarity	This criterion cannot easily be separated from that of representativeness. If a site is ‘distinctive’ then it will, by definition, be part of the variability which a representative sample would represent. The criteria might best be approached as one which exists within the criteria of representativeness, giving a particular weighting to certain classes of site. The main requirement for being able to assess rarity will be to know what is common and what is unusual in the site record but also the way that archaeology confers prestige on certain sites because of their ability to provide certain information. The criterion of rarity may be assessed at a range of levels: local, regional, state, national, and global.
Educational Potential	Heritage sites and areas should be conserved and managed in relation to their value to people. It is assumed that archaeologists have the ability to speak of the value of sites to members of their own profession. Where archaeologists or others carrying out assessments are speaking for the educational value of sites to the public, the onus is on them to go to the public for an assessment of this value, or to reputable studies which have canvassed public demand for education. The danger, otherwise, is that archaeologists would be projecting their values onto a public which is itself given no voice on the matter.
Aesthetics	Archaeologists are not expected to include an assessment of aesthetic significance along with their assessment of scientific significance. In relation to heritage places, aesthetic significance is generally taken to mean the visual beauty of the place. Aesthetic value is not inherent in a place but arises in the sensory response people have to it.

12.2.1 Grading scientific values

The following gradations, where a site or zone satisfies at least one criterion, have been applied to provide a measure of the values/significance for Aboriginal objects identified within the Subject Area, and to provide an overall assessment of the significance of each of the zones used that define the Subject Area.

Table 13: Criteria for grading scientific values

Gradation	Description
Low	The site or object contains only a single or limited number of features and has no potential to meaningfully inform our understanding of the past beyond what it contributes through its current recording (i.e. no or low research potential). The site or object is a representative but unexceptional example of the most common class of sites or objects in the region. Many more similar examples can be confidently predicted to occur within the Subject Area, and in the region.
Moderate	The site or object derives value because it contains features, both archaeological and contextual, which through further investigation may contribute to our understanding of the local past. These features include but are not limited to the relationship with landscape features or other Aboriginal archaeological sites or areas of identified heritage importance; diagnostic archaeological or landscape features that inform a chronology; and a relatively large assemblage of stone artefacts. The presence of a diverse artefact and feature assemblage, and connectedness with landscape features and other notable sites provide relatively higher representative and rarity values than sites of low significance.
High	The site or object has value because it contains archaeological and/or contextual features which through further investigation may significantly contribute to our understanding of the past, both locally and on a regional scale. These features include, but are not limited to: Aboriginal ancestral remains; the site’s relationship with landscape features or other Aboriginal archaeological sites or areas of identified heritage importance; diagnostic archaeological or landscape features that inform a chronology; and a very large

Gradation	Description
	assemblage of stone artefacts associated with other features such as oven remains or shell midden. Such sites will be relatively rare and will be representative of a limited number of similar sites that make up this class; hence they derive high representative and rarity values.

12.3 Assessment of archaeological significance

An assessment of each of the criteria for archaeological (scientific) value and significance is summarised in below and presented in detail for each Aboriginal heritage site in Table 15 (previously assessed Aboriginal heritage sites) and Table 16 (newly identified Aboriginal heritage sites) below. Aboriginal heritage sites at MCO that have been managed in accordance with the HMP are not included.

Table 14: Summary of Aboriginal heritage sites by scientific significance rating and location

Scientific significance rating	UG2 Approved Mining Area	UG2 Extended Mining Area	Count of Aboriginal I heritage sites
	37	5	42
High	S2MC238, S2MC236		2
Moderate	S2MC417, S1MC055		2
Low-Moderate	S2MC412, S2MC439*, S2MC440*, S2MC444*, S1MC438	S2MC441*, S2MC442*	7
Low	S1MC077, S2MC413, S2MC415, S2MC416, S2MC420, S2MC438*, S2MC445*, S1MC054, S1MC056, S1MC057, PAD 10 Moolarben Coal, PAD 11 Moolarben Coal, PAD 4 Moolarben Coal, PAD 5 Moolarben Coal, PAD 8 Moolarben Coal, PAD 9 Moolarben Coal, S1MC074, S1MC075, S1MC076, S1MC406, S1MC407, S1MC409, S2MC237, S2MC239, S2MC411, S2MC414, S2MC418, S2MC419	S2MC443*, S2MC446*, S2MC447*	31

Where Aboriginal heritage sites have previously been assessed for significance (e.g. Hamm 2006a; 2008a, Kuskie 2013b, AECOM 2015), these assessments have been used to develop the significance ratings. The following updates to previously assessed significance ratings have been made:

- S1MC055 has had its archaeological significance rating increased from low to moderate to reflect that Rock Shelters with Artefacts represent approximately 6% of sites across MCC, Ulan and Wilpinjong and 3% of sites within MCC.
- S2MC417 has had its archaeological significance rating increased from low-moderate to moderate as:
 - It is located 150 m from S2MC238, a large open artefact scatter.
 - It contains basalt cores and flakes which may be able to demonstrate a relationship with basalt outcrops across UG2 and other sites, such as S2MC438.

These sites have been assessed as having moderate scientific values (S2MC417 and S1MC055) due to their potential to inform research questions around the use of basalt outcrops in the local area and their potential to be connected in the landscape through this resource. S1MC055, as a Rock Shelter with Artefacts, is a relatively uncommon site type with a higher number of stone artefacts than other sites within the cultural landscape of the ridge south of Carr's Gap. Two (2) Aboriginal heritage sites have been identified as having high scientific (research) values (S2MC236 and S2MC238) and are addressed in more detail in Section 13 below.

An additional seven (7) Aboriginal heritage sites have been assessed as having low-moderate potential to answer research questions around the presence or absence of evidence of Aboriginal use along the Moolarben ridge.

Thirty-one (31) Aboriginal heritage sites are considered to have low scientific value. While all sites and their components have research value, these sites or objects contain only a single or limited number of features and have limited potential to meaningfully inform our understanding of the past beyond what it contributes through its current recording and the research that is undertaken as part of the HMP for all stone artefacts. Frequently these sites exhibit low integrity due to disturbance and are not associated with subsurface deposits. Many more similar examples can be confidently predicted to occur within the Subject Area, and in the region.

Table 15: Significance Assessment – previously recorded sites

Site name	AHIMS ID#	Site Type	Description	Cultural values	Aesthetic value	Rarity	Representativeness	Integrity	Scientific (archaeological) value/ Research Potential	Educational Potential	Scientific Significance Rating
S1MC054	36-3-0859	Artefacts	Three stone artefacts, recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	Previously assessed in Hamm (2006a) as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
S1MC055	36-3-0860	Rock Shelter with Artefacts	A shelter with eight surface stone artefacts, recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	Rock Shelters with Artefacts represent 6% of the recorded sites across MCO, Ulan and Wilpinjong. They are relatively uncommon at MCO and more common at Ulan.	Previously assessed in Hamm (2006a) as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value. This site has been reassessed as having moderate scientific values due to its potential to inform research questions around the use of basalt outcrops in the local area and their potential to be connected in the landscape through this resource S1MC055, as a Rock Shelter with Artefacts, is a less common site type with a higher number of stone artefacts than other sites along the Moolarben Ridge, and as such may inform research questions around the frequency of use and occupation along the ridgeline.	No specific educational opportunities have been identified for this site.	Moderate*
S1MC056	36-3-0861	Rock Shelter with Artefacts	A shelter with one stone artefact, recorded by Hamm 2008	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	Rock Shelters with Artefacts represent 6% of the recorded sites across MCO, Ulan and Wilpinjong. They are relatively uncommon at MCO and more common at Ulan.	Previously assessed in Hamm (2006a) as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value.	No specific educational opportunities have been identified for this site.	Low
S1MC057	36-3-0862	Artefacts	16 stone artefacts, recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	Previously assessed in Hamm (2006a) as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
S1MC074	36-3-0879	Isolated Artefact	A single stone artefact recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	Previously assessed in Hamm (2006a) as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
S1MC075	36-3-0880	Isolated Artefact	A single stone artefact recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	Previously assessed in Hamm (2006a) as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
S1MC076	36-3-0881	Isolated Artefact	A single stone artefact recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	Previously assessed in Hamm (2006a) as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low

Site name	AHIMS ID#	Site Type	Description	Cultural values	Aesthetic value	Rarity	Representativeness	Integrity	Scientific (archaeological) value/ Research Potential	Educational Potential	Scientific Significance Rating
								scientific or research value of the site.			
S1MC077	36-3-0882	Isolated Artefact	A single stone artefact recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	Previously assessed in Hamm (2006a) as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
PAD 4 Moolarben Coal	36-3-0883	PAD	Originally recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	This site has previously been identified as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
PAD 5 Moolarben Coal	36-3-0884	Rock Shelter with PAD	Originally recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	This site has previously been identified as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
PAD 8 Moolarben Coal	36-3-0954	Rock Shelter with Artefacts and PAD	Isolated Artefact and PAD. Originally recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	This site has previously been identified as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
PAD 9 Moolarben Coal	36-3-0955	Rock Shelter with PAD	Originally recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	This site has previously been identified as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
PAD 10 Moolarben Coal	36-3-0956	Rock Shelter with PAD	Originally recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	This site has previously been identified as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
PAD 11 Moolarben Coal	36-3-0957	Rock Shelter with PAD	Originally recorded by Hamm (2006a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	This site has previously been identified as having low conservation value.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2006a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
S2MC236	36-3-0016 & 36-3-0134	Rock Shelters with Art and Artefacts	A highly significant shelter with rock art and artefacts. UG2 was redesigned to reduce the risk of impact to this site.	This site has previously been recorded as having significant cultural value to the RAPs and the region.	S2MC 236 is noted as having high aesthetic value due to its art and its landscape setting.	This site type and combination of site features have previously been recorded as rare within the MCC. Its art component is rare within MCC. Its complexity and range of art motifs is rare in the region.	This site is a significant and rare site type, with exceptional cultural significance and conservation value, within the MCC, having multiple art and artefacts within a shelter and a multiple feature components (macropod, reptile and wombat motifs, artefacts, possible hearth and PAD).	This site has previously been impacted by graffiti and vandalism over the last 200 years, but has since had restricted access and is managed under the RSMA UG2.	This site has research value due to its importance to the Wiradjuri people, its rarity, conservation value, range of component features, potential for usewear and residue analysis of grinding features, to investigate motif choice, to look at sourcing of ochre and paints and landscape use through geochemical analysis, possible dating through OSL/TL and radiocarbon, to provide information regarding the	This site is described as having education values (Hamm 2008a). This site has education potential due to its multiple components.	High

Site name	AHIMS ID#	Site Type	Description	Cultural values	Aesthetic value	Rarity	Representativeness	Integrity	Scientific (archaeological) value/ Research Potential	Educational Potential	Scientific Significance Rating
									chronology of Aboriginal use of the UG2 area. The potential to preserve one or more layers of occupation. The site is strategically located between Moolarben Creek Valley and Murrumbidgee Creek Valley.		
S2MC237	36-3-1382	Isolated Artefact	A single stone artefact recorded by Hamm (2008a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	Components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2008a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
S2MC238	36-3-1383	Artefacts	A large stone artefact scatter comprising 104 stone artefacts, recorded by Hamm (2008a)	This site has previously been recorded as having significant cultural value to the RAPs and the region.	S2MC 238 is noted as having high aesthetic value. The site lies at the head of a gully and overlooks an expanse of sandstone escarpment.	This site type and combination of site features have previously been recorded as rare within the MCC.	The site has conservation values due to its setting, cultural values, range, its connectivity to other sites associated with the valley and Moolarben Ridge. Diversity of its components and its research values	The site condition is described as being good.	This site has research value due to its range of component features, possible dating through OSL/TL to provide information regarding the chronology of Aboriginal use of the UG2 area, its connectivity and proximity to the significance Moolarben Ridge and S2MC236 and proximity to other Aboriginal heritage sites The potential to preserve one or more layers of occupation.	This site is described as having education values (Hamm 2008a). This site has education potential due to its multiple components.	High
S2MC239	36-3-1384	Artefacts	Three stone artefacts, recorded by Hamm (2008a)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	This site type is common within MCC and the local region	Components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The integrity of the site was not identified by Hamm (2006a) as contributing to the scientific or research value of the site.	This site is not identified by Hamm (2008a) as having Scientific value	No specific educational opportunities have been identified for this site.	Low
S1MC407	36-3-3300	Artefacts	Open artefact scatter identified by AECOM (2015d)	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The site condition is described in the site card as poor due to its proximity to an access track.	This site is identified by AECOM (2015d) as having low Scientific value	No specific educational opportunities have been identified for this site.	Low
S1MC406	36-3-3302	Artefacts	Artefact scatter with 30 artefacts located on and around an access track AECOM (2015d).	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are	The site condition is described in the site card as poor due to its location on and around an access track.	This site is identified by AECOM (2015d) as having low Scientific value.	No specific educational opportunities have been identified for this site.	Low

Site name	AHIMS ID#	Site Type	Description	Cultural values	Aesthetic value	Rarity	Representativeness	Integrity	Scientific (archaeological) value/ Research Potential	Educational Potential	Scientific Significance Rating
							present within the MCO Keeping Place. Further examples can be predicted to occur in the region.				
S1MC409	36-3-3303	Rock Shelter with PAD	A small low hanging shelter with PAD approximately 2m x 2m in size, no artefacts evident AECOM (2015d).	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	No Aboriginal occupation or objects have been identified at this location.	The site condition is described in the site card as good.	This site is identified by AECOM (2015d) as having low Scientific value	No specific educational opportunities have been identified for this site.	Low
S2MC411	36-3-3320	Artefacts	Artefact scatter (11) located on a lower slope on the N side of a first order drainage/gully, stretching to 80m E-W and 40m N-S. Site includes quartz cores, complete and broken flakes and retouched flake.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low
S2MC412	36-3-3321	Isolated Artefact	A quartz geometric microlith located on a lower slope on the S side of a first order drainage/gully.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site.	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low-Moderate
S2MC413	36-3-3322	Isolated Artefact	A quartz flake located on a northerly lower slope on the S side of a first order drainage/gully.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low
S2MC414	36-3-3323	Isolated Artefact	A quartz retouched flake located on a easterly lower slope, west of an east facing plateau.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site.	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low
S2MC415	36-3-3324	Isolated Artefact	A crystal quartz core located on a N-S ridge.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO	The site condition is described in the site card as poor due to surface wash, clearing of vegetation and farming.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low

Site name	AHIMS ID#	Site Type	Description	Cultural values	Aesthetic value	Rarity	Representativeness	Integrity	Scientific (archaeological) value/ Research Potential	Educational Potential	Scientific Significance Rating
							Keeping Place. Further examples can be predicted to occur in the region.				
S2MC419	36-3-3448	Artefacts	Two stone artefacts located on an eroded slope	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The site condition is described in the site card as poor due to its location on an eroded slope.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low
S2MC418	36-3-3449	Isolated Artefact	An isolated quartz flake located on a slope within scrub vegetation.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The site condition is described in the site card as poor.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low
S2MC416	36-3-3450	Artefacts	A chert complete flake, a quartz core (MD:38) were located approximately 30 m apart on a revegetated slope.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be predicted to occur in the region.	The site condition is described in the site card as good.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low
S2MC417	36-3-3451	Artefacts	Artefact scatter (26) on north-east mid slope. Includes quartz cores, quartz complete and broken flakes, basalt flakes, a basalt core, crystal quartz complete and broken flakes, a chert core and a chert flake. Soils are a shallow sandy loam with bedrock exposed.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be expected across the region due to the distribution of the Bald Hill soil landscape.	The site condition is described in the site card as good.	The site is considered to have moderate scientific value. While the site has limited subsurface deposits due to shallow soils, the site is in close proximity to the highly significant RSMA, a large open artefact scatter comprising 104 stone artefacts and contains basalt core and flakes, which may be able to answer research questions about the connectivity of sites in the landscape and local use of basalt.	No specific educational opportunities have been identified for this site.	Moderate*
S2MC420	36-3-3452	Artefacts	Artefact scatter consisting of 6 artefacts located on a sandy rise/saddle.	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further	The site condition is described in the site card as good.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential. The site is considered to have low	No specific educational opportunities have been identified for this site.	Low

Site name	AHIMS ID#	Site Type	Description	Cultural values	Aesthetic value	Rarity	Representativeness	Integrity	Scientific (archaeological) value/ Research Potential	Educational Potential	Scientific Significance Rating
							examples can be predicted to occur in the region.		surface potential due to shallow soils.		
S1MC438	36-3-3454	Isolated Artefact	One chert complete flake It is located on a gentle upper slope south of OC2 pit wall	All sites have high cultural value to the RAPs	No aesthetic values have previously been noted for this site	The site type and its features are common in the local region	This site type and its components are represented in conservation areas throughout MCO, Ulan, Wilpinjong, and examples of this artefact type are present within the MCO Keeping Place. Further examples can be expected across the region due to the distribution of the Bald Hill soil landscape.	The site condition is described in the site card as good.	The site is considered to have low to moderate, scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential. However XRF/PXRF may be able to inform research questions around sourcing and use of the landscape and provide a connection between S1MC417 and S1MC238.	No specific educational opportunities have been identified for this site.	Low-Moderate

*Scientific significance rating has changed from previous record of site

Table 16: Significance Assessment – newly recorded sites

Site name	AHIMS ID#	Site Type	Description	Cultural Values	Aesthetic Values	Rarity	Representativeness	Integrity	Scientific (Archaeological value/ Research Potential)	Educational Potential	Scientific significance rating
S2MC438	36-3-3807	Isolated Artefact	One retouched chert flake	All sites have high cultural value to the RAPs	The setting of this site was noted as it offered views across Murrumbidgee Creek valley and OC4.	While the artefact component of this site was common, it is situated on a basalt cap which is a relatively uncommon feature on the Moolarben Ridge and within the MCC.	The site has some conservation value due to its aesthetic appeal and potential source of basalt for the manufacture of stone artefacts.	Portions of the site have been disturbed by vehicle tracks and past drilling.	The site has scientific value as basalt is an uncommon resource within the Subject Area and MCC and its potential to improve our understanding of the use of basalt for stone tool manufacture and use across the region.	This site has educational value due to its landscape setting and geology.	Low
S2MC439	36-3-3808	Rock Shelter with PAD	PAD, no artefacts	All sites have high cultural value to the RAPs. The shelter was noted as a nice cool place to sit by the RAPs during the site inspection.	The site has moderate aesthetic value as it is located on the upper slope of steep hills, providing a view over the immediate gully. The rock shelter was noted as a nice cool place to sit by the RAPs during the site inspection.	The site type and its features are common in the local region.	No evidence of Aboriginal use has been identified.	The overall integrity of the PAD remains in good condition; however, portions of the site have been disturbed by rabbit burrowing and seepage along joints.	The site has no visible artefacts, but PAD contains deposit estimated at 50 cm at the dripline. The depth of the deposit offers the potential to preserve one or more layers of occupation. The shelter is considered to have low to moderate research value and further investigation is warranted to determine if subsurface material is present.	No specific educational opportunities have been identified for this site.	Low-Moderate
S2MC440	36-3-3809	Rock Shelter with Artefacts and PAD	two quartz flakes, PAD	All sites have high cultural value to the RAPs	The site has low to moderate aesthetic value as it is located along the midslope of a continuous sandstone ridge, looking south-west across a gully.	Rock Shelters with Artefacts represent 6% of the recorded sites across MCO, Ulan and Wilpinjong. They are relatively uncommon at MCO and more common at Ulan.	The visible artefact assemblage has limited conservation value and other more representative sites are conserved within the MCC, Ulan Coal and Wilpinjong Coal conservation areas and within the salvaged assemblage in the Keeping Place	Portions of the site are in fair to good condition. Further stone artefacts are likely within the shelter, however the integrity of the deposit may be reduced as a result of wombat burrowing.	The site has scientific value as its sandy deposit with charcoal fragments and artefact assemblage may be datable through OSL/TL and provide information regarding the chronology of Aboriginal use of the UG2 area, however its integrity due to animal disturbance has reduced this research potential	No specific educational opportunities have been identified for this site.	Low-Moderate
S2MC441	36-3-3810	Rock Shelter with Artefacts and PAD	two quartz flakes, PAD	All sites have high cultural value to the RAPs	The site has low to moderate aesthetic value as the site consists of two adjoining overhangs with a connected deposit and as it is located along the midslope of a continuous sandstone ridgeline, facing south, a overlooking gully.	Rock Shelters with Artefacts represent 6% of the recorded sites across MCO, Ulan and Wilpinjong. They are relatively uncommon at MCO and more common at Ulan.	The visible artefact assemblage has limited conservation value and other more representative sites are conserved within the MCC, Ulan Coal and Wilpinjong Coal conservation areas and within the salvaged assemblage in the Keeping Place	The integrity of the shelter and PAD remain in a good condition; however, portions of the site have been disturbed by wombat burrowing.	The site has scientific value as its sandy deposits and artefact assemblage over the two shelter may be datable through OSL/TL and provide information regarding the chronology of Aboriginal use of the UG2 area however its integrity due to animal disturbance as like reduced this research potential	No specific educational opportunities have been identified for this site.	Low-Moderate
S2MC442	36-3-3812	Rock Shelter with PAD	PAD	All sites have high cultural value to the RAPs	The site has low to moderate aesthetic value as it is located on the upper slope of a steep hills, overlooking the surrounding valleys.	The site type and its features are common in the local region.	No evidence of Aboriginal use has been identified.	The site is in good condition.	The site has scientific value as its sandy deposits and artefact assemblage over the shelter may be datable through OSL/TL and provide information regarding the presence/absence of Aboriginal use of the Moolarben ridge and a chronology of Aboriginal use of the UG2 area	No specific educational opportunities have been identified for this site.	Low-Moderate
S2MC443	36-3-3811	Rock Shelter with PAD	PAD	All sites have high cultural value to the RAPs	The site has low to moderate aesthetic value as it is located on the upper slope of a steep hills, overlooking the surrounding valleys.	The site type and its features are common in the local region.	No evidence of Aboriginal use has been identified.	The site is in good condition.	The site has scientific value as it may be able to assist in answering questions regarding presence/absence of Aboriginal stone artefact	No specific educational opportunities have been identified for this site.	Low

Site name	AHIMS ID#	Site Type	Description	Cultural Values	Aesthetic Values	Rarity	Representativeness	Integrity	Scientific (Archaeological value/ Research Potential)	Educational Potential	Scientific significance rating
									use in shelters across the MCO ridge.		
S2MC444	36-3-3813	Rock Shelter with PAD	PAD	All sites have high cultural value to the RAPs	The site has low to moderate aesthetic value as it is located on the mid slope of a steep hills. It was noted that the site provided a good overlook of the gully.	The site type and its features are common in the local region.	No evidence of Aboriginal use has been identified.	The integrity of the shelter and PAD remain in a good condition; however, portions of the site have been disturbed by wombat burrowing	The site has scientific value as it has a large habitable floor with at least 30 cm of a sandy deposit. The site contains no visible artefacts, the depth of the deposit offers the potential to preserve one or more layers of occupation.	No specific educational opportunities have been identified for this site.	Low-Moderate
S2MC445	36-3-3817	Rock Shelter with PAD	PAD	All sites have high cultural value to the RAPs	No aesthetic values have been noted for this site	The site type and its features are common in the local region.	No evidence of Aboriginal use has been identified.	The site is in good condition.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low
S2MC446	36-3-3814	Rock Shelter with Artefacts and PAD	One quartz flake	All sites have high cultural value to the RAPs	The site has low to moderate aesthetic value as it is located on the upper slope of a steep hills, looking out over a gully.	The site type and its features are common in the local region.	Rock Shelters with Artefacts represent 6% of the recorded sites across MCO, Ulan and Wilpinjong. They are relatively uncommon at MCO and more common at Ulan.	Portions of the site have been disturbed by animal use and downslope sediment movement.	While further stone artefacts are likely within the deposit, the area of PAD is relatively small and the deposit is moderately sloped, decreasing the integrity of any deposits	No specific educational opportunities have been identified for this site.	Low
S2MC447	36-3-3815	Rock Shelter with Artefact	One quartz flake	All sites have high cultural value to the RAPs	The site has low to moderate aesthetic values. The site is located along the upper slope of a ridgeline. Native vegetation of Kurrajong trees and fig were noted surrounding the site. The site shows evidence of fire.	The site type and its features are common in the local region.	Rock Shelters with Artefacts represent 6% of the recorded sites across MCO, Ulan and Wilpinjong. They are relatively uncommon at MCO and more common at Ulan.	The site is in a fair condition, however it has been affected by block fall and fire.	The site is considered to have low scientific value, representing transient movement across sloped country with shallow, erosional soil with no subsurface archaeological potential.	No specific educational opportunities have been identified for this site.	Low
S2MC448*	36-3-3816	Isolated Artefact	One chert scraper	All sites have high cultural value to the RAPs	No aesthetic values have been noted for this site	The site type and its features are common in the local region.	The visible artefact assemblage has limited conservation value and other more representative sites are conserved within the MCC, Ulan Coal and Wilpinjong Coal conservation areas and within the salvaged assemblage in the Keeping Place.	The site condition is considered good	Further stone artefacts are considered likely to be present at the site, however visibility was low at the time of the survey. The site contains common research values typical to all artefact scatters across MCO.	No specific educational opportunities have been identified for this site.	Low

*S2MC448 is located outside the Subject Area.

13. Impact assessment

13.1 Potential for harm

The *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) requires that both direct and indirect harm to Aboriginal objects and Aboriginal places be considered. Generally direct harm refers to occasions where an activity physically impacts a site or objects and therefore affects the heritage values possessed by the site or objects. Indirect harm is usually taken to mean harm stemming from secondary consequences of the activity and may affect sites or objects as an indirect consequence of the activity. Examples of such indirect harm are increased visitors to a site, or increased erosion in an area as a result of an activity.

As noted in Section 3.2, MCO is seeking to modify the Project Approval for Stage 2 of the MCC. The proposed modifications would be limited to the UG2 mining domain (i.e. the Subject Area).

The proposed development has the potential to harm Aboriginal objects through subsidence-induced impacts.

The potential for mine subsidence-induced ground movements to harm Aboriginal objects or areas of Aboriginal cultural value is dependent on many factors, including the nature of the Aboriginal objects or areas of cultural value themselves. MSEC (2008, 2021) describes how longwall mining can result in the cracking, heaving and stepping at the ground surface. The magnitude of these effects is largely dictated by factors such as the longwall, depth of cover (how deep the coal is below the ground surface), extracted seam thickness, geology above the longwalls, and the presence of geological features such as joints or faults, especially near the ground surface.

In the case of Aboriginal cultural heritage, the nature of the heritage sites and features is also a very important consideration in the potential effects of subsidence-induced ground movements. Whether a site is an open site with stone artefacts, or a culturally significant area, or whether the site is a rock shelter or grinding groove platform are important considerations in determining the likely impact, if any.

For rock shelters, the types of changes will be similar or identical to those that would be expected due to natural weathering processes, but exacerbated by subsidence. For example, a naturally weathering block which will have detached and fallen at some point in time may be detached and fall sooner due to differential movements of the rock strata induced by subsidence (Biosis Research and The Ecology Lab 2007: 29).



Plate 51: Example of natural blockfall and collapse that has occurred within UG2.

In the case of open sites that occur in an area with a soil profile, further to the above possible results of subsidence-induced ground movements, it can be reliably noted that for deeper longwall mines any stresses and strains exerted by the ground movement will generally be within the tolerance limits of the soil profile (therefore showing little to no impact on the surface), although isolated cracking of soils at the surface may occur. For the Subject Area, with relatively shallow cover and steep slopes, impacts may be more pronounced (MSEC 2008, 2021).

The consideration of potential harm to Aboriginal heritage sites from the proposed activity from subsidence-induced ground movements falls into three distinct categories:

- sites relatively more susceptible to harm from subsidence (e.g. rock shelters);
- sites relatively less susceptible to harm from subsidence (e.g. open artefact sites) and
- other sites of cultural value where landscape changes (such as mass movement) may impact heritage values.

As noted in Section 3.2, the Subject Area comprises the following components:

- The UG2 Approved Mining Area.
- Rock Shelter Management Area.
- The UG2 Extended Mining Area.

13.1.1 Subsidence impact assessment

MSEC has prepared a subsidence report to support the UG2 Modification application (MSEC 2021). The following statements are taken directly from the MSEC report.

The proposed modifications to the Approved Layout include changes to commencing and finishing ends, longwall widths and longwall lengths as detailed in Section 1.1 of MSEC (2021). The proposed extraction height has also been increased from 3.0 m for the Approved Layout to up to 3.5 m for the Modified Layout.

Table 17: Comparison of Maximum Predicted Conventional Subsidence Parameters based on the Approved Layout and the Modified Layout, taken from Table 4.3 in MSEC (2021)

Layout	Maximum Predicted Total Conventional Subsidence (mm)	Maximum Predicted Total Conventional Tilt (mm/m)	Maximum Predicted Total Conventional Hogging Curvature (km)	Maximum Predicted Total Conventional Sagging Curvature (km)
Approved Layout (LW10-13) (Report No. MSEC353)	1980	> 100	> 3	> 3
Modified Layout (LW201-205) (Report No. MSEC1167)	2500	> 100	> 3	> 3

It can be seen from the above table, that the maximum predicted total vertical subsidence based on the Modified Layout (i.e. 2500 mm) is greater than that based on the Approved Layout (i.e. 1980 mm). The increased vertical subsidence is the result of the increase in extraction height from 3.0 to 3.5 m (MSEC 2021).

The depths of cover over the underground mining areas vary from 40 m to 155 m. Where the depths of cover above Longwalls 201 to 205 are less than 100 m, surface cracking is expected to be typically in the order of 150 to 200 mm wide, but could be as large as 500 mm wide where the depths of cover are the shallowest. The surface crack widths are likely to be smaller where the depths of cover are greater, or

where the surface cracks result from the travelling wave. Where the depths of cover above Longwalls 201 to 205 are 100 to 150 m, the surface crack widths are expected to be typically in the order of 100 mm to 150 mm wide (MSEC 2021).

The maximum predicted total tilt, hogging curvature and sagging curvature based on the Modified Layout are the same as those for the Approved Layout. Whilst the specific values of the maximum tilt and curvatures are not shown, due to these representing the localised irregular movements rather than the macro (i.e. overall) movements, these parameters do not change (MSEC 2021).

A summary of the maximum predicted values of total conventional subsidence, tilt and curvature for the cliffs, resulting from the extraction of Longwalls 201 to 205 for the Modified Layout, is provided in the table below. The values are the maximum predicted parameters within 20 metres of their mapped extents. The predicted tilts provided in this table are the maxima after the completion of all the longwalls. The predicted curvatures are the maxima at any time during or after the extraction of the longwalls.

Table 18: Comparison of Maximum Predicted Conventional Subsidence Parameters for the Cliffs based on the Approved and Modified Layouts (Table 5.7 in MSEC 2021)

Layout	Cliff	Maximum Predicted Total Conventional Subsidence (mm)	Maximum Predicted Total Conventional Tilt (mm/m)	Maximum Predicted Total Conventional Hogging Curvature (km-1)	Maximum Predicted Total Conventional Sagging Curvature (km-1)
Approved Layout (Report No. MSEC353)	C7	80	2.0	0.15	0.09
	C8	1760	40	> 3.0	2.0
	C9	1360	45	2.5	1.8
	C10	< 20	< 0.5	< 0.01	< 0.01
Modified Layout (Report No. MSEC1167)	C7	< 20	1.0	0.13	< 0.01
	C8	2450	55	> 3.0	> 3.0
	C9	<20	<0.5	0.03	< 0.01
	C10	< 20	< 0.5	< 0.01	< 0.01

It can be seen from Table 18, that the maximum predicted conventional subsidence parameters increase and decrease at the cliffs.

The predicted vertical subsidence, tilt and curvatures at Cliff C7 based on the Modified Layout are slightly less than those based on the Approved Layout. On this basis impact assessments for this Cliff C7 do not change as a result of the Modified Layout. Cliff C7 is protected by a sterilised wide coal pillar based on 0.5 times the depth of cover from the cliff line. The predicted conventional strain of 1.5 mm/m is considered to be of sufficient magnitude to result in tensile cracking in sandstone, however this strain is located at the extremity of the 20 m radius surrounding the cliff and away from the main continuous section of cliff and is considered conservative. The potential for impacts at Cliff C7 based on conventional subsidence movements is considered to be negligible (MSEC 2021).

The predicted maximum subsidence, tilt and curvature parameters at Cliff C8 based on the Modified Layout are greater than or equal to those based on the Approved Layout, which is predominantly a result of the proposed increased extraction height (MSEC 2021). This change is seen at PAD 8 Moolarben Coal and PAD 11 Moolarben Coal. The proposed impact and management response for these sites remains the same.

The predicted subsidence, tilt and curvature at Cliff C9 based on the Modified Layout are less than those based on the Approved Layout due to changes to the longwall footprints (MSEC 2021). The predicted subsidence parameters at Cliff C10 are unchanged for the Modified Layout (MSEC 2021).

The increased cut height will result in an increase in magnitude of predicted vertical subsidence above the extracted longwalls. However, due to the shallow depth of cover, features located above the longwalls will experience high and localised tilt and curvature and the nature of impacts and management measures based on the Approved Layout will not change for the Modified Layout.

A number of built and natural features have been identified within or in the vicinity of the Subject Area including ephemeral drainage lines, cliffs, steep slopes, unsealed tracks and trails, mine infrastructure, archaeological sites and survey control marks. Detailed assessment of potential subsidence impact for these built and natural features is provided in MSEC (2021). There are few built features located within the Subject Area (MSEC 2021).

As a result of changes in the longwall layouts, some locations will experience a reduction in observed impacts and some locations will experience an increase in observed impacts. The main reductions in impacts will be observed between LW201 and 204, and between Longwall 202a and 202b. The main increases in impacts will be observed to the north west of LW204, above the south eastern end of LW201, and above LW202a (MSEC 2021).

Schedule 4 of the Stage 2 Project Approval provides a Subsidence Impact Performance Measure for minor cliffs and rock face features of “minor environmental consequences (that is, occasional rockfalls, displacement of or dislodgment of boulders or slabs, or fracturing, that in total do not impact more than 5% of the total face area of each such type of feature within any longwall mining domain)”. Minor cliffs and rock face features are located across the Subject Area.

MSEC (2021) concluded that it is difficult to quantify the expected extent of impacts to the minor cliffs and rock face features in total as some locations above the longwall panels may exceed the performance measures and some locations may be within the performance measures. Predicted subsidence impacts to minor cliffs and rock face features have been considered in the assessment of cultural values in the ACHA.

Schedule 4 of the Stage 2 Project Approval provides a Subsidence Impact Performance Measure of “negligible subsidence impact or environmental consequences” for Aboriginal heritage site S2MC236.

S2MC236 is located at Cliff C7 within the UG2 Approved Mining Area and includes a rock shelter, artwork and artefact scatter. S2MC236 is considered to have high significance at a regional level and any harm to the Aboriginal cultural heritage site would be considered an unacceptable impact. Cliff C7 and S2MC236 are protected by a sterilised coal pillar based on 0.5 times the depth of cover from the Cliff. Based on the low magnitude of predicted subsidence parameters, the potential for impacts at Cliff C7 and S2MC236 is considered to be negligible (MSEC 2021). The Modified Layout would not result in any change to the existing subsidence performance measure for S2MC236 of “negligible subsidence impacts or environmental consequences” (MSEC 2021).

13.1.2 Potential subsidence impacts for Aboriginal heritage sites

A total of 42 Aboriginal heritage sites have been identified in the Subject Area and assessed by MSEC (2021) comprising 37 known Aboriginal heritage sites identified in the UG2 Approved Mining Area and five (5) known Aboriginal heritage sites identified in the UG2 Extended Mining Area.

All Aboriginal heritage sites and Country are considered to have high cultural value by the RAPs.

While there is an increase in the predicted subsidence parameters (vertical subsidence, maximum predicted tilt and curvatures) at 18 Aboriginal heritage sites within the UG2 Approved Mining Area (ACHA Appendix C), the overall impact assessments based on the Approved Layout do not change for the Modified Layout (MSEC 2021).

The predicted subsidence parameters in the UG2 Extended Mining Area based on the Modified Layout are similar to those predicted for the UG2 Approved Mining Area and therefore the potential impacts to Aboriginal heritage sites in the UG2 Extended Mining Area would be similar to the UG2 Approved Mining Area (MSEC 2021).

Of the five (5) Aboriginal heritage sites within the UG2 Extended Mining Area, three (3) Aboriginal heritage sites (of low to low-moderate archaeological significance) are considered unlikely to experience subsidence impacts as they would not be undermined and two (2) Aboriginal heritage sites (both low archaeological significance) are predicted likely to experience subsidence impacts.

The PAD at S2MC 446 has been disturbed by animal use and downslope sediment movement due to the sloped rock shelter floor and while impacts are likely to occur, archaeological excavation is unlikely to provide reliable dating samples due to the low integrity of the deposit. While S2MC447 contains PAD and may be impacted by subsidence, the internal rock shelter floor is stone and sloped and the PAD extends from the dripline towards the break of slope of the ridge and as such is unlikely to be impacted in the event of rock shelter collapse.

Appendix C in the ACHA provides the maximum subsidence parameters by site. Table 19 provides a summary of changes to the approved level of impact for Aboriginal heritage sites within the Subject Area from the Approved layout and the Modified layout. These changes in impacts are further broken down by scientific significance ratings.

13.1.3 Summary of potential impacts

As described in Section 1 and Section 2, this report focuses on the UG2 Extended Mining Area where there is the potential for impacts to areas not already approved for impact associated with the Moolarben Coal Project Stage 2. Notwithstanding, those sites with approved subsidence impacts (i.e. from the Moolarben Coal Project Stage 2) are also considered in terms of the incremental impacts or change in impacts within the UG2 Approved Mining Area associated with the Modified Layout.

As required by The Code of Practice the likely impacts, type, degree and consequence of harm to Aboriginal heritage sites from the UG2 Modification project are presented in Table 20.

Table 19: Changes to approved impacts for Aboriginal heritage sites*

Change in approved level of impact from Approved Layout to Modified Layout	Scientific significance ¹	Site Name	Count of Aboriginal heritage sites
Decrease			14
	High	S2MC238	1
	Moderate	S2MC417	1
	Low-Moderate	S2MC412, S2MC439*, S2MC440*, S2MC444*, S2MC441*	5
	Low	S1MC077, S2MC413, S2MC415, S2MC416, S2MC420 S2MC438*, S2MC445*	7
No change			26
	High	S2MC236	1
	Moderate	S1MC055	1
	Low-Moderate	S1MC438, S2MC442*	2
	Low	S1MC054, S1MC056, S1MC057, PAD 10 Moolarben Coal, PAD 11 Moolarben Coal, PAD 4 Moolarben Coal, PAD 5 Moolarben Coal, PAD 8 Moolarben Coal, PAD 9 Moolarben Coal, S1MC074, S1MC075, S1MC076, S1MC406, S1MC407, S1MC409, S2MC237, S2MC239, S2MC411, S2MC414, S2MC418, S2MC419, S2MC443*	22
Increase			2
	Low	S2MC446*, S2MC447*	2
Grand Total			42

¹ All sites in this table are considered to have high cultural value by the RAPs

* Newly recorded Aboriginal heritage site.

Table 20: Impact assessment summary for Subject Area.

Site Name	Site Features	AHIMS ID#	Location	Potential impact mechanism	Type of harm	Likelihood of harm	Degree of harm (Total, Partial, None)	Consequence of harm
PAD 10 Moolarben Coal	Rock Shelter with PAD	36-3-0956	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
PAD 11 Moolarben Coal	Rock Shelter with PAD	36-3-0957	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
PAD 4 Moolarben Coal	PAD	36-3-0883	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
PAD 5 Moolarben Coal	Rock Shelter with PAD	36-3-0884	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
PAD 8 Moolarben Coal	Rock Shelter with Artefacts and PAD	36-3-0954	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
PAD 9 Moolarben Coal	Rock Shelter with PAD	36-3-0955	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
S1MC054	Artefacts	36-3-0859	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC055	Rock Shelter with Artefacts	36-3-0860	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC056	Rock Shelter with Artefacts	36-3-0861	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC057	Artefacts	36-3-0862	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC074	Isolated Artefact	36-3-0879	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC075	Isolated Artefact	36-3-0880	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC076	Isolated Artefact	36-3-0881	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC077	Isolated Artefact	36-3-0882	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC406	Artefacts	36-3-3302	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC407	Artefacts	36-3-3300	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S1MC409	Rock Shelter with PAD	36-3-3303	UG2 AMA	Subsidence	Direct	Likely	Total	Total loss of value
S1MC438	Isolated Artefact	36-3-3454	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC236	Rock Shelter with Art and Artefacts	36-3-0016 & 36-3-0134	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Loss of value
S2MC237	Isolated Artefact	36-3-1382	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value

Site Name	Site Features	AHIMS ID#	Location	Potential impact mechanism	Type of harm	Likelihood of harm	Degree of harm (Total, Partial, None)	Consequence of harm
S2MC238	Artefacts	36-3-1383	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC239	Artefacts	36-3-1384	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC411	Artefacts	36-3-3320	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC412	Isolated Artefact	36-3-3321	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC413	Isolated Artefact	36-3-3322	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC414	Isolated Artefact	36-3-3323	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC415	Isolated Artefact	36-3-3324	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC416	Artefacts	36-3-3450	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC417	Artefacts	36-3-3451	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC418	Isolated Artefact	36-3-3449	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC419	Artefacts	36-3-3448	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC420	Artefacts	36-3-3452	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC438*	Isolated Artefact	36-3-3807	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial loss of value
S2MC439*	Rock Shelter with PAD	36-3-3808	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC440*	Rock Shelter with Artefacts and PAD	36-3-3809	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC441*	Rock Shelter with Artefacts and PAD	36-3-3810	UG2 EMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC442*	Rock Shelter with PAD	36-3-3812	UG2 EMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC443*	Rock Shelter with PAD	36-3-3811	UG2 EMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC444*	Rock Shelter with PAD	36-3-3813	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC445*	Rock Shelter with PAD	36-3-3817	UG2 AMA	Subsidence	Indirect	Unlikely	Partial	Partial Loss of value
S2MC446*	Rock Shelter with Artefacts and PAD	36-3-3814	UG2 EMA	Subsidence	Direct	Likely	Total	Total Loss of value
S2MC447*	Rock Shelter with Artefact	36-3-3815	UG2 EMA	Subsidence	Direct	Likely	Total	Total Loss of value

* Newly recorded site.

¹ The code does not provide definitions for these categories; however they are taken to mean:

Type of harm: Direct- the object will or may be subject to direct physical disturbance. Indirect- there may be secondary consequences from the activity, resulting in harm. None- neither the object nor its context will be altered.

Degree of harm: Total: the object(s) will be directly harmed in their entirety. Partial- some objects will be directly or indirectly harmed, however a portion of a site may remain unaffected. None- there will be no harm.

Consequence of harm: Total loss of value- no heritage values will remain subsequent to the harm. Partial loss of value- some heritage values will remain subsequent to the harm. No loss of value- there will be no harm, and no loss of value

14. Management and mitigation measures

14.1 Management framework

A framework for the management of Aboriginal heritage sites within the approved MCC has been developed as part of the HMP (MCO 2020) based on sites assessed significance, site type and the nature of proposed impacts.

14.2 Designing to avoid harm

The following actions were undertaken to minimise the risk of subsidence impacts:

- As noted previously, the longwall mining layout has been designed to include a coal block pillar beneath the Rock Shelter Management Area to reduce the risk of subsidence induced impacts to S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134) and Cliff Line C7.
- During the assessment process, a setback of LW202a and 202b from Cliff Line C9 was established, resulting in a reduction in maximum predicted subsidence parameters to sites S2MC438, S2MC420, S1MC439, S2CM440, S2MC441, S2MC442, S2MC443, S2MC444, S2MC445.

14.3 Justifying harm

Actions have been taken to reduce harm and the likelihood of harm through design, as outlined in the section above.

14.4 Mitigating harm

Management measures are warranted to mitigate the loss of values to Aboriginal heritage sites and values that would result from the proposed activity in the Subject Area. Management and mitigation measures are also needed to ensure continued compliance with the HMP (MCO 2020) and Project Approval (08_0135).

For the UG2 Modification, harm would be mitigated using the principles established and outlined in the HMP (MCO 2020), which has been developed in consultation with the RAPs. In summary this would see a process of:

- Survey of Underground Areas not previously surveyed (Section 5.3.2 of the HMP).
- Rock shelter sites with potential for subsidence being subject to monitoring (Section 5.9.1 of the HMP).
- Determining the likely impact of blasting and subsidence (Section 5.8.3, 5.8.4 and Section 5.9.1 of the HMP) and, if required, undertaking archaeological excavation (Section 5.6 of the HMP).
- Following the protocol for recording and surface collection (Section 5.5 of the HMP).
- Management of Previously Unrecorded Aboriginal Archaeological Site (Section 5.10 of the HMP).
- Following the protocol for the Discovery of Human Remains (Section 5.11 of the HMP).
- Management of the Aboriginal Archaeological Sites Database (Section 5.12 of the HMP).
- Management of the Keeping Place (Section 5.13 of the HMP).
- Following the protocol for damage to a known Aboriginal archaeological site (Section 5.16 of the HMP).

14.4.1 Management of S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134)

Schedule 4 of the Stage 2 Project Approval (08_0135) provides a subsidence impact performance measure for Aboriginal heritage site S2MC236 (AHIMS 36-3-0016 and 36-3-0134) of “negligible subsidence impacts or environmental consequences”. There are no proposed changes to this subsidence performance measure for S2MC236 as a result of the UG2 Modification.

It is however noted that the significance of this site cannot be understated. Given the significance of this site and its setting, MCO would implement all means to avoid impact to this site. The HMP requires that

S2MC236 be subject to a comprehensive subsidence monitoring regime (as per Section 5.9.1 of the HMP) and blast vibration monitoring (as per Section 5.9.2 of the HMP). MSEC (2021: ii) recommends a survey monitoring program to enable an adaptive management approach to satisfy the performance measures for Aboriginal heritage site S2MC236 and Cliff C7.

14.4.2 Management requirements for other Aboriginal heritage sites at UG2

Management requirements for other Aboriginal heritage sites within the Subject Area are detailed below.

14.4.2.1 Survey of Underground Areas not previously surveyed

Management of unsurveyed land would be undertaken in accordance with Section 5.3.2 of the HMP (MCO 2020).

It is proposed any unsurveyed land within the Subject Area containing features likely to be affected by subsidence impacts would also be managed under this framework to inform the Extraction Plan.

14.4.2.2 Monitoring of Aboriginal sites

Newly recorded Aboriginal heritage sites within the Subject Area would be managed in accordance with Section 5.9.1 of the HMP (MCO 2020).

No Aboriginal cultural heritage sites were identified of moderate-high or high scientific significance in the UG2 Extended Mining Area.

14.4.2.3 . Previously unrecorded Aboriginal heritage sites

Previously unrecorded Aboriginal heritage sites within the Subject Area would be managed in accordance with Section 5.10 of the HMP.

The proposed management mitigation measures relate to subsidence impacts only. Any surface disturbance would require further assessment,

15. Conclusion and recommendations

The existing HMP (MCO 2020) anticipates the type of harm described in this assessment, and as such provides a robust management framework within which to manage both the impacts and avoidance of harm to Aboriginal heritage sites and values. While the management measures recommended herein are consistent with the currently approved plan, management would be undertaken consistent with the contemporary management plan that exists at the time of the works.

The following draft recommendations have been made (Table 21). Site specific management measures are detailed in Table 22.

Table 21: Recommendations

Recommendations	
Continued consultation with RAPs	
1.	MCO would continue to engage with the RAPs throughout the assessment and activities associated UG2 Modification in accordance with the procedures outlined in Section 5.1 of the HMP (MCO 2020).
Management of the Rock shelter Management Area, including S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134)	
2.	MCO maintains performance measures, contingency plans and improves strategies to achieve these for the Rock Shelter Management Area, including S2MC236 (AHIMS ID# 36-3-0016 and 36-3-0134). Detailed monitoring measures (e.g. baseline recording, real-time monitoring, visual inspections etc.) for S2MC236 would be determined in consideration of outcomes of further detailed assessment undertaken to inform preparation of an Extraction Management Plan. Trigger Action Response Plans (TARPs) would also be developed to inform implementation of mitigation measures in consideration of monitoring outcomes. The HMP (MCO 2020) would be updated to incorporate any revised monitoring measures and associated TARPs.
General	
3.	If approved, the HMP (MCO 2020) would be updated to include the extent of the UG2 Extended Mining Area and the management of Aboriginal heritage values within it.
4.	Management of Aboriginal heritage sites in the Subject Area be undertaken in accordance with the procedures outlined in the HMP (MCO 2020).

Table 22: Site specific management recommendations for sites within the Subject Area.

Aboriginal Heritage Site	Description	AHIMS ID#	Location	Cultural Value	Scientific Value	Proposed Management Strategy
PAD 10 Moolarben Coal	Rock Shelter with PAD	36-3-0956	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
PAD 11 Moolarben Coal	Rock Shelter with PAD	36-3-0957	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
PAD 4 Moolarben Coal	PAD	36-3-0883	UG2 AMA	High	Low	Complete detailed recording prior to impact Undertake a monitoring program in accordance with Section 5.9.1 of the HMP
PAD 5 Moolarben Coal	Rock Shelter with PAD	36-3-0884	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
PAD 8 Moolarben Coal	Rock Shelter with Artefacts and PAD	36-3-0954	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
PAD 9 Moolarben Coal	Rock Shelter with PAD	36-3-0955	UG2 AMA	High	Low	Complete detailed recording prior to impact Where detailed recording indicates PAD warrants further investigation and where impacts are considered likely, undertake archaeological excavation
S1MC054	Artefacts	36-3-0859	UG2 AMA	High	Low	Unmitigated impacts
S1MC055	Rock Shelter with Artefacts	36-3-0860	UG2 AMA	High	Moderate	Complete baseline recording Undertake a monitoring program in accordance with Section 5.9.1 of the HMP

Aboriginal Heritage Site	Description	AHIMS ID#	Location	Cultural Value	Scientific Value	Proposed Management Strategy
						Undertake surface collection and archaeological excavation where warranted where monitoring indicates impacts are likely
S1MC056	Rock Shelter with Artefacts	36-3-0861	UG2 AMA	High	Low	Unmitigated impact.
S1MC057	Artefacts	36-3-0862	UG2 AMA	High	Low	Unmitigated impact.
S1MC074	Isolated Artefact	36-3-0879	UG2 AMA	High	Low	Unmitigated impact.
S1MC075	Isolated Artefact	36-3-0880	UG2 AMA	High	Low	Unmitigated impact.
S1MC076	Isolated Artefact	36-3-0881	UG2 AMA	High	Low	Unmitigated impact.
S1MC077	Isolated Artefact	36-3-0882	UG2 AMA	High	Low	Unmitigated impact.
S1MC406	Artefacts	36-3-3302	UG2 AMA	High	Low	Unmitigated impact.
S1MC407	Artefacts	36-3-3300	UG2 AMA	High	Low	Unmitigated impact.
S1MC409	Rock Shelter with PAD	36-3-3303	UG2 AMA	High	Low	Unmitigated impact.
S1MC438	Isolated Artefact	36-3-3454	UG2 AMA	High	Low-Moderate	Unmitigated impacts.
S2MC236	Rock Shelter with Art and Artefacts	36-3-0016 & 36-3-0134	UG2 AMA	High	High	S2MC236 would be subject to avoidance Rock shelter sites and PAD sites with potential for subsidence impacts or blasting would be subject to a comprehensive monitoring regime (Section 5.9.1 of the HMP).
S2MC237	Isolated Artefact	36-3-1382	UG2 AMA	High	Low	Unmitigated impact.
S2MC238	Artefacts	36-3-1383	UG2 AMA	High	High	Unmitigated impact.
S2MC239	Artefacts	36-3-1384	UG2 AMA	High	Low	Unmitigated impact.
S2MC411	Artefacts	36-3-3320	UG2 AMA	High	Low	Unmitigated impact.
S2MC412	Isolated Artefact	36-3-3321	UG2 AMA	High	Low-Moderate	Unmitigated impact.
S2MC413	Isolated Artefact	36-3-3322	UG2 AMA	High	Low	Unmitigated impact.
S2MC414	Isolated Artefact	36-3-3323	UG2 AMA	High	Low	Unmitigated impact.
S2MC415	Isolated Artefact	36-3-3324	UG2 AMA	High	Low	Unmitigated impact.
S2MC416	Artefacts	36-3-3450	UG2 AMA	High	Low	Unmitigated impact.

Aboriginal Heritage Site	Description	AHIMS ID#	Location	Cultural Value	Scientific Value	Proposed Management Strategy
S2MC417	Artefacts	36-3-3451	UG2 AMA	High	Moderate	Unmitigated impact.
S2MC418	Isolated Artefact	36-3-3449	UG2 AMA	High	Low	Unmitigated impact.
S2MC419	Artefacts	36-3-3448	UG2 AMA	High	Low	Unmitigated impact.
S2MC420	Artefacts	36-3-3452	UG2 AMA	High	Low	Unmitigated impact.
S2MC438*	Isolated Artefact	36-3-3807	UG2 AMA	High	Low	Unmitigated impact.
S2MC439*	Rock Shelter with PAD	36-3-3808	UG2 AMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC440*	Rock Shelter with Artefacts and PAD	36-3-3809	UG2 AMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC441*	Rock Shelter with Artefacts and PAD	36-3-3810	UG2 EMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC442*	Rock Shelter with PAD	36-3-3812	UG2 EMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC443*	Rock Shelter with PAD	36-3-3811	UG2 EMA	High	Low	Unmitigated impact
S2MC444*	Rock Shelter with PAD	36-3-3813	UG2 AMA	High	Low-Moderate	Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP) and, if required, archaeological excavation (Section 5.6 of the HMP) prior to extraction.
S2MC445*	Rock Shelter with PAD	36-3-3817	UG2 AMA	High	Low	Unmitigated impact.
S2MC446*	Rock Shelter with Artefacts and PAD	36-3-3814	UG2 EMA	High	Low	Complete detailed recording prior to impact Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP).
S2MC447*	Rock Shelter with Artefact	36-3-3815	UG2 EMA	High	Low	Complete detailed recording prior to impact

Aboriginal Heritage Site	Description	AHIMS ID#	Location	Cultural Value	Scientific Value	Proposed Management Strategy
						Where impacts are deemed likely to occur, undertake surface collection (Section 5.5 of the HMP).

**Newly recorded site*

UG2 AMA = UG2 Approved Mining Area.

UG2 EMA = UG2 Extended Mining Area.

References

AECOM 2011a. Moolarben Preferred Project Report: Aboriginal Archaeological and Cultural Heritage Addendum. Unpublished report prepared for Moolarben Coal.

AECOM 2011b. Archaeological Collection & Excavation: Northern Borefield, Moolarben Coal Operations, Ulan, NSW. Unpublished report prepared for Moolarben Coal.

AECOM 2011c. Due Diligence Assessment of Proposed Exploration Drill Sites EL6288. Unpublished report prepared for Moolarben Coal.

AECOM 2012. Due Diligence Assessment of Proposed Exploration Drill Sites EL6288. Unpublished report prepared for Moolarben Coal.

AECOM 2014. Aboriginal archaeological due diligence assessment for Underground 4 (UG4) south drilling works. Unpublished.

AECOM 2015a. Aboriginal archaeological due diligence assessment for six boreholes and associated access tracks in Open Cut 4 (OC4) March 2015. Unpublished report prepared for Moolarben Coal.

AECOM 2015b. Aboriginal archaeological due diligence assessment for the Southern RIM Area drilling program March 2015. Unpublished report prepared for Moolarben Coal.

AECOM 2015c. Aboriginal archaeological due diligence assessment for the Northern RIM Area drilling program March 2015. Unpublished report prepared for Moolarben Coal.

AECOM 2015d. Aboriginal archaeological due diligence assessment for Moolarben Coal Project Stage 1 Modification 9 Project Approval May 2015. Unpublished report prepared for Moolarben Coal.

AECOM 2015e. Aboriginal archaeological due diligence assessment for the proposed Stage 2 coal conveyor May 2015. Unpublished report prepared for Moolarben Coal.

AECOM 2015f. Aboriginal archaeological due diligence assessment for Moolarben Coal Project Stage 2 Project Approval May 2015. Unpublished report prepared for Moolarben Coal.

AECOM 2015g. Assessment of potential Aboriginal Shelter sites S1MC345 and S1MC352 June 2015. Unpublished report prepared for Moolarben Coal.

Coffey Natural Systems 2009. Response to Submissions Report - Part A Moolarben Coal Project - Stage 2.

Hamm, G. 2006a. Moolarben Coal Project - Aboriginal Cultural Heritage Assessment Report. Report to Moolarben Coal Mines Pty Ltd.

Hamm, G. 2006b. Responses to Issues Raised in Respect of the Moolarben Coal Project Aboriginal Cultural Heritage Assessment Report. Report to Moolarben Coal Mines Pty Ltd.

Hamm, G. 2008a. Moolarben Coal Project - Aboriginal Cultural Heritage Assessment Report Stage 2. Report Prepared for Moolarben Coal Mine.

Hamm, G. 2008b. Aboriginal Heritage Plan for MCP Stage 1 Development Areas: Open Cut 1 and Main Infrastructure Area. Report Prepared for Moolarben Coal Mine.

- Hamm, G. 2009a. Aboriginal Cultural Heritage & Archaeological Assessment for Moolarben Coal Project Stage 1 Infrastructure Area & Proposed Water Sharing Pipeline Modification Project in Support of a Section 75w (2) Approval.
- Hamm, G. 2009b. Aboriginal Cultural Heritage & Archaeological Assessment for Moolarben Coal Project Stage 1 Northern Borefield Area.
- Hamm, G. 2009c. Moolarben Coal Project Executive Summary Report. Hamm, G. 2010 Disturbance Report for Moolarben Coal Project Stage 2.
- Hamm, G. 2010. Disturbance Report for Moolarben Coal Project Stage 2. Unpublished report to Moolarben Coal Operations Pty Limited.
- Hamm, G and Foley, L. 2010. Cultural Heritage Management Report on Moolarben Coal Project Stage 1: Open Cut 1 & Main Infrastructure Area.
- Hansen Bailey 2012. Moolarben Coal Project Stage 2 Preferred Project Report Response to Submissions.
- Kuskie, P. 2010b. Moolarben Coal Project Stage 2: Aboriginal Heritage Advice on Potential Impacts to Aboriginal cultural heritage sites. Report to Moolarben Coal.
- Kuskie, P. 2012a. Ulan Coal Continued Operations Project: Test Excavations of Aboriginal Shelter Sites within the North 1 Panels – Interim Report. Report to Ulan Coal Mines Ltd.
- Kuskie, P. 2012b. Moolarben Coal Project Stage 2 - Preliminary Report on Aboriginal Heritage Survey of Geotechnical Investigation Areas. Report to Ulan Coal Mines Ltd.
- Kuskie, P. 2012c. Moolarben Coal Project Stage 2 - Preliminary Report on Aboriginal Heritage Survey of Proposed Ulan - Wollar Road and Country Energy 66 kV Powerline Realignment.
- Kuskie, P. 2013a. Moolarben Coal Project – Stage 1 Optimisation Modification, Near Ulan, Central Tablelands of New South Wales: Aboriginal Cultural Heritage Assessment. Report to Moolarben Coal.
- Kuskie, P. 2013b. Wilpinjong Coal mine, Central Tablelands of new South Wales – Modification Aboriginal Cultural Heritage Assessment.
- Kuskie, P. 2013c. Aboriginal Heritage Management Plan Stage 1. Version 2. Report to Moolarben Coal.
- Kuskie, P. 2014a. Moolarben Coal Project, Central Tablelands of New South Wales: Stage 1 – Report on Additional Aboriginal Heritage Survey and Salvage of Proposed Core Shed.
- Kuskie, P. 2014b. Moolarben Coal Project – Preliminary Report on Aboriginal Heritage Survey of EL7073 Exploration Drilling in September 2014.
- Kuskie, P. 2014c. Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Underground 1 Drilling Areas in October 2014.
- Kuskie, P. 2015b. Moolarben Coal Project Stage 2 – Preliminary Report on Aboriginal Heritage Survey of Proposed Murragamba Road Realignment February 2015.
- Kuskie, P. 2015c. Stage 1 Open Cut 2 – Report on additional Aboriginal heritage survey and salvage.

- Niche 2014. Moolarben Coal Mine OC4 South-West Modification Aboriginal Cultural Heritage Assessment. Unpublished report prepared for Moolarben Coal.
- Niche 2014b. Moolarben Coal Complex UG1 Optimisation Modification Aboriginal Cultural Heritage Assessment. Unpublished report prepared for Moolarben Coal.
- Niche 2015a. Aboriginal Cultural Heritage Assessment - Moolarben Coal Complex UG1 Optimisation Modification June 2015. Unpublished report prepared for Moolarben Coal.
- Niche 2015b. Paleo A, Paleo B, Paleo C, NW01 and NW02 Exploration Boreholes. Aboriginal Objects Due Diligence Assessment December 2015. Unpublished report prepared for Moolarben Coal.
- Niche 2016a. Aboriginal Cultural Heritage Conservation Fence Aboriginal Heritage Survey and Assessment March 2016. Unpublished report prepared for Moolarben Coal.
- Niche 2016b. Dun Dun East Biodiversity Offset Area, Hargraves, NSW Aboriginal Cultural Heritage Values Assessment. Unpublished report prepared for Moolarben Coal.
- Niche 2016c. Moolarben Coal Complex- Relocation of Telstra Services Aboriginal heritage pre-surface disturbance survey April 2016. Unpublished report prepared for Moolarben Coal.
- Niche 2016d. Moolarben Coal Complex Longwalls 101 – 103 Aboriginal Heritage Survey Report June 2016. Unpublished report prepared for Moolarben Coal.
- Niche 2016e. Moolarben Coal Complex – Fire Trail Aboriginal objects due diligence assessment June 2016. Unpublished report prepared for Moolarben Coal.
- Niche 2016f. Moolarben Coal Complex – Open Cut 3, Mining Lease Drilling Programme, Aboriginal cultural heritage survey July 2016. Unpublished report prepared for Moolarben Coal.
- Niche 2016g. Moolarben Coal Complex – Open Cut 4 Mining Lease Drilling Programme, Aboriginal cultural heritage survey assessment July 2016. Unpublished report prepared for Moolarben Coal.
- Niche 2016h. Moolarben Coal Complex – Open Cut 3 Exploration Lease Drilling Programme, Aboriginal cultural heritage survey assessment October 2016. Unpublished report prepared for Moolarben Coal.
- Niche 2017a. Moolarben Coal UG1 Longwalls 101-103 Extraction Plan Aboriginal Cultural Heritage Technical Report March 2017. Unpublished report prepared for Moolarben Coal.
- Niche 2017b. OC3 LOX Lines and Access Tracks, Extra Access Lines Aboriginal Heritage Assessment January 2017. Unpublished report prepared for Moolarben Coal.
- Niche 2017c. Moolarben Coal Complex – Underground 3 (UG3), Exploration Drilling Programme, Aboriginal cultural heritage due diligence survey February 2017. Unpublished report prepared for Moolarben Coal.
- Niche 2017d. Moolarben visual screen areas pre-clearance salvage. Unpublished report prepared for Moolarben Coal.
- Niche 2017e. Moolarben Coal Complex Open Cut Optimisation Modification Aboriginal Cultural Heritage Assessment. Unpublished report prepared for Moolarben Coal.
- Niche 2017f. Salvage of Aboriginal site S1MC254 (AHIMS ID 3-3-1069), Northern Borefields Area of Stage 1.

Niche 2017g. Moolarben Coal Operations – Cliff Line 3 Aboriginal Heritage Site Inspection.

Niche 2018a. ML 1715 Sill Drilling Program, Aboriginal objects due diligence survey and assessment. Unpublished report prepared for Moolarben Coal.

Niche 2018b. Exploration Drilling Program within the boundary of EL 6288, Aboriginal cultural heritage due diligence survey and assessment. Unpublished report prepared for Moolarben Coal.

Niche 2018c. Exploration Drilling Program within the boundary of EL 7073, Aboriginal cultural heritage due diligence survey and assessment. Unpublished report prepared for Moolarben Coal.

Niche 2018d. Exploration Drilling Program within the disturbance boundary of ML 1691, Aboriginal cultural heritage due diligence survey and assessment. Unpublished report prepared for Moolarben Coal.

Niche 2018e. Exploration Drilling Program within the disturbance boundary of ML 1715, Aboriginal cultural heritage due diligence survey and assessment. Unpublished report prepared for Moolarben Coal.

Niche 2018f. Exploration Drilling Program within ML 1691, Aboriginal cultural heritage due diligence survey and assessment. Unpublished report prepared for Moolarben Coal.

Niche 2018g. OC4 salvage of Aboriginal cultural heritage sites S2MC353 and S2MC356. Unpublished report prepared for Moolarben Coal.

Niche 2018h. Open Cut 4 additional survey of unsurveyed areas – Clearance Report. Unpublished report prepared for Moolarben Coal.

Niche 2019a. ML1715 2019 Exploration Drilling Program, Aboriginal objects due diligence survey and assessment. Unpublished report prepared for Moolarben Coal.

Niche 2019b. Exploration Drilling Program within the boundary of EL 6288, Aboriginal cultural heritage due diligence survey and assessment. Unpublished report prepared for Moolarben Coal.

Niche 2019c. Aboriginal Cultural Heritage Assessment Report Moolarben Coal Operations UG4 Ancillary Works Modification, Ulan NSW.

Niche 2019d. Addendum to Aboriginal Cultural Heritage Assessment Moolarben Coal Operations UG4 Ancillary Works Modification Ulan NSW.

Niche 2020a. Moolarben Coal Operation Heritage Salvage Program 2020. Unpublished report prepared for Moolarben Coal.

Niche 2020b. Moolarben Coal Operation EL6288 OC3 Exploration Drilling Program – Aboriginal Objects Due Diligence Assessment. Unpublished report prepared for Moolarben Coal.

Niche 2020c. EL6288 Stage 1A and 2 Exploration Drilling Program. Unpublished report prepared for Moolarben Coal.

Niche 2020d. EL7073 Infills Exploration Drilling Program. Unpublished report prepared for Moolarben Coal.

Niche 2020e. ML1628 UG4 Exploration Drilling Program. Unpublished report prepared for Moolarben Coal.

Niche 2020f. Moolarben Coal Project Stage 1, Open Cut 3 (05_0117) Additional Aboriginal Heritage Survey and Salvage Compliance Report

Pearson, M. 1981. *Seen Through Different Eyes: Changing Land Use and Settlement Patterns in the Upper Macquarie River Region of NSW from Prehistoric Times to 1860*. Ph.D. Thesis, Department of Prehistory and Anthropology, Australian National University, Canberra.

Urban Tree Management Australia 2008. Report: Arboricultural Assessment of Scarred Tree ref. (36-3-0798: S1MC1) at Ulan, New South Wales for Moolarben Coal Project Stage 1.

Annex 1: AHIMS extensive search

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
36-3-0237	MC11	AGD	55	763384	6421070	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.David Maynard					Permits		
36-3-3588	S2MC 436	GDA	55	763464	6421352	Open site	Valid	Artefact : -		
	Contact	Recorders	Niche Environment and Heritage, Miss. Marika Low					Permits		
36-3-0134	Murragamba_No:1;	AGD	55	761300	6421170	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Warren Bluff					Permits		
36-3-0882	S1MC77	AGD	55	761597	6419653	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0883	PAD 4 Moolarben Coal	AGD	55	761685	6419735	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0884	PAD 5 Moolarben Coal	AGD	55	761685	6419736	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0885	PAD 6 Moolarben Coal	AGD	55	761341	6420748	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0879	S1MC74	AGD	55	761687	6419730	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0880	S1MC75	AGD	55	761683	6419722	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0881	S1MC76	AGD	55	761684	6419723	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0954	PAD 8 Moolarben Coal	AGD	55	761478	6421053	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0955	PAD 9 Moolarben Coal	AGD	55	761552	6421040	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		
36-3-0956	PAD 10 Moolarben Coal	AGD	55	761551	6421051	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm					Permits		

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6420000 - 6421500 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 101

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
36-3-0957	PAD 11 Moolarbeen Coal	AGD	55	761426	6420964	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact									
	Recorders									
36-3-0958	PAD 12 Moolarbeen Coal	AGD	55	761318	6420832	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact									
	Recorders									
36-3-1144	S1MC307	GDA	55	762110	6421138	Open site	Valid	Artefact : 1		101600
	Contact									
	Recorders									
36-3-2606	PAD 6 MOOLARBEN COAL 1	GDA	55	761370	6420748	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact									
	Recorders									
36-3-2613	S1MC331	GDA	55	760843	6421283	Open site	Valid	Artefact : -		
	Contact									
	Recorders									
36-3-2623	S1MC341	GDA	55	761009	6420337	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact									
	Recorders									
36-3-2624	S1MC342	GDA	55	761252	6420370	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact									
	Recorders									
36-3-2625	S1MC343	GDA	55	761430	6420424	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact									
	Recorders									
36-3-2626	S1MC344	GDA	55	761434	6420500	Open site	Valid	Artefact : -		
	Contact									
	Recorders									
36-3-2627	S1MC345	GDA	55	761438	6420476	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact									
	Recorders									
36-3-2628	S1MC346	GDA	55	761423	6420537	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact									
	Recorders									

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6420000 - 6421500 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 101

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
36-3-2629	S1MC347	GDA	55	760928	6420913	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology Permits
36-3-2630	S1MC348	GDA	55	760901	6420914	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology Permits
36-3-2631	S1MC349	GDA	55	760793	6420933	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology Permits
36-3-2632	S1MC350	GDA	55	760746	6420946	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology Permits
36-3-2633	S1MC351	GDA	55	761070	6421070	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology Permits
36-3-2634	S1MC352	GDA	55	761168	6421080	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology Permits
36-3-2635	S1MC353	GDA	55	761421	6420743	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology Permits
36-3-2636	S1MC354	GDA	55	761448	6420591	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology Permits
36-3-2963	S1MC364	GDA	55	760280	6421547	Open site	Valid	Artefact :-		
	Contact									Recorders Mr.Peter Kuskie Permits
36-3-2964	S1MC365	GDA	55	760389	6421132	Open site	Destroyed	Artefact :-		
	Contact									Recorders Mr.Peter Kuskie Permits
36-3-2965	S1MC366	GDA	55	760503	6421036	Open site	Valid	Artefact :-		
	Contact									Recorders Mr.Peter Kuskie Permits
36-3-2966	S1MC367	GDA	55	760479	6420901	Open site	Destroyed	Artefact :-		

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6420000 - 6421500 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 101

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders		Mr.Peter Kuskie				Permits		
36-3-2967	S1MC368	GDA	55	760252	6421002	Open site	Valid	Artefact : -		
	Contact	Recorders		Mr.Peter Kuskie				Permits		
36-3-2968	S1MC369	GDA	55	760182	6421093	Open site	Valid	Artefact : -		
	Contact	Recorders		Mr.Peter Kuskie				Permits		
36-3-2969	S1MC370	GDA	55	760650	6420618	Open site	Destroyed	Artefact : -		
	Contact	Recorders		Mr.Peter Kuskie				Permits		
36-3-2970	S1MC371	GDA	55	760567	6420113	Open site	Valid	Artefact : -		
	Contact	Recorders		Mr.Peter Kuskie				Permits		
36-3-2971	S1MC372	GDA	55	760584	6420656	Open site	Valid	Artefact : -		
	Contact	Recorders		Mr.Peter Kuskie				Permits		
36-3-2972	S1MC373	GDA	55	760505	6419956	Open site	Destroyed	Artefact : -		
	Contact	Recorders		Mr.Peter Kuskie				Permits		
36-3-2973	S1MC374	GDA	55	760609	6419953	Open site	Destroyed	Artefact : -		
	Contact	Recorders		Mr.Peter Kuskie				Permits		
36-3-3270	S2MC280	GDA	55	762206	6421532	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Ms.Caitlin Marsh				Permits		
36-3-3320	S2MC411	GDA	55	761561	6421334	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Mr.Balazs Hansel				Permits		
36-3-3321	S2MC412	GDA	55	761598	6421256	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Mr.Balazs Hansel				Permits		
36-3-3322	S2MC413	GDA	55	761562	6421167	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Mr.Balazs Hansel				Permits		
36-3-3323	S2MC414	GDA	55	761554	6421016	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Mr.Balazs Hansel				Permits		
36-3-3324	S2MC415	GDA	55	761551	6420787	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Mr.Balazs Hansel				Permits		
36-3-3448	S2MC419	GDA	55	761567	6421081	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Ms.Clare Anderson				Permits		
36-3-3449	S2MC418	GDA	55	761548	6421061	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Ms.Clare Anderson				Permits		
36-3-3450	S2MC416	GDA	55	761805	6420742	Open site	Valid	Artefact : -		
	Contact	Recorders		Niche Environment and Heritage,Ms.Clare Anderson				Permits		
36-3-3451	S2MC417	GDA	55	761872	6420833	Open site	Valid	Artefact : -		

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6420000 - 6421500 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 101

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders						Permits		
36-3-3453	S2MC422	GDA	55	762421	6420880	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3454	S1MC438	GDA	55	761173	6420237	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3318	S2MC262b	GDA	55	763513	6420829	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3285	S2MC390	GDA	55	762773	6420107	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-0222	Moolaben Creek MC1	AGD	55	760592	6421015	Open site	Destroyed	Artefact : -	Open Camp Site	
	Contact	Recorders						Permits		
36-3-0223	MC2	AGD	55	760420	6420880	Open site	Destroyed	Artefact : -	Open Camp Site	
	Contact	Recorders						Permits		
36-3-1194	S2MC49	GDA	55	763398	6420819	Open site	Valid	Artefact : 1		101603
	Contact	Recorders						Permits		
36-3-1195	S2MC50	GDA	55	763428	6421011	Open site	Valid	Artefact : 68		101603
	Contact	Recorders						Permits		
36-3-1196	S2MC51	GDA	55	763330	6421014	Open site	Valid	Artefact : 17		101603
	Contact	Recorders						Permits		
36-3-1197	S2MC52	GDA	55	763353	6420804	Open site	Valid	Artefact : 1		101603
	Contact	Recorders						Permits		
36-3-1381	S2MC234	GDA	55	763698	6421496	Open site	Valid	Artefact : 2		101603
	Contact	Recorders						Permits		
36-3-1188	S2MC43	GDA	55	763401	6421479	Open site	Valid	Artefact : 152		101603
	Contact	Recorders						Permits		
36-3-1189	S2MC44	GDA	55	763280	6421535	Open site	Valid	Artefact : 18		101603
	Contact	Recorders						Permits		
36-3-1190	S2MC45	GDA	55	763308	6421596	Open site	Valid	Artefact : 16		101603
	Contact	Recorders						Permits		
36-3-1191	S2MC46	GDA	55	763230	6421656	Open site	Valid	Artefact : 20, Potential Archaeological Deposit (PAD) : 1		101603
	Contact	Recorders						Permits		
36-3-1198	S2MC53	GDA	55	763336	6421261	Open site	Valid	Artefact : 43		101603

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6420000 - 6421500 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 101

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.



SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders						Permits		
36-3-1199	S2MC54	GDA	55	763657	6420483	Open site	Valid	Artefact : 85		101603
	Contact	Recorders						Permits		
36-3-1200	S2MC55	GDA	55	763774	6420431	Open site	Valid	Artefact : 18		101603
	Contact	Recorders						Permits		
36-3-1202	S2MC57	GDA	55	763637	6420656	Open site	Valid	Artefact : 53		101603
	Contact	Recorders						Permits		
36-3-1203	S2MC58	GDA	55	763598	6420782	Open site	Valid	Artefact : 98		101603
	Contact	Recorders						Permits		
36-3-1204	S2MC59	GDA	55	763611	6421022	Open site	Valid	Artefact : 25		101603
	Contact	Recorders						Permits		
36-3-1207	S2MC60	GDA	55	764013	6420264	Open site	Valid	Artefact : 1		101603
	Contact	Recorders						Permits		
36-3-1211	S2MC64	GDA	55	763797	6420228	Open site	Valid	Artefact : 627		101603
	Contact	Recorders						Permits		
36-3-1212	S2MC65	GDA	55	764111	6420070	Open site	Valid	Artefact : 21		101603
	Contact	Recorders						Permits		
36-3-1214	S2MC67	GDA	55	764124	6420085	Open site	Valid	Artefact : 13		101603
	Contact	Recorders						Permits		
36-3-1215	S2MC68	GDA	55	764195	6420109	Open site	Valid	Artefact : 1		101603
	Contact	Recorders						Permits		
36-3-1382	S2MC237	GDA	55	761302	6421217	Open site	Valid	Artefact : 1		101603
	Contact	Recorders						Permits		
36-3-1383	S2MC238	GDA	55	761752	6420984	Open site	Valid	Artefact : 104		101603
	Contact	Recorders						Permits		
36-3-1384	S2MC239	GDA	55	761953	6421041	Open site	Valid	Artefact : 3		101603
	Contact	Recorders						Permits		
36-3-3101	S2MC377	GDA	55	763071	6421680	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3111	S2MC 388	GDA	55	762868	6420220	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3112	S2MC 384	GDA	55	762735	6420242	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3113	S2MC383	GDA	55	762822	6420265	Open site	Valid	Artefact : -		

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6420000 - 6421500 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 101

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders								Permits
36-3-3114	S2MC379	GDA	55	763226	6421468	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3115	S2MC380	GDA	55	763267	6421485	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3116	S2MC381	GDA	55	763347	6421282	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3120	S2MC 392	GDA	55	762948	6420178	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3121	S2MC 391	GDA	55	762880	6420149	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3122	S2MC378	GDA	55	763197	6421627	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3117	S2MC 389	GDA	55	762791	6420187	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3118	S2MC 385	GDA	55	763094	6420562	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3146	S2MC 386	GDA	55	763290	6420579	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3039	S3MC355	GDA	55	763294	6420681	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3042	S2MC354	GDA	55	763447	6420505	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3043	S2MC353	GDA	55	763701	6420215	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3142	S2MC357	GDA	55	763037	6421444	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3126	S2MC 397	GDA	55	763356	6421439	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3130	S2MC 387	GDA	55	763114	6420472	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6420000 - 6421500 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 101

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports	
36-3-0863	S1MC58	AGD	55	761241	6419040	Open site	Valid	Artefact : 1			
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm								Permits
36-3-0864	S1MC59	AGD	55	761274	6419089	Open site	Valid	Artefact : 1			
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm								Permits
36-3-0865	S1MC60	AGD	55	761555	6418906	Open site	Valid	Artefact : 1			
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm								Permits
36-3-0882	S1MC77	AGD	55	761597	6419653	Open site	Valid	Artefact : 1			
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm								Permits
36-3-0883	PAD 4 Moolarben Coal	AGD	55	761685	6419735	Open site	Valid	Potential Archaeological Deposit (PAD) : 1			
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm								Permits
36-3-0884	PAD 5 Moolarben Coal	AGD	55	761685	6419736	Open site	Valid	Potential Archaeological Deposit (PAD) : 1			
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm								Permits
36-3-0886	S1MC078	GDA	55	761628	6417183	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0887	S1MC079	GDA	55	761592	6417154	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0888	S1MC080	GDA	55	761535	6417281	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0889	S1MC081	GDA	55	761547	6417308	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0890	S1MC082	GDA	55	761563	6417309	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0891	S1MC083	GDA	55	761557	6417330	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0892	S1MC084	GDA	55	761580	6417360	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0893	S1MC085	GDA	55	761613	6417323	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0894	S1MC086	GDA	55	761612	6417508	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits
36-3-0895	S1MC087	GDA	55	761615	6417500	Open site	Destroyed	Artefact : 1			
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low								Permits

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6417000 - 6420000 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 116

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
36-3-0896	S1MC088	GDA	55	761608	6417465	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0897	S1MC089	GDA	55	761591	6417421	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0898	S1MC090	GDA	55	761579	6417403	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0899	S1MC091	GDA	55	761631	6417624	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0900	S1MC092	GDA	55	761659	6417596	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0901	S1MC093	GDA	55	761659	6417588	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0902	S1MC094	GDA	55	761638	6417728	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0866	S1MC61	AGD	55	761650	6418891	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0867	S1MC62	AGD	55	761503	6418958	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0868	S1MC63	AGD	55	761502	6418979	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0869	S1MC64	AGD	55	761502	6418989	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0870	S1MC65	AGD	55	761382	6418984	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0871	S1MC66	AGD	55	761345	6418974	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0872	S1MC67	AGD	55	761298	6418996	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0873	S1MC68	AGD	55	761300	6419026	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0874	S1MC69	AGD	55	761300	6419031	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0875	S1MC70	AGD	55	761427	6419023	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6417000 - 6420000 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 116

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
36-3-0876	S1MC71	AGD	55	761428	6419024	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0877	S1MC72	AGD	55	761421	6419023	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0878	S1MC73	AGD	55	761429	6419089	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0879	S1MC74	AGD	55	761687	6419730	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0880	S1MC75	AGD	55	761683	6419722	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0881	S1MC76	AGD	55	761684	6419723	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0931	S1MC122	AGD	55	764066	6416619	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0932	S1MC123	AGD	55	764064	6416622	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0933	S1MC124	AGD	55	764070	6416630	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0939	S1MC130	AGD	55	762600	6418163	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0940	S1MC131	AGD	55	762763	6418104	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0941	S1MC132	AGD	55	763451	6417107	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0942	S1MC133	AGD	55	763477	6417119	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0943	S1MC134	AGD	55	763507	6417086	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0944	S1MC135	AGD	55	763535	6417042	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0945	S1MC136	AGD	55	762737	6417948	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits
36-3-0946	S1MC137	AGD	55	762338	6418398	Open site	Valid	Artefact : 1		
	Contact	Recorders		Mr.Giles (dup ID#12832) Hamm						Permits

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6417000 - 6420000 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 116

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
36-3-0947	S1MC138	AGD	55	762315	6418451	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Giles (dup ID#12832) Hamm Permits							
36-3-0948	S1MC139	GDA	55	762549	6417807	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0951	S1MC142	GDA	55	761479	6417036	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0952	S1MC143	GDA	55	761535	6417066	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-0953	S1MC144	GDA	55	761519	6417142	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Niche Environment and Heritage,Mr.Giles (dup ID#12832) Hamm, Miss.Marika Low Permits							
36-3-2614	S1MC332	GDA	55	762299	6418767	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	South East Archaeology Permits							
36-3-2615	S1MC333	GDA	55	762086	6418954	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	South East Archaeology Permits							
36-3-2616	S1MC334	GDA	55	761975	6418915	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	South East Archaeology Permits							
36-3-2617	S1MC335	GDA	55	761874	6419277	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	South East Archaeology Permits							
36-3-2618	S1MC336	GDA	55	761725	6418961	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	South East Archaeology Permits							
36-3-2619	S1MC337	GDA	55	761575	6419390	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	South East Archaeology Permits							
36-3-2620	S1MC338	GDA	55	761564	6419379	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	South East Archaeology Permits							

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6417000 - 6420000 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 116

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
36-3-2621	S1MC339	GDA	55	761544	6419370	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology
36-3-2622	S1MC340	GDA	55	761472	6419251	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders South East Archaeology
36-3-2970	S1MC371	GDA	55	760567	6420113	Open site	Valid	Artefact :-		
	Contact									Recorders Mr.Peter Kuskie
36-3-2972	S1MC373	GDA	55	760505	6419956	Open site	Destroyed	Artefact :-		
	Contact									Recorders Mr.Peter Kuskie
36-3-2973	S1MC374	GDA	55	760609	6419953	Open site	Destroyed	Artefact :-		
	Contact									Recorders Mr.Peter Kuskie
36-3-2983	S1MC384	GDA	55	760788	6419355	Open site	Destroyed	Artefact :-		
	Contact									Recorders Niche Environment and Heritage,Mr.Corey O'Driscoll,Miss.Marika Low
36-3-2985	S1MC386	GDA	55	760565	6419600	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders Mr.Peter Kuskie
36-3-2986	S1MC387	GDA	55	760600	6419780	Open site	Destroyed	Artefact :-		
	Contact									Recorders Mr.Peter Kuskie
36-3-3264	S1MC423	GDA	55	763536	6417715	Open site	Valid	Artefact :-		
	Contact									Recorders Niche Environment and Heritage,Ms.Caitlin Marsh
36-3-3277	S1MC415	GDA	55	762959	6417626	Open site	Valid	Artefact :- , Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders Niche Environment and Heritage,Ms.Caitlin Marsh
36-3-3278	S1MC420	GDA	55	763413	6417000	Open site	Valid	Artefact :-		
	Contact									Recorders Niche Environment and Heritage,Ms.Caitlin Marsh
36-3-3280	S1MC422	GDA	55	764057	6417158	Closed site	Valid	Artefact :- , Potential Archaeological Deposit (PAD) :-		
	Contact									Recorders Niche Environment and Heritage,Ms.Caitlin Marsh
36-3-3281	S1MC427	GDA	55	761686	6417317	Open site	Destroyed	Artefact :-		
	Contact									Recorders Niche Environment and Heritage,Niche Environment and Heritage,Ms.Caitlin Marsh
36-3-3300	S1MC407	GDA	55	762112	6419384	Open site	Valid	Artefact :-		

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6417000 - 6420000 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 116

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Mr.Balazz Hansel					<u>Permits</u>		
36-3-3301	S1MC408	GDA	55	762668	6418884	Closed site	Valid	Habitation Structure :-, Potential Archaeological Deposit (PAD) :-		
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Mr.Balazz Hansel					<u>Permits</u>		
36-3-3302	S1MC406	GDA	55	762401	6419241	Open site	Valid	Artefact :-		
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Mr.Balazz Hansel					<u>Permits</u>		
36-3-3303	S1MC409	GDA	55	762055	6419371	Closed site	Valid	Habitation Structure :-, Potential Archaeological Deposit (PAD) :-		
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Mr.Balazz Hansel					<u>Permits</u>		
36-3-3438	S1MC 458	GDA	55	762539	6418537	Open site	Valid	Artefact :-		
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Mr.Samuel Ward					<u>Permits</u>		
36-3-3439	S1MC 459	GDA	55	762549	6418297	Open site	Valid	Artefact :-		
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Mr.Samuel Ward					<u>Permits</u>		
36-3-3437	S1MC 457	GDA	55	762229	6418581	Open site	Valid	Artefact :-		
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Mr.Samuel Ward					<u>Permits</u>		
36-3-3452	S2MC420	GDA	55	762499	6419324	Open site	Valid	Artefact :-		
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Ms.Clare Anderson					<u>Permits</u>		
36-3-3285	S2MC390	GDA	55	762773	6420107	Open site	Valid	Artefact :-		
	<u>Contact</u>	<u>Recorders</u>	Niche Environment and Heritage,Mr.Balazz Hansel					<u>Permits</u>		
36-3-1212	S2MC65	GDA	55	764111	6420070	Open site	Valid	Artefact : 21		101603
	<u>Contact</u>	<u>Recorders</u>	Mr.Giles (dup ID#12832) Hamm					<u>Permits</u>		
36-3-1214	S2MC67	GDA	55	764124	6420085	Open site	Valid	Artefact : 13		101603
	<u>Contact</u>	<u>Recorders</u>	Mr.Giles (dup ID#12832) Hamm					<u>Permits</u>		
36-3-1215	S2MC68	GDA	55	764195	6420109	Open site	Valid	Artefact : 1		101603
	<u>Contact</u>	<u>Recorders</u>	Mr.Giles (dup ID#12832) Hamm					<u>Permits</u>		
36-3-1235	S2MC89	GDA	55	764167	6419140	Open site	Valid	Artefact : 93		101603
	<u>Contact</u>	<u>Recorders</u>	Mr.Giles (dup ID#12832) Hamm					<u>Permits</u>		
36-3-1238	S2MC92	GDA	55	764116	6419333	Open site	Valid	Artefact : 1		101603
	<u>Contact</u>	<u>Recorders</u>	Mr.Giles (dup ID#12832) Hamm					<u>Permits</u>		
36-3-1239	S2MC93	GDA	55	764127	6419266	Open site	Valid	Artefact : 3		101603
	<u>Contact</u>	<u>Recorders</u>	Mr.Giles (dup ID#12832) Hamm					<u>Permits</u>		
36-3-1240	S2MC94	GDA	55	764078	6419242	Open site	Valid	Artefact : 1		101603

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6417000 - 6420000 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 116

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders						Permits		
36-3-1241	S2MC95	GDA	55	763986	6419379	Open site	Valid	Artefact : 1		101603
	Contact	Recorders						Permits		
36-3-1242	S2MC96	GDA	55	763968	6419309	Open site	Valid	Artefact : 3		101603
	Contact	Recorders						Permits		
36-3-1243	S2MC97	GDA	55	764011	6419162	Open site	Valid	Artefact : 7		101603
	Contact	Recorders						Permits		
36-3-3120	S2MC 392	GDA	55	762948	6420178	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3121	S2MC 391	GDA	55	762880	6420149	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3117	S2MC 389	GDA	55	762791	6420187	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3037	S2MC352	GDA	55	764196	6419735	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3221	S2MC405	GDA	55	760515	6417282	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3222	S2MC404	GDA	55	760929	6419108	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3223	S2MC403	GDA	55	761267	6418384	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3224	S2MC402	GDA	55	761432	6418173	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3225	S2MC401	GDA	55	760690	6417473	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3226	S2MC400	GDA	55	760505	6417171	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3137	S1MC419	GDA	55	763297	6417006	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3138	S1MC418	GDA	55	763075	6417264	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3139	S1MC417	GDA	55	763087	6417264	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
36-3-3140	S1MC416	GDA	55	763087	6417293	Open site	Valid	Artefact : -		

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6417000 - 6420000 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 116

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders								Permits
36-3-3141	S1MC414	GDA	55	762715	6417560	Open site	Valid	Artefact : -		
	Contact	Recorders								Permits
36-3-3614	S1MC448	GDA	55	761380	6417245	Open site	Destroyed	Artefact : -		
	Contact	Recorders								Permits
36-3-3615	S1MC447	GDA	55	761167	6417314	Open site	Destroyed	Artefact : -		
	Contact	Recorders								Permits
36-3-3616	S1MC446	GDA	55	760832	6417259	Open site	Destroyed	Artefact : -		
	Contact	Recorders								Permits
36-3-3617	S1MC445	GDA	55	761920	6417132	Open site	Destroyed	Artefact : -		
	Contact	Recorders								Permits
36-3-3618	S1MC444	GDA	55	761900	6417038	Open site	Destroyed	Artefact : -		
	Contact	Recorders								Permits
36-3-3619	S1MC443	GDA	55	762076	6416861	Open site	Destroyed	Artefact : -		
	Contact	Recorders								Permits
36-3-3620	S1MC442	GDA	55	761903	6416995	Open site	Destroyed	Artefact : -		
	Contact	Recorders								Permits

Report generated by AHIMS Web Service on 03/03/2021 for Chelsea Freeman for the following area at Datum :GDA, Zone : 55, Eastings : 759000 - 764000, Northings : 6417000 - 6420000 with a Buffer of 200 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 116

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

Annex 2: Field data for Aboriginal Heritage Sites

Annex 2: Field data for Wiradjuri Heritage Sites

Archaeological Report

Moolarben Coal Complex UG2 Modification, Ulan NSW

Mid-Western Regional Council Local Government Area

Prepared for Moolarben Coal Operations Pty Ltd

Prepared by Niche Environment and Heritage Pty Ltd | 16 November 2021



1.1.1 Document control

Project number	Client	Project manager	LGA
6462	Moolarben Coal Operations	Clare Anderson	Mid-Western Regional Council

Version	Author	Review	Status	Date
D1	Chelsea Freeman	Clare Anderson	Draft	27 July 2021
Rev0	Clare Anderson	-	Final	16 November

© Niche Environment and Heritage Pty Ltd (ACN 137 111 721) 2019

Copyright protects this publication. All rights reserved. Except for purposes permitted by the Australian *Copyright Act 1968*, reproduction, adaptation, electronic storage, transmission and communication to the public by any means is prohibited without our prior written permission. Any third party material, including images, contained in this publication remains the property of the specified copyright owner unless otherwise indicated, and is used subject to their licensing conditions.

Important information about your Report

Your Report has been written for a specific purpose: The Report has been developed for a specific purpose as agreed by us with you and applies only for that purpose. Unless otherwise stated in the Report, this Report cannot be applied or used when the nature of the specific purpose changes from that agreed. **Report for the sole benefit of Niche's client:** This Report has been prepared by Niche for you, as Niche's client, in accordance with our agreed purpose, scope, schedule and budget. This Report should not be applied for any purpose other than that stated in the Report. Unless otherwise agreed in writing between us, the Report has been prepared for your benefit and no other party. Other parties should not and cannot rely upon the Report or the accuracy or completeness of any recommendation. **Limitations of the Report:** The work was conducted, and the Report has been prepared, in response to an agreed purpose and scope, within respective time and budget constraints, and possibly in reliance on certain data and information made available to Niche. The analyses, assessments, opinions, recommendations, and conclusions presented in this Report are based on that purpose and scope, requirements, data, or information, and they could change if such requirements or data are inaccurate or incomplete. **No responsibility to others:** Niche assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with, or conclusions expressed in the Report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with, or conclusions expressed in the Report.

Niche Environment and Heritage Pty Ltd (ACN 137 111 721)
Enquiries should be addressed to Niche Environment and Heritage
PO Box 2443, Parramatta NSW 1750, Australia
Email: info@niche-eh.com

Table of Contents

Annex 2: Field data for Wiradjuri heritage sites	5
1.1 S2MC438 (AHIMS ID#36-3-3807)- A5	5
1.2 S2MC439 (AHIMS ID#36-3-3808)- A16	6
1.3 S2MC440 (AHIMS ID#36-3-3809)- A4_A5	8
1.4 S2MC441 (AHIMS ID#36-3-3810)- A7b_A7 and A8_8b	10
1.5 S2MC442 (AHIMS ID#36-3-3812)- CDF5	12
1.6 S2MC443 (AHIMS ID# 36-3-3811)- RS CDF6.....	14
1.7 S2MC444 (AHIMS ID#36-3-3813)- CDF10	16
1.8 S2MC445(AHIMS ID#36-3-3817)- CDF11	18
1.9 S2MC446 (AHIMS ID#36-3-3814)- CA11	20
1.10 S2MC447 (AHIMS ID#36-3-3815)- CA15	22
1.11 S2MC448 (AHIMS ID#36-3-3816)- CA23	24

List of Plates

Plate 1: S2MC438 (AHIMS ID# 36-3-3807), general location.	5
Plate 2: S2MC438 (AHIMS ID# 36-3-3807), chert flake.....	5
Plate 3: S2MC438 (AHIMS ID# 36-3-3807), chert flake.....	5
Plate 4: S2MC438 (AHIMS ID# 36-3-3807), general location.	5
Plate 5: S2MC439 (AHIMS ID# 36-3-3808) Shelter with PAD, facing north-east.....	7
Plate 6: S2MC439 (AHIMS ID# 36-3-3808) Shelter with PAD, facing south.	7
Plate 7: S2MC439 (AHIMS ID# 36-3-3808) Shelter with PAD, facing south.	7
Plate 8: S2MC440 (AHIMS ID# 36-3-3809) Shelter with Artefact and PADs, general location, facing north-east.	9
Plate 9: S2MC440 (AHIMS ID# 36-3-3809) Shelter with Artefact and PAD, facing north-east.....	9
Plate 10: S2MC440 (AHIMS ID# 36-3-3809), shelter detail with wombat burrowing at back of shelter.....	9
Plate 11: Quartz complete flake located at S2MC440 (AHIMS ID# 36-3-3809).	9
Plate 12: S2MC441 (AHIMS ID#36-3-3810), Shelter with Artefacts and PAD, facing south-east.....	11
Plate 13: S2MC441 (AHIMS ID#36-3-3810), Shelter with Artefacts and PAD, facing north-east.	11
Plate 14: S2MC441 (AHIMS ID#36-3-3810), Shelter with Artefacts and PAD, facing south-east.....	11
Plate 15: S2MC441 (AHIMS ID#36-3-3810), Shelter with Artefacts and PAD, facing north-east.	11
Plate 16: General photo S2MC442 (AHIMS ID# 36-3-3812), facing north-west.....	13
Plate 17: General photo of view from S2MC442 (AHIMS ID# 36-3-3812), facing south-west.....	13
Plate 18: S2MC443 (AHIMS ID#36-3-3811), facing east.	15
Plate 19: Shelter detail, S2MC443 (AHIMS ID#36-3-3811), facing east.	15
Plate 20: General photo of S2MC443 (AHIMS ID#36-3-3811), facing north-west.	15
Plate 21: General photo of view from S2MC443 (AHIMS ID#36-3-3811), facing south.	15
Plate 22: S2MC444 (AHIMS ID#36-3-3813) Shelter with PAD, facing south-east.	17
Plate 23: S2MC444 (AHIMS ID#36-3-3813) Shelter with PAD, facing south-west.....	17
Plate 24: S2MC444 (AHIMS ID#36-3-3813) Shelter with PAD, facing south-west.....	17
Plate 25: S2MC444 (AHIMS ID#36-3-3813) Shelter with PAD, facing south-east.	17
Plate 26: S2MC445 (AHIMS ID#36-3-3817) Rock shelter with PAD, facing south-west.....	19
Plate 27: S2MC445 (AHIMS ID#36-3-3817) Rock shelter with PAD, facing west.	19

Plate 28: S2MC445 (AHIMS ID#36-3-3817) Rock shelter with PAD, facing east.	19
Plate 29: View from S2MC445 (AHIMS ID#36-3-3817) Rock shelter with PAD, facing north-east.....	19
Plate 30: S2MC446 (AHIMS ID#36-3-3814) Shelter with Artefact and PADs, facing south, artefact located in foreground.	21
Plate 31: S2MC446 (AHIMS ID#36-3-3814) Shelter with Artefact and PAD, facing south-west.	21
Plate 32: S2MC446 (AHIMS ID#36-3-3814) backed chert flake.....	21
Plate 33: S2MC446 (AHIMS ID#36-3-3814) Shelter with Artefact and PAD, interior detail, facing south.	21
Plate 34: S2MC447 (AHIMS ID#36-3-3815), Shelter with artefacts, facing north-west.....	23
Plate 35: S2MC447 (AHIMS ID#36-3-3815), Shelter with artefacts, facing south-west.	23
Plate 36: Quartz flake located at site S2MC447 (AHIMS ID#36-3-3815).	23
Plate 37: landscape view from S2MC447 (AHIMS ID#36-3-3815), Shelter with artefacts, facing south-east.	23
Plate 38: S2MC448 (AHIMS ID#36-3-3816), general location.	24
Plate 39: S2MC 448 (AHIMS ID#36-3-3816), chert scraper, ventral surface.....	24

List of Tables

Table 1: S2MC439 (AHIMS ID#36-3-3808) site information	6
Table 2: S2MC440 (AHIMS ID#36-3-3809) site information	8
Table 3: S2MC441 (AHIMS ID#36-3-3810) site information	10
Table 4: S2MC442 (AHIMS ID#36-3-3812) site information	12
Table 5: S2MC443 (AHIMS ID# 36-3-3811) site information.....	14
Table 6: S2MC444 (AHIMS ID#36-3-3813) site information	16
Table 7: S2MC445(AHIMS ID#36-3-3817) site information	18
Table 8: S2MC446 (AHIMS ID#36-3-3814) site information	20
Table 9: S2MC447 (AHIMS ID#36-3-3815) site information	22

Annex 2: Field data for Wiradjuri heritage sites

1.1 S2MC438 (AHIMS ID#36-3-3807)- A5

A chert retouched flake was located on a dirt track on a cleared ridge crest within the UG2 approved longwall mining extent, approximately 130 m north-east of S2MC420, an artefact scatter of six stone artefacts identified during surveys for an exploration drilling program. The landform offered views across Murragamba Creek valley and OC4. Cobbles and outcrops of basalt were exposed across the ridge crest.



Plate 1: S2MC438 (AHIMS ID# 36-3-3807), general location.



Plate 2: S2MC438 (AHIMS ID# 36-3-3807), chert flake.



Plate 3: S2MC438 (AHIMS ID# 36-3-3807), chert flake.



Plate 4: S2MC438 (AHIMS ID# 36-3-3807), general location.

1.2 S2MC439 (AHIMS ID#36-3-3808)- A16

S2MC439, a Shelter with PAD, was recorded on the upper slope of the ridge, approximately 140 m east-south-east of S2MC438. The shelter interior has a sandy deposit approximately greater than 50 cm along the dripline and while no stone artefacts were identified, the shelter outlook, proximity to a potential stone resource and other stone artefact sites and depth of the deposit increases the likelihood of subsurface stone artefacts being present. The integrity of the deposit was affected by rabbit burrowing.

Table 1: S2MC439 (AHIMS ID#36-3-3808) site information

S2MC439 (AHIMS ID#36-3-3808) site information					
Overview					
Site type	Shelter with PAD	MGAE	762659	MGAN	6419427
Previous Recording	No	Date Recorded	11/5/2021		
Physical Characteristics					
Width (m)	6	Depth (m)	5	Height (m)	2
Orientation	South	Floor area	30 m ²	Floor condition	Sandy deposit approximately >50cm in depth.
Location in Landscape					
Site context	Large conglomerate sandstone overhang located on an upper slope of steep hills				
Formation	Cavernous weathering				
Distance from water (m)	>200m	Landform	Mid slope of steeply inclined hill.		
Setting	Located				
Notes	Conglomerate sandstone overhang with rabbit burrowing. Seepage was visible along the joints. The sandy deposit was approximately 50 cm at the dripline. The comment was made by survey participants that it had an excellent view and was a nice cool place to sit.				
Archaeological Deposit					
Deposit	Yes	Describe	Sandy deposit approximately >50cm in depth.		
Visible artefacts?	No	Where?	N/A	How many?	N/A
Notes:	The shelter interior has a sandy deposit approximately greater than 50 cm along the dripline and while no stone artefacts were identified, the shelter outlook, proximity to a potential stone resource and other stone artefact sites and depth of the deposit increases the likelihood of subsurface stone artefacts being present. The integrity of the deposit however was impacted from rabbit burrowing.				
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Environmental Factors					
Waterwash	Y	Graffiti	N	Macro vegetals	N
Animals	Y	Salt/granular loss	N	Fissuring	N
Insects	N	Spalling/Exfoliation	Y	Other	
Fire	N	Block fall	N		

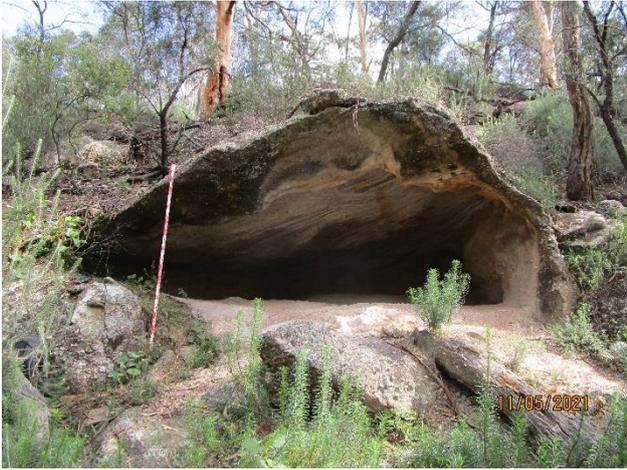


Plate 5: S2MC439 (AHIMS ID# 36-3-3808) Shelter with PAD, facing north-east.



Plate 6: S2MC439 (AHIMS ID# 36-3-3808) Shelter with PAD, facing south.

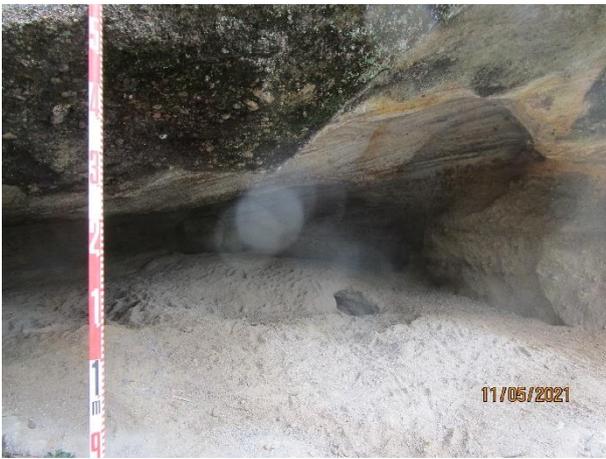


Plate 7: S2MC439 (AHIMS ID# 36-3-3808) Shelter with PAD, facing south.

1.3 S2MC440 (AHIMS ID#36-3-3809)- A4_A5

S2MC440, a Shelter with Artefacts and PAD, located midslope, along a continuous sandstone ridge, looking south-west across a gully. Vegetation at the front of the shelter is burnt. The shelter interior large habitable floor space and has a sandy deposit at least 30 cm deep in parts. Two stone artefacts were located within the drip line and interior of the shelter.

Table 2: S2MC440 (AHIMS ID#36-3-3809) site information

S2MC440 (AHIMS ID#36-3-3809) site information					
Overview					
Site type	Shelter with Artefacts and PAD	MGAE	762581	MGAN	6419199
Previous Recording	No	Date Recorded	11/5/2021		
Shelter/Overhang details					
Width (m)	8	Depth (m)	5	Height (m)	4
Orientation	South-west	Floor area	40	Floor condition	Sandy deposit approx. 30 cm deep.
Location in Landscape					
Site context	Located midslope, along a continuous sandstone ridge, looking south-west across a gully. Vegetation at the front of the shelter is burnt				
Formation	Chemical weathering, Exfoliation				
Distance from water (m)	200	Landform	Mid Slope of steep hills		
Setting	Sandstone ridge				
Notes	Sandy deposit with charcoal fragments across front of shelter and visible in wombat/animal digging. Two stone artefacts located along drip line and interior of shelter				
Archaeological Deposit					
Deposit	Yes	Describe	The deposit is at least 30 cm deep.		
Visible artefacts?	Yes	Where?	Along dripline and shelter interior.	How many?	2
Notes:	Further stone artefacts are likely within the shelter, however the integrity of the deposit may be reduced as a result of wombat burrowing.				
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Waterwash	N	Graffiti	N	Macro vegetals	Y
Animals	Y	Salt/granular loss	Y	Fissuring	N
Insects	Y	Spalling/Exfoliation	Y	Other	Lateral movement of planes
Fire	Y	Block fall	N		

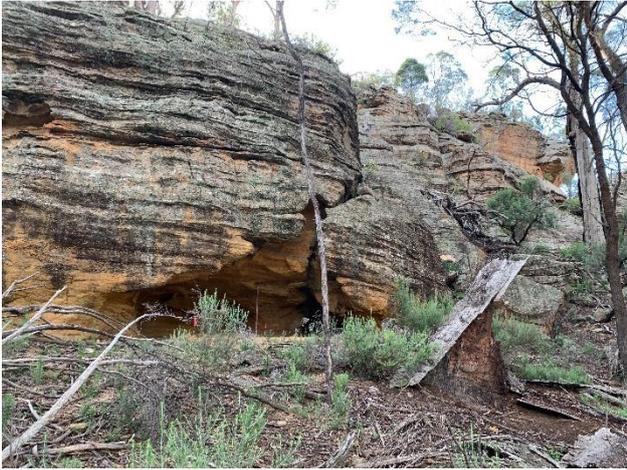


Plate 8: S2MC440 (AHIMS ID# 36-3-3809) Shelter with Artefact and PADs, general location, facing north-east.



Plate 9: S2MC440 (AHIMS ID# 36-3-3809) Shelter with Artefact and PAD, facing north-east.



Plate 10: S2MC440 (AHIMS ID# 36-3-3809), shelter detail with wombat burrowing at back of shelter.



Plate 11: Quartz complete flake located at S2MC440 (AHIMS ID# 36-3-3809).

1.4 S2MC441 (AHIMS ID#36-3-3810)- A7b_A7 and A8_8b

S2MC441, a Shelter with Artefacts and PAD, was recorded mid slope along a continuous sandstone ridge running roughly east-west. The shelter interiors have a sandy deposit, disturbed in parts by wombat burrowing. Two quartz flakes were located within the dripline of the shelters.

Table 3: S2MC441 (AHIMS ID#36-3-3810) site information

S2MC441 (AHIMS ID#36-3-3810) site information					
Overview					
Site type	Shelter with Artefact and PAD	MGAE	762710	MGAN	6419181
Previous Recording	No	Date Recorded	11/5/2021		
Physical Characteristics					
Width (m)	14	Depth (m)	20	Height (m)	1.8
Orientation	South	Floor area	25	Floor condition	Sandy deposit
Location in Landscape					
Site context	Located midslope on a continuous sandstone ridgeline, facing south, overlooking gully				
Formation	Cavernous weathering, block fall and exfoliations				
Distance from water (m)	>200m	Landform	Mid slope of steeply inclined ridgeline		
Setting	Continuous sandstone ridgeline				
Notes	Two adjoining overhangs with a sandy deposit. Wombat burrowing evident in the rear of the shelter and a birds nest was located in the overhang of the shelter.				
Archaeological Deposit					
Deposit	Yes	Describe	Sandy deposit in two adjoining shelters		
Visible artefacts?	Yes	Where?	Dripline	How many?	2
Notes:	Two quartz flakes are located along the dripline among quartzose gravels. One quartz flake was located between the two overhangs				
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Environmental Factors					
Waterwash	N	Graffiti	N	Macro vegetals	N
Animals	Y	Salt/granular loss	Y	Fissuring	N
Insects	N	Spalling/Exfoliation	Y	Other	
Fire	N	Block fall	N		



Plate 12: S2MC441 (AHIMS ID#36-3-3810), Shelter with Artefacts and PAD, facing south-east.



Plate 13: S2MC441 (AHIMS ID#36-3-3810), Shelter with Artefacts and PAD, facing north-east.



Plate 14: S2MC441 (AHIMS ID#36-3-3810), Shelter with Artefacts and PAD, facing south-east.



Plate 15: S2MC441 (AHIMS ID#36-3-3810), Shelter with Artefacts and PAD, facing north-east.

1.5 S2MC442 (AHIMS ID#36-3-3812)- CDF5

S2MC442 is a Shelter with PAD is a large sandstone overhang located on the upper slope. The overhang has formed through chemical weathering, block fall and exfoliation and has been highly weathered. The overhang consists of banded conglomerate sandstone and fine-grained sandstone. The floor of the overhang is stone with 20 cm fine sandy deposit, however flat to gently inclined land continuous along the same contour line towards S2MC443. The shelter has been visited in the past during construction of a fenceline.

Table 4: S2MC442 (AHIMS ID#36-3-3812) site information

S2MC442 (AHIMS ID#36-3-3812) site information					
Overview					
Site type	Shelter with PAD	MGAE	762819	MGAN	6419201
Previous Recording	No	Date Recorded	11/5/2021		
Shelter/Overhang details					
Width (m)	13.6	Depth (m)	7.1	Height (m)	3.5
Orientation	South-east	Floor area	35 m ²	Floor condition	Stone floor with Sandy deposit
Location in Landscape					
Site context	Sandstone outcrops at top of ridgeline				
Formation	Exfoliation, Blockfall, Chemical weathering				
Distance from water (m)	>200m	Landform	Upper Slope of steep hills		
Setting	Continuous sandstone ridgeline				
Notes	Large shelter that has been highly weathered with banding of conglomerate sandstone and fine grained sandstone. Stone floor with sandy deposit approximately 20cm deep.				
Archaeological Deposit					
Deposit	Yes	Describe	Sandy deposit approximately 20 cm formed through weathering of sandstone.		
Visible artefacts?	No	Where?	N/A	How many?	N/A
Notes:	Shelter directly adjacent to S2MC443. Fence line running through the two shelters, separating the deposits.				
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Environmental Data					
Waterwash	Y	Graffiti	N	Macro vegetals	Y
Animals	Y	Salt/granular loss	Y	Fissuring	N
Insects	Y	Spalling/Exfoliation	Y	Other	
Fire	N	Block fall	Y		



Plate 16: General photo S2MC442 (AHIMS ID# 36-3-3812), facing north-west.



Plate 17: General photo of view from S2MC442 (AHIMS ID# 36-3-3812), facing south-west.

1.6 S2MC443 (AHIMS ID# 36-3-3811)- RS CDF6

S2MC443 (AHIMS ID# 36-3-3811), a Shelter with PAD, was located along the same contour line as S2MC442, separated by an old fence line. The large sandstone overhang has formed through chemical weathering, block fall and exfoliation and has been highly weathered. The overhang consists of banded conglomerate sandstone and provides a large habitable floor space with excellent views across the valley to the south east, east and north-east. The floor of the overhang is stone with 15 cm sandy deposit at dripline and at least 30 cm at rear of the shelter. S2MC443 (AHIMS ID# 36-3-3811) is directly adjacent to S2MC442 (AHIMS ID# 36-3-3812). Overhangs are separated by fence line. While no Aboriginal objects were visible at the time of the survey, the outlook, scale of the shelter, estimate deposit depth and blockfall at the front of the shelter increases the likelihood for Aboriginal objects to be present.

Table 5: S2MC443 (AHIMS ID# 36-3-3811) site information

S2MC443 (AHIMS ID#36-3-3811) site information					
Overview					
Site type	Shelter with PAD	MGAE	762797	MGAN	6419189
Previous Recording	No	Date Recorded	11/5/2021		
Shelter/Overhang details					
Width (m)	9	Depth (m)	6	Height (m)	2.3
Orientation	South	Floor area	54 m ²	Floor condition	Stone floor with Sandy deposit
Location in Landscape					
Site context	Sandstone outcrops at top of ridgeline				
Formation	Exfoliation, Blockfall, Chemical weathering				
Distance from water (m)	>200m	Landform	Upper Slope of steep hills		
Setting	Continuous sandstone ridgeline				
Notes	Large shelter that reduces to height of 90cm at the rear of the shelter. Stone floor with sandy deposit approximately 15cm deep at dripline and 30cm at rear of the shelter.				
Archaeological Deposit					
Deposit	Yes	Describe	Sandy deposit approximately 20 cm formed through weathering of sandstone.		
Visible artefacts?	No	Where?	N/A	How many?	N/A
Notes:	Shelter directly adjacent to S2MC442. Fence line running through the two shelters, separating the deposits.				
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Environmental Factors					
Waterwash	Y	Graffiti	N	Macro vegetals	Y
Animals	Y	Salt/granular loss	Y	Fissuring	N
Insects	Y	Spalling/Exfoliation	Y	Other	
Fire	Y	Block fall	Y		



Plate 18: S2MC443 (AHIMS ID#36-3-3811), facing east.



Plate 19: Shelter detail, S2MC443 (AHIMS ID#36-3-3811), facing east.



Plate 20: General photo of S2MC443 (AHIMS ID#36-3-3811), facing north-west.



Plate 21: General photo of view from S2MC443 (AHIMS ID#36-3-3811), facing south.

1.7 S2MC444 (AHIMS ID#36-3-3813)- CDF10

S2MC444, a Shelter with PAD, consists of large sandstone overhang along a continuous sandstone ridge, located mid-slope. The shelter contains an approximately 30 cm deep sandy deposit with evidence of animal burrowing and wasp nests throughout the shelter.

Table 6: S2MC444 (AHIMS ID#36-3-3813) site information

S2MC444 (AHIMS ID#36-3-3813) site information					
Overview					
Site type	Shelter with PAD	MGAE	762718	MGAN	6419307
Previous Recording	No	Date Recorded	11/5/2021		
Shelter/Overhang details					
Width (m)	17.1	Depth (m)	8.3	Height (m)	7.6
Orientation	North	Floor area	45 m ²	Floor condition	Sandy deposit
Location in Landscape					
Site context	Ridgeline running NW-SE				
Formation	Exfoliation, Blockfall, Chemical weathering				
Distance from water (m)	>200m	Landform	Mid Slope of steep hills		
Setting	Continuous sandstone ridgeline				
Notes	Shelter height decreases to the rear of the shelter, measuring 1.6m in height at rear. Banding of conglomerate sandstone and fine-grained sandstone. Actively weathering. Ironstone veins evident along roof. Wasps nest evident and wombat faeces. Large gum tree 2 m north of drip line. Outlook across gully.				
Archaeological Deposit					
Deposit	Yes	Describe	Sandy deposit approximately 30 cm formed through weathering of sandstone. Leaf litter and block fall along drip line of shelter.		
Visible artefacts?	No	Where?	N/A	How many?	N/A
Notes:	The shelter has a large habitable floor with at least 30 cm of deposit. Animal burrowing is likely to have reduced the integrity of the deposit.				
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Waterwash	N	Graffiti	Y	Macro vegetals	Y
Animals	Y	Salt/granular loss	Y	Fissuring	Y- Horizontal cracking
Insects	Y	Spalling/Exfoliation	Y	Other	
Fire	N	Block fall	Y		



Plate 22: S2MC444 (AHIMS ID#36-3-3813) Shelter with PAD, facing south-east.



Plate 23: S2MC444 (AHIMS ID#36-3-3813) Shelter with PAD, facing south-west.



Plate 24: S2MC444 (AHIMS ID#36-3-3813) Shelter with PAD, facing south-west.



Plate 25: S2MC444 (AHIMS ID#36-3-3813) Shelter with PAD, facing south-east.

1.8 S2MC445(AHIMS ID#36-3-3817)- CDF11

Site S2MC445, a Shelter with PAD, comprises of a large sandstone overhang located within a continuous sandstone outcrop along the midline of steep hills. The interior of the shelter consists of conglomerate sandstone banding and contains wasps and birds nests within the shelter. The shelter a grey sandy deposit on top of a sandstone floor.

Table 7: S2MC445(AHIMS ID#36-3-3817) site information

S2MC445(AHIMS ID#36-3-3817) Site information					
Overview					
Site type	Shelter with PAD	MGAE	762710	MGAN	6419307
Previous Recording	No	Date Recorded	11/5/2021		
Shelter/Overhang details					
Width (m)	15	Depth (m)	6	Height (m)	2.6
Orientation	north-east	Floor area	90	Floor condition	Stone floor with grey sandy deposit.
Location in Landscape					
Site context					
Formation	Chemical weathering, Block fall, Exfoliation				
Distance from water (m)	>200m	Landform	Mid Slope of steep hills		
Setting	Continuous Sandstone Ridgeline				
Notes	Shelter has been subjected to large block fall and actively weathering of shelter. Shelter consists of Conglomerate sandstone banding with wasps' nests and birds' nests evident within the shelter.				
Archaeological Deposit					
Deposit	Yes	Describe	PAD located within the eastern end of the shelter, approximately 4 m from dripline.		
Visible artefacts?	No	Where?	N/A	How many?	N/A
Notes:					
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Waterwash	N	Graffiti	N	Macro vegetals	Y
Animals	Y	Salt/granular loss	Y	Fissuring	Y- diagonal and vertical cracking
Insects	Y	Spalling/Exfoliation	Y	Other	Lateral movement of planes and Mineral efflorescence.
Fire	Y	Block fall	Y		



Plate 26: S2MC445 (AHIMS ID#36-3-3817) Rock shelter with PAD, facing south-west.



Plate 27: S2MC445 (AHIMS ID#36-3-3817) Rock shelter with PAD, facing west.

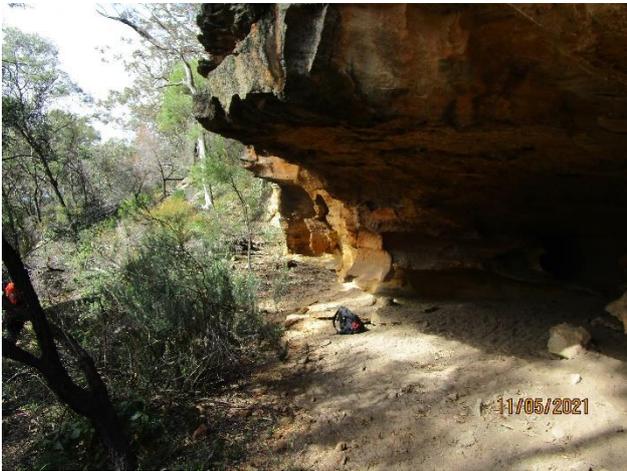


Plate 28: S2MC445 (AHIMS ID#36-3-3817) Rock shelter with PAD, facing east.



Plate 29: View from S2MC445 (AHIMS ID#36-3-3817) Rock shelter with PAD, facing north-east.

1.9 S2MC446 (AHIMS ID#36-3-3814)- CA11

S2MC446 is a large sandstone shelter and overhang with PAD and artefacts located within a sandstone outcrop along the mid slope of moderately inclined hills, overlooking a gully. The shelter interior consists of a sloped stone floor that levels out towards the back of the shelter. The stone floor has a built-up sandy deposit, approximately 30 to 40 cm deep along the dripline. The shelter contains wasp nests and is actively being used by animals. A chert backed flake was located in the eroding downslope of the shelter. While further stone artefacts are likely within the deposit, the area of PAD is relatively small and the deposit is moderately sloped. Downslope sediment movement and the impact of animal use is also likely to have impacted the integrity of the deposit.

Table 8: S2MC446 (AHIMS ID#36-3-3814) site information

S2MC446(AHIMS ID#36-3-3814) Site information					
Overview					
Site type	Shelter with Artefact and PAD	MGAE	762958	MGAN	6418838
Previous Recording	No	Date Recorded	12/5/2021		
Shelter/Overhang details					
Width (m)	7.5	Depth (m)	8.6	Height (m)	6
Orientation	North	Floor area	40	Floor condition	Sloped, stone floor
Location in Landscape					
Site context	Large overhang overlooking the gully mid slope.				
Formation	Chemical weathering and Exfoliation				
Distance from water (m)	>200m	Landform	Mid slope of moderately inclined hills.		
Setting	Sandstone outcrop				
Notes	Shelter has a moderately slope sandstone floor, levelling out towards the back of the shelter, with a build up of deposit, approximately 30 to 40 cm deep along the dripline. Inactive wasp nests evident in the shelter, active animal use of the shelter as evident by animal urine.				
Archaeological Deposit					
Deposit	Yes	Describe	PAD approximately 30-40 cm deep along drip line, overlying a sandstone floor.		
Visible artefacts?	Yes	Where?	One artefact found on eroding downslope.	How many?	1
Notes:	Artefact was a single chert backed flake. While further stone artefacts are likely within the deposit, the area of PAD is relatively small and the deposit is moderately sloped. Downslope sediment movement and the impact of animal use is also likely to have impacted the integrity of the deposit.				
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Waterwash	N	Graffiti	N	Macro vegetals	N
Animals	Y	Salt/granular loss	Y	Fissuring	N
Insects	Y	Spalling/Exfoliation	Y	Other	
Fire	Y	Block fall	N		



Plate 30: S2MC446 (AHIMS ID#36-3-3814) Shelter with Artefact and PADs, facing south, artefact located in foreground.



Plate 31: S2MC446 (AHIMS ID#36-3-3814) Shelter with Artefact and PAD, facing south-west.



Plate 32: S2MC446 (AHIMS ID#36-3-3814) backed chert flake..



Plate 33: S2MC446 (AHIMS ID#36-3-3814) Shelter with Artefact and PAD, interior detail, facing south.

1.10 S2MC447 (AHIMS ID#36-3-3815)- CA15

S2MC447 is a shelter with an isolated quartz flake located downslope of the shelter, is a large flat roofed overhang with a dead tree at the entrance and a kurrajong tree to the south and a fig downslope, just below the crest. Shelter has formed through blockfall, roof has been affected by fire and fungal growth.

Table 9: S2MC447 (AHIMS ID#36-3-3815) site information

S2MC447 (AHIMS ID#36-3-3815) site information					
Overview					
Site type	Shelter with Artefacts	MGAE	763093	MGAN	6418707
Previous Recording	No	Date Recorded	12/5/2021		
Location in Landscape					
Site context	NE-SW ridgeline				
Formation	Chemical weathering ,Blockfall				
Distance from water (m)	>200m	Landform	Upper slope		
Setting	Sandstone outcrop				
Notes	Shelter is a large flat roofed overhang with a dead tree at the entrance and a kurrajong tree to the south and a fig downslope, just below the crest. Shelter has formed through blockfall, roof has been affected by fire and fungal growth.				
Archaeological Deposit					
Deposit	No	Describe			
Visible artefacts?	Yes	Where?	Within dripline of shelter	How many?	1
Notes:	A quartz complete flake was located downslope of the shelter				
Panel / Platform					
Art surfaces	N/A		Grooves	N/A	
Waterwash	Y	Graffiti	N	Macro vegetals	Y
Animals	Y	Salt/granular loss	Y	Fissuring	Y- horizontal cracking
Insects	N	Spalling/Exfoliation	Y	Other	
Fire	N	Block fall	N		

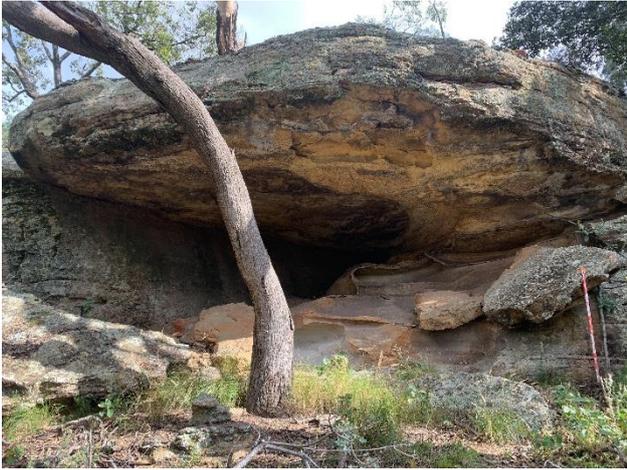


Plate 34: S2MC447 (AHIMS ID#36-3-3815), Shelter with artefacts, facing north-west.

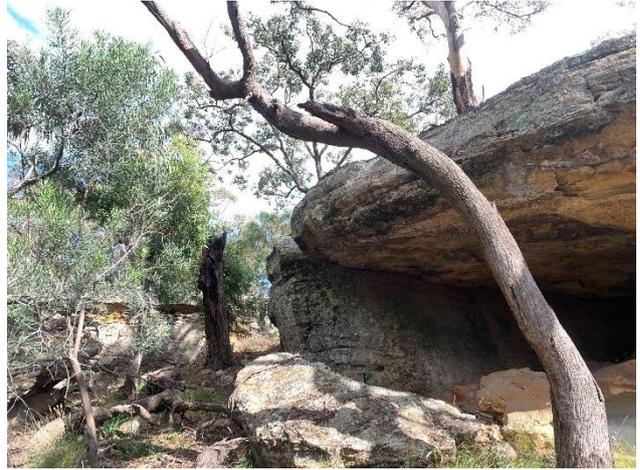


Plate 35: S2MC447 (AHIMS ID#36-3-3815), Shelter with artefacts, facing south-west.



Plate 36: Quartz flake located at site S2MC447 (AHIMS ID#36-3-3815).



Plate 37: landscape view from S2MC447 (AHIMS ID#36-3-3815), Shelter with artefacts, facing south-east.

1.11 S2MC448 (AHIMS ID#36-3-3816)- CA23

S2MC448 consists of an isolated chert scraper located on a slate-covered lower slope in open depression. Visibility due to leaf and slate cover was poor but it is likely further surface artefacts are present.



Plate 38: S2MC448 (AHIMS ID#36-3-3816), general location.



Plate 39: S2MC 448 (AHIMS ID#36-3-3816), chert scraper, ventral surface.

Annex 3: Field data for Overhangs

**Annex 3: Field data for overhangs
Archaeological Report
UG2 Modification Complex Survey, Moolarben, NSW**

Mid-Western Regional Council Local Government Area

Prepared for Moolarben Coal Operations Pty Ltd

Prepared by Niche Environment and Heritage Pty Ltd | 23 November 2021



1.1.1 Document control

Project number	Client	Project manager	LGA
6462	Moolarben Coal Operations	Clare Anderson	Mid-Western Regional Council

Version	Author	Review	Status	Date
D1	Chelsea Freeman	-	Draft	2 October 2021
Rev0	Clare Anderson	-	Final	16 November 2021

© Niche Environment and Heritage Pty Ltd (ACN 137 111 721) 2019

Copyright protects this publication. All rights reserved. Except for purposes permitted by the Australian *Copyright Act 1968*, reproduction, adaptation, electronic storage, transmission and communication to the public by any means is prohibited without our prior written permission. Any third party material, including images, contained in this publication remains the property of the specified copyright owner unless otherwise indicated, and is used subject to their licensing conditions.

Important information about your Report

Your Report has been written for a specific purpose: The Report has been developed for a specific purpose as agreed by us with you and applies only for that purpose. Unless otherwise stated in the Report, this Report cannot be applied or used when the nature of the specific purpose changes from that agreed. **Report for the sole benefit of Niche's client:** This Report has been prepared by Niche for you, as Niche's client, in accordance with our agreed purpose, scope, schedule and budget. This Report should not be applied for any purpose other than that stated in the Report. Unless otherwise agreed in writing between us, the Report has been prepared for your benefit and no other party. Other parties should not and cannot rely upon the Report or the accuracy or completeness of any recommendation. **Limitations of the Report:** The work was conducted, and the Report has been prepared, in response to an agreed purpose and scope, within respective time and budget constraints, and possibly in reliance on certain data and information made available to Niche. The analyses, assessments, opinions, recommendations, and conclusions presented in this Report are based on that purpose and scope, requirements, data, or information, and they could change if such requirements or data are inaccurate or incomplete. **No responsibility to others:** Niche assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with, or conclusions expressed in the Report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with, or conclusions expressed in the Report.

Niche Environment and Heritage Pty Ltd (ACN 137 111 721)
Enquiries should be addressed to Niche Environment and Heritage
PO Box 2443, Parramatta NSW 1750, Australia
Email: info@niche-eh.com

Table of Contents

Annex 3: Field data for overhangs.....	8
1.1 RS CDF1.....	8
1.2 RS CDF2.....	8
1.3 RS CDF3.....	9
1.4 RS CDF4.....	9
1.5 RS CDF7.....	10
1.6 RS CDF8.....	10
1.7 RS CDF9.....	11
1.8 RS CDF18.....	11
1.9 RS CDF19.....	12
1.10 RS CDF20.....	12
1.11 RS CDF21.....	13
1.12 RS CDF22.....	13
1.13 RS CDF23.....	14
1.14 RS CDF24.....	14
1.15 RS CDF25.....	15
1.16 RS CDF26.....	15
1.17 RS CDF27.....	16
1.18 RS CDF28.....	16
1.19 RS CDF29.....	17
1.20 RS CDF30.....	17
1.21 RS CDF31.....	18
1.22 RS CDF32.....	18
1.23 RS CDF33.....	19
1.24 RS CDF34.....	19
1.25 RS A4.....	20
1.26 RS A6_A5.....	20
1.27 RS A8_A6.....	20
1.28 RS A9.....	21
1.29 RS A10.....	21
1.30 RS A11.....	21
1.31 RS A12.....	22

1.32	RS A13.....	22
1.33	RS A14.....	23
1.34	RS A15.....	23
1.35	RS cA6.....	23
1.36	RS CA8.....	24
1.37	RS CA9.....	24
1.38	RS CA10.....	25
1.39	RS CA12.....	25
1.40	RS CA13.....	26
1.41	RS CA8_CA8.....	27
1.42	RS CA14_ca9.....	27
1.43	RS CA16.....	27
1.44	RS CA17.....	28
1.45	RS CA18.....	29
1.46	RS CA19.....	29
1.47	RS CA20.....	30
1.48	RS CA21.....	30
1.49	RS CA22.....	31

List of Plates

Plate 1: General photo RS CDF1, facing south..... 8

Plate 2: General photo of view from RS CDF1, facing north-east. 8

Plate 3: General photo RS CDF2, facing south..... 8

Plate 4: General photo of view from RS CDF2, facing north. 8

Plate 5: General photo RS CDF3, facing south..... 9

Plate 6: General photo of view from RS CDF3, facing north-east. 9

Plate 7: General photo RS CDF4, facing south-west..... 9

Plate 8: General photo of view from RS CDF4, facing north-east. 9

Plate 9: General photo RS CDF7, facing south..... 10

Plate 10: General photo of view from RS CDF7, facing north. 10

Plate 11: General photo RS CDF8, facing south..... 10

Plate 12: General photo of trees and block fall blocking the entranceway of RS CDF8, facing north-east. ... 10

Plate 13: General photo RS CDF9, facing south..... 11

Plate 14: General photo of view from RS CDF4, facing north. 11

Plate 15: General photo RS CDF18, facing south..... 11

Plate 16: General photo of view from RS CDF18, facing north-west. 11

Plate 17: General photo RS CDF4, facing south-west..... 12

Plate 18: General photo RS CDF4, facing south-west..... 12

Plate 19: General photo RS CDF20, facing south-west..... 12

Plate 20: General photo of view from RS CDF20, facing north-east. 12

Plate 21: General photo RS CDF21, facing south-east..... 13

Plate 22: General photo of view from RS CDF21, facing north-west. 13

Plate 23: General photo RS CDF22, facing south-south-west. 13

Plate 24: General photo of view from RS CDF22, facing north-north-east..... 13

Plate 25: General photo RS CDF23, facing west. 14

Plate 26: General photo of view from RS CDF23, facing east. 14

Plate 27: General photo RS CDF24, facing north-west..... 14

Plate 28: General photo of view from RS CDF24, facing north-east. 14

Plate 29: General photo RS CDF25, facing west.	15
Plate 30: General photo of view from RS CDF25, facing east.	15
Plate 31: General photo RS CDF26, facing south-east.....	15
Plate 32: General photo of view from RS CDF26, facing north-west.	15
Plate 33: General photo RS CDF27, facing north-east.....	16
Plate 34: General photo RS CDF27, facing north-east.....	16
Plate 35: General photo RS CDF28, facing north-east.....	16
Plate 36: General photo RS CDF26, facing north-east.....	16
Plate 37: General photo RS CDF29, facing south-west.....	17
Plate 38: General photo of view from inside RS CDF29, facing east.	17
Plate 39: General photo RS CDF30, facing south.....	17
Plate 40: General photo of view from RS CDF30, facing north.	17
Plate 41: General photo RS CDF31, facing north-east.....	18
Plate 42: General photo of RS CDF31, facing north-east.	18
Plate 43: General photo RS CDF32, facing south-west.....	18
Plate 44: General photo of view from RS CDF32, facing north-east.	18
Plate 45: General photo RS CDF33, facing south-west.....	19
Plate 46: General photo of view from RS CDF33, facing north-east.	19
Plate 47: General photo RS CDF34, facing east.	19
Plate 48: General photo of view from RS CDF34, facing west.....	19
Plate 49: General photo RS A4.	20
Plate 50: General photo RS A8_A6, facing north.....	20
Plate 51: General photo of RS A8_A6, facing north-east.	20
Plate 52: General photo RS A9, facing north-east.....	21
Plate 53: General photo of RD A9, facing south-east.....	21
Plate 54: General photo RS A11, facing south-east.....	21
Plate 55: General photo of view from RS A11, facing south.	21
Plate 56: General photo RS A12, facing east.	22
Plate 57: General photo of view from RS A12, facing south-east.	22

Plate 58: General photo RS A13, facing north-east.....	22
Plate 59: General photo of view from RS A13, facing north-west.	22
Plate 60: View from RSA14, facing east.....	23
Plate 61: General photo of inside RS A14, facing south.	23
Plate 62: General photo RS A15.	23
Plate 63: General photo of RS A15.	23
Plate 64: General photo RS CA8, facing south-west.....	24
Plate 65: General photo of view from RS CA8, facing north-east.	24
Plate 66: General photo RS CA9, facing west.	24
Plate 67: General photo of inside RS CA9.....	24
Plate 68: General photo RS CA10, facing south-west.....	25
Plate 69: General photo of view from RS CA10, facing south-west.	25
Plate 70: General photo RS CA12, facing south.....	25
Plate 71: General photo RS CA12, facing south-west.....	25
Plate 72: General photo RS CA12, facing south-west.....	26
Plate 73: Grooves located at RSCA12.	26
Plate 74: Grooves located at RSCA12.	26
Plate 75: General photo RS CA13.	26
Plate 76: General photo of view from RS CA13.....	26
Plate 77: General photo RS CA8_CA8.....	27
Plate 78: General photo RS CA16, facing south-west.....	27
Plate 79: General photo RS CA17, facing south-west.....	28
Plate 80: General photo of view from RS CA17, facing south-east.	28
Plate 81: RS CA17 graffiti showing "A.G"	28
Plate 82: RS CA17 graffiti showing "H B A R 1934"	28
Plate 83: General photo RS CA18, facing south-west.....	29
Plate 84: General photo of RS CA18, facing south-east.	29
Plate 85: S1MC506, Shelter with artefacts, facing south-west.	29
Plate 86: S2MC447, Shelter with artefacts within landscape context, facing north-west.....	29

Plate 87: General photo RS CA20, facing south-west.....	30
Plate 88: General photo of view from RS CA20, facing north-east.	30
Plate 89: General photo RS CA21, facing north-west.....	30
Plate 90: Detail photo of interior of RS CA13.	30
Plate 91: General photo RS CA22 within the landscape, facing north-west.	31
Plate 92: General photo of RS CA22, facing south-west.	31

Annex 3: Field data for overhangs

1.1 RS CDF1

RS CDF1 is a low overhang that has been highly weathered, with small opening formed in the back corner of the shelter due to weathering. The overhang comprised of conglomerate sandstone. The shelter floor contained a fine sandy layer formed through erosion of sandstone. No Aboriginal objects or Potential Archaeological Deposit identified.



Plate 1: General photo RS CDF1, facing south.



Plate 2: General photo of view from RS CDF1, facing north-east.

1.2 RS CDF2

RS CDF2 is a low overhang that has formed through block fall and exfoliation and consists of conglomerate sandstone banded with fine grained sandstone. The overhang floor contained high amounts of leaf litter, with evidence of animal burrowing. No Aboriginal objects or Potential Archaeological Deposit was identified.



Plate 3: General photo RS CDF2, facing south.



Plate 4: General photo of view from RS CDF2, facing north.

1.3 RS CDF3

RS CDF3 is an overhang that has formed through chemical weathering, block fall and exfoliation and consists of exfoliated banded conglomerate sandstone. The floor of the overhang is stone with 15 cm sandy deposit. No Aboriginal objects or Potential Archaeological Deposit.



Plate 5: General photo RS CDF3, facing south.



Plate 6: General photo of view from RS CDF3, facing north-east.

1.4 RS CDF4

RS CDF4 is a low overhang that has formed through chemical weathering and exfoliation and has been highly weathered. The overhang consists of banded conglomerate sandstone with vertical fissuring running through the northern wall of the overhang. The floor of the overhang is stone with 2 cm fine sandy deposit. No Aboriginal objects or Potential Archaeological Deposit.



Plate 7: General photo RS CDF4, facing south-west.



Plate 8: General photo of view from RS CDF4, facing north-east.

1.5 RS CDF7

RS CDF7 is a large overhang that has formed through chemical weathering, block fall and exfoliation. The overhang consists of banded conglomerate sandstone. The floor of the overhang is eroded sandstone with a sandy deposit that has piled in a section of the overhang floor. No Aboriginal objects or Potential Archaeological Deposit.



Plate 9: General photo RS CDF7, facing south.



Plate 10: General photo of view from RS CDF7, facing north.

1.6 RS CDF8

RS CDF8 is a low overhang that has formed through chemical weathering, block fall and exfoliation and consists of conglomerate sandstone with horizontal fissuring. The overhang floor contained high amounts of leaf litter and rock fall, with a fallen tree blocking the entrance of the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 11: General photo RS CDF8, facing south.



Plate 12: General photo of trees and block fall blocking the entranceway of RS CDF8, facing north-east.

1.7 RS CDF9

RS CDF9 is a small overhang that has formed through chemical weathering, block fall and exfoliation and consists of conglomerate sandstone. The overhang floor is stone with a sandy deposit approximately 5 cm formed through weathering of the sandstone. No Aboriginal objects or Potential Archaeological Deposit.

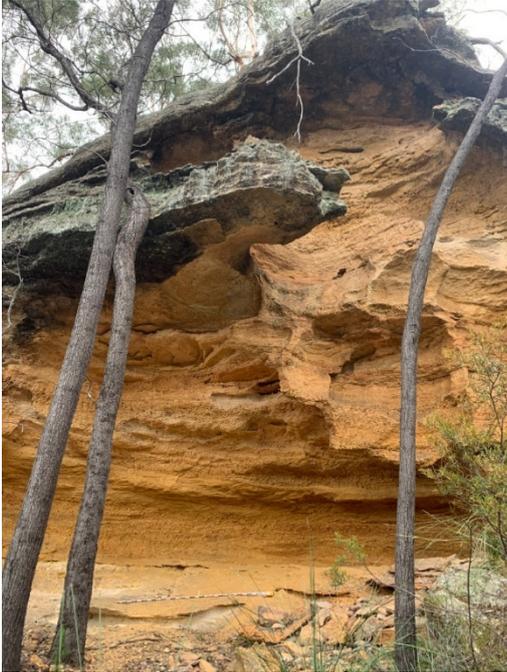


Plate 13: General photo RS CDF9, facing south.



Plate 14: General photo of view from RS CDF9, facing north.

1.8 RS CDF18

RS CDF18 is an overhang that has formed through cavernous weathering and consists of conglomerate sandstone. The overhang floor contains a stone floor and evidence of seepage with micro vegetals growing. No Aboriginal objects or Potential Archaeological Deposit.



Plate 15: General photo RS CDF18, facing south.



Plate 16: General photo of view from RS CDF18, facing north-west.

1.9 RS CDF19

RS CDF19 is an overhang that has formed through block fall and cavernous weathering with a stone floor. The overhang was damp with seepage and displayed vertical cracking. The shelter in an area with figtree, nightshade around the shelter. No Aboriginal objects or Potential Archaeological Deposit.

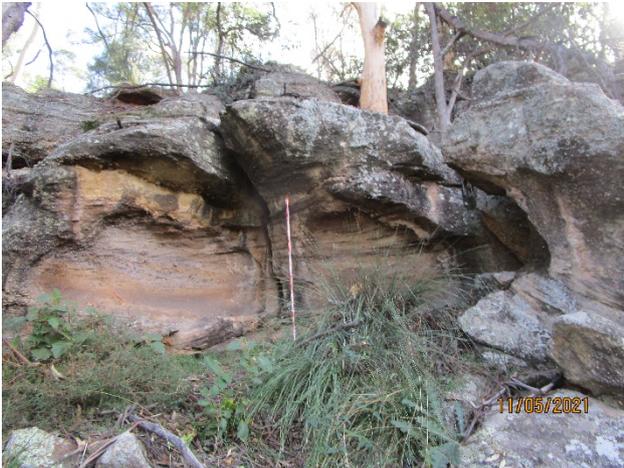


Plate 17: General photo RS CDF19, facing south-west.

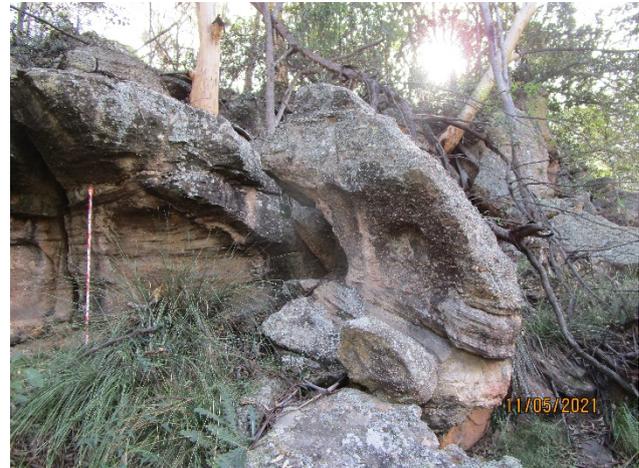


Plate 18: General photo RS CDF19, facing south-west.

1.10 RS CDF20

RS CDF20 is a small overhang that has formed through block fall and cavernous weathering with sandy deposit cover in leaf litter. The deposit has been dug out by animals (wombats) and has been undermined at the rear of the overhang. The overhang consists of conglomerate sandstone with vertical fissuring evident through backwall and into the ceiling. No Aboriginal objects or Potential Archaeological Deposit.



Plate 19: General photo RS CDF20, facing south-west.



Plate 20: General photo of view from RS CDF20, facing north-east.

1.11 RS CDF21

RS CDF21 is a small overhang that has formed through block fall and cavernous weathering with a sandy deposit over a stone floor. The overhang contains banded conglomerate sandstone with erosion along horizontal bedding. Wasps nest and cobwebs are evident throughout the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 21: General photo RS CDF21, facing south-east.



Plate 22: General photo of view from RS CDF21, facing north-west.

1.12 RS CDF22

RS CDF22 is a small overhang that has formed through block fall and cavernous weathering with a sandy deposit over a stone floor. The overhang contains exfoliated banded conglomerate sandstone, with the ceiling covered by wasps nests. Vertical cracking is evident along the backwall of the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 23: General photo RS CDF22, facing south-south-west.



Plate 24: General photo of view from RS CDF22, facing north-north-east.

1.13 RS CDF23

RS CDF23 is a low overhang that has formed primarily through block fall and has been subjected to chemical weathering and exfoliation. The overhang floor is stone, with a sandy layer from weathered sandstone, leaf litter throughout. A dead tree Infront of the overhang was evident. No Aboriginal objects or Potential Archaeological Deposit.



Plate 25: General photo RS CDF23, facing west.



Plate 26: General photo of view from RS CDF23, facing east.

1.14 RS CDF24

RS CDF24 is a low and wide overhang that has formed through chemical weathering, block fall and exfoliation. Th overhang interior contained a stone floor with rock fall, vertical and horizontal cracking along the walls and wasp nests through the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 27: General photo RS CDF24, facing north-west.



Plate 28: General photo of view from RS CDF24, facing north-east.

1.15 RS CDF25

RS CDF25 is an overhang that has formed through chemical weathering, block fall and exfoliation and is located atop of a steeply sloped sandstone platform. The overhang floor consists of a steeply sloped rock floor with large amounts of rockfall. No Aboriginal objects or Potential Archaeological Deposit.



Plate 29: General photo RS CDF25, facing west.



Plate 30: General photo of view from RS CDF25, facing east.

1.16 RS CDF26

RS CDF26 is an isolated overhang that has a steeply inclined stone floor that levels out approximately 4m deep into the overhang. A sandy deposit approximately 10 cm deep has formed on the level portion of the stone floor. Evidence of animal burrowing is present at the rear of the overhang. The exterior has been heat effected, with cracking exfoliation due to fire continuing into the shelter for 4m. No Aboriginal objects or Potential Archaeological Deposit.



Plate 31: General photo RS CDF26, facing south-east.



Plate 32: General photo of view from RS CDF26, facing north-west.

1.17 RS CDF27

RD CDF27 inaccessible due to location. No Aboriginal objects identified at base of overhang.

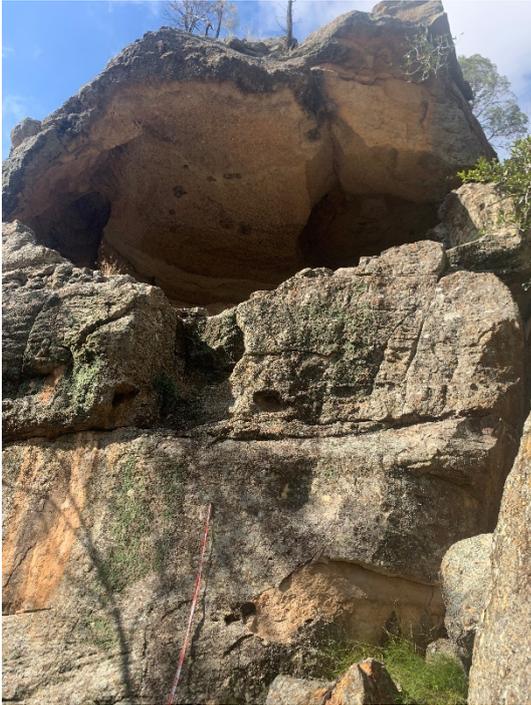


Plate 33: General photo RS CDF27, facing north-east.

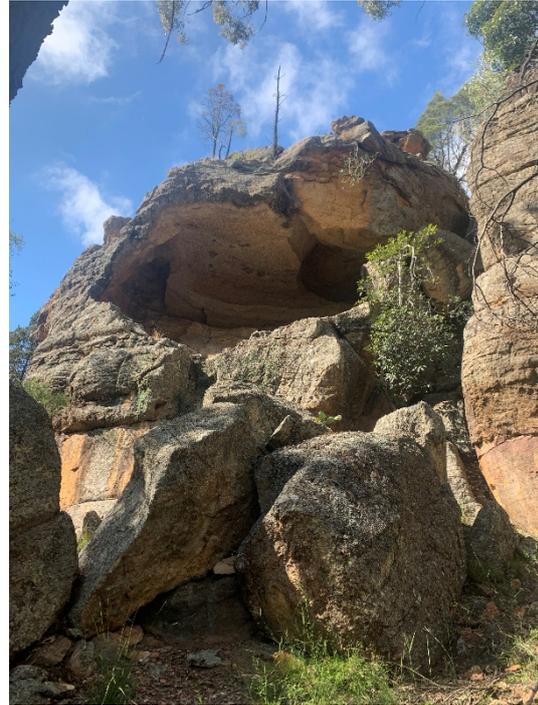


Plate 34: General photo RS CDF27, facing north-east.

1.18 RS CDF28

No Aboriginal objects or Potential Archaeological Deposit.

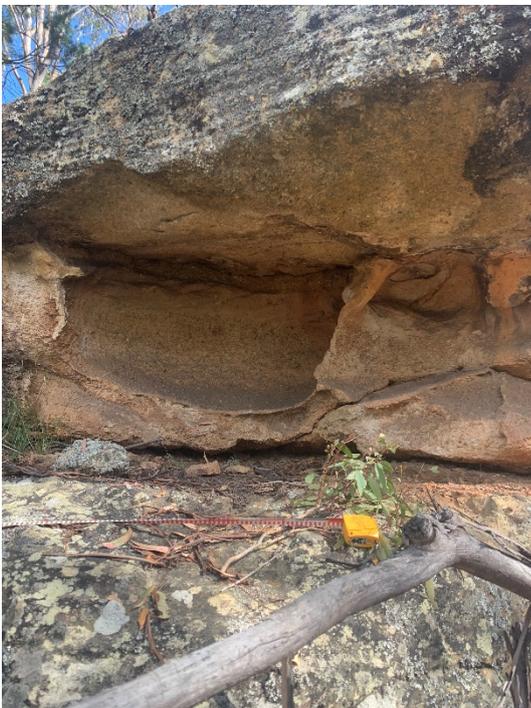


Plate 35: General photo RS CDF28, facing north-east.



Plate 36: General photo RS CDF28, facing north-east.

1.19 RS CDF29

RS CDF29 is an overhang that has formed through chemical weathering, exfoliation, and cavernous weathering. The overhang consists of banded conglomerate sandstone with bands of fine-grained sandstone. The floor of the overhang is stone with a sandy deposit formed through exfoliation of sandstone. The entrance of the overhang is covered by leaf litter, a fallen tree and block fall, partially blocking entrance into the overhang. Vertical cracking is evident along the rear wall and continuing into the ceiling of the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 37: General photo RS CDF29, facing south-west.



Plate 38: General photo of view from inside RS CDF29, facing east.

1.20 RS CDF30

RS CDF30 is a low overhang that has formed through chemical weathering, block fall and exfoliation. The overhang floor consists of a sandy deposit approximately 15 cm deep that has formed through exfoliated sandstone and internal rockfall. The overhang consists of banding of fine-grained orange sandstone. No Aboriginal objects or Potential Archaeological Deposit.



Plate 39: General photo RS CDF30, facing south.



Plate 40: General photo of view from RS CDF30, facing north.

1.21 RS CDF31

RS CDF31 is a small weathered boulder. No Aboriginal objects or Potential Archaeological Deposit.



Plate 41: General photo RS CDF31, facing north-east.



Plate 42: General photo of RS CDF31, facing north-east.

1.22 RS CDF32

RS CDF32 is a low overhang that has formed through chemical weathering and exfoliation. The overhang consists of a flat stone floor with an exfoliated sandstone sandy layer with evidence of animal faeces and leaf litter. The interior of the overhang consists of conglomerated sandstone with a vertical cracking occurring along the eastern wall near the entrance of the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 43: General photo RS CDF32, facing south-west.



Plate 44: General photo of view from RS CDF32, facing north-east.

1.23 RS CDF33

RS CDF33 is a low overhang that has formed through chemical weathering and exfoliation. The overhang floor consists of a strong floor with a sandy deposit of exfoliated sandstone. The overhang has a width of 3.4m at the entrance but expands to a width of 5.2m internally. Internally the overhang consists of fine-grained pale sandstone banded with orange conglomerate sandstone. Effects of burning are evident on the exterior and within the interior of the overhang, with small horizontal cracking occurring along the back wall of the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 45: General photo RS CDF33, facing south-west.



Plate 46: General photo of view from RS CDF33, facing north-east.

1.24 RS CDF34

RS CDF34 consists of a high overhang that has formed through chemical weathering and exfoliation. The overhang consists of conglomerate sandstone with ironstone veining, with vertical, horizontal, and diagonal cracking occurring along the side and rear walls and into the ceiling. The overhang floor is a steeply sloped stone floor. No Aboriginal objects or Potential Archaeological Deposit.



Plate 47: General photo RS CDF34, facing east.



Plate 48: General photo of view from RS CDF34, facing west.

1.25 RS A4

No Aboriginal objects or Potential Archaeological Deposit



Plate 49: General photo RS A4.

1.26 RS A6_A5

RS A6_A5 is a low overhang located that has formed through chemical weathering and block fall. The overhang consists of a sloped stone floor with a sandy deposit, minor block fall and animal burrowing. Diagonal cracking evident in the interior of the overhang. No Aboriginal objects or potential Archaeological Deposit.

1.27 RS A8_A6

RS A8_A6 is a low overhang located that has formed through chemical weathering block fall and exfoliations. Evidence of animal and insect use of the overhang. No Aboriginal objects or Potential Archaeological Deposits.



Plate 50: General photo RS A8_A6, facing north.



Plate 51: General photo of RS A8_A6, facing north-east.

1.28 RS A9

RS A9 is a low overhang that has formed through chemical weathering and block fall and contains a sandy stone floor. No Aboriginal objects or Potential Archaeological Deposit.



Plate 52: General photo RS A9, facing north-east.



Plate 53: General photo of RS A9, facing south-east.

1.29 RS A10

RS A10 is a large conglomerate sandstone overhang that has formed through cavernous weathering and is located on the mid to upper slope of steep hills. It has a shallow sandy deposit overlying a sloped stone floor. No Aboriginal objects or Potential Archaeological Deposit.

1.30 RS A11

RS A11 is a large overhang that is located mid slope and has formed through cavernous weathering and block fall. Fine bands of white sandstone and larger bands of conglomerate sandstone run through the shelter matrix. No Aboriginal objects or Potential Archaeological Deposit.

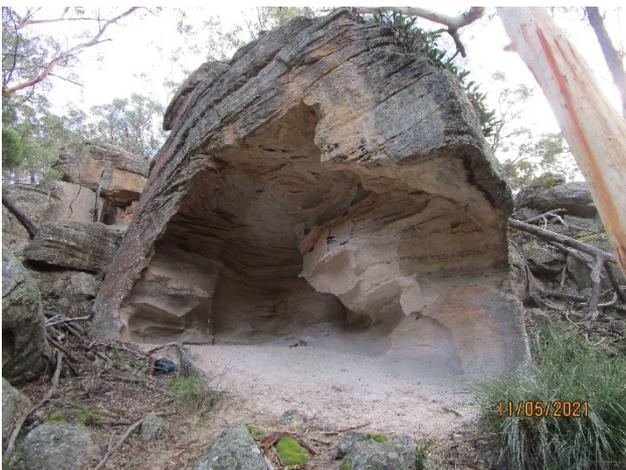


Plate 54: General photo RS A11, facing south-east.



Plate 55: General photo of view from RS A11, facing south.

1.31 RS A12

RS A12 is a small sandstone overhang formed from cavernous weathering and block fall, downslope of RS A11. There is enough space to sit with a view down to the drainage line. Animal burrowing is present. No Aboriginal objects or Potential Archaeological Deposit.



Plate 56: General photo RS A12, facing east.



Plate 57: General photo of view from RS A12, facing south-east.

1.32 RS A13

RS A13 is an overhang that has formed from block fall with a sloped floor and approximately 20 cm of rocky and sandy floor overlying block fall. It looks down towards earthworks associated with slate deposits. No Aboriginal objects or Potential Archaeological Deposit.



Plate 58: General photo RS A13, facing north-east.



Plate 59: General photo of view from RS A13, facing north-west.

1.33 RS A14

RS A14 is a sandstone overhang that has formed through cavernous weathering with a stone floor and some build-up of sandy deposit at the front and downslope of the dripline. Fire has affected the front of the shelter. No Aboriginal objects or Potential Archaeological Deposit.

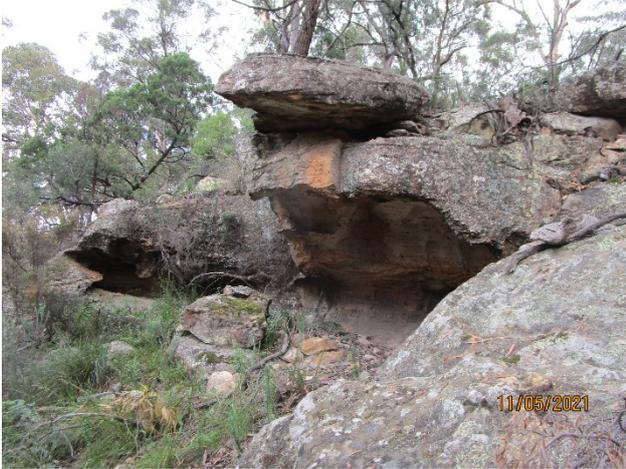


Plate 60: View from RS A14, facing east.



Plate 61: General photo of inside RS A14, facing south.

1.34 RS A15

RS A15 is a conglomerate sandstone overhang located on the mid slope. The sloped sandstone floor has a build-up of exfoliated sediment approximately 20 cm deep at the dripline. No Aboriginal objects or Potential Archaeological Deposit.



Plate 62: General photo RS A15.



Plate 63: General photo of RS A15.

1.35 RS cA6

RS cA6 is a low overhang that consists of twin overhangs with wombat burrowing at least 1m deep in overhang. Second overhang has a stone floor. No Aboriginal objects or Potential Archaeological Deposit.

1.36 RS CA8

RS CA8 is a large overhang that has formed through chemical weathering. The overhang is steeply sloped and rocky and contains vertical and horizontal cracking. No Aboriginal objects or Potential Archaeological Deposit.



Plate 64: General photo RS CA8, facing south-west.



Plate 65: General photo of view from RS CA8, facing north-east.

1.37 RS CA9

RS CA9 is low overhang facing east towards gully with burnt exterior and quartz gravel exfoliated sandstone floor thinly across stone floor. No Aboriginal objects or Potential Archaeological Deposit. Ants/termite nest running up back wall.



Plate 66: General photo RS CA9, facing west.



Plate 67: General photo of inside RS CA9.

1.38 RS CA10

RS 10 is a large overhang situated mid slope overlooking hilly, a larger shelter is located south east with artefacts. the overhang contains sloped floor with block fall and silty brown soils with conglomerate sandstone pebbles. No Aboriginal objects or Potential Archaeological Deposit. Animals and birds have nested in the overhang.



Plate 68: General photo RS CA10, facing south-west.



Plate 69: General photo of view from RS CA10, facing south-west.

1.39 RS CA12

RS CA12 is an overhang that was requested to be recorded due to the presence of multiple grooves on blockfall at western end of shelter outside drip line. The grooves are following the ridges of sandstone in a similar weathering pattern to other parts of the shelter, are not internally smooth due to conglomerate inclusions and are exposed to rainfall. The dimensions of the grooves are not typical of cultural grooves. The grooves have most likely formed through natural processes.



Plate 70: General photo RS CA12, facing south.



Plate 71: General photo RS CA12, facing south-west.



Plate 72: General photo RS CA12, facing south-west.



Plate 73: Grooves located at RSCA12.



Plate 74: Grooves located at RSCA12.

1.40 RS CA13

No Aboriginal objects or Potential Archaeological Deposit.



Plate 75: General photo RS CA13.



Plate 76: General photo of view from RS CA13.

1.41 RS CA8_CA8

RS CA8_CA8 is a shallow overhang that has formed through chemical weathering and exfoliation. The overhang is being used as a bird habitat with two nests present within the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 77: General photo RS CA8_CA8.

1.42 RS CA14_ca9

No Aboriginal objects or Potential Archaeological Deposit.

1.43 RS CA16

RS CA16 is a large overhang that is obscured by debris blocking the entrance. The overhang contained a stone floor with block fall and debris. The shelter was not entered due to blockage. No Aboriginal objects or Potential Archaeological Deposit.



Plate 78: General photo RS CA16, facing south-west.

1.44 RS CA17

RS CA17 is a large overhang with a large vertical crack running from bedding plane and up through rear of shelter and across ceiling. Two graffiti panels scratched into iron oxide stained chemically weathered sandstone reading "H B A R 1934" and "A.G". No Aboriginal objects or Potential Archaeological Deposit.



Plate 79: General photo RS CA17, facing south-west.



Plate 80: General photo of view from RS CA17, facing south-east.



Plate 81: RS CA17 graffiti showing "A.G".



Plate 82: RS CA17 graffiti showing "H B A R 1934".

1.45 RS CA18

RS CA18 overhang that forms part of a continuous ridgeline. Wash is visible across most surfaces; the overhang is actively weathering and exfoliating. The overhang has a steep sloped stone floor. No Aboriginal objects or Potential Archaeological Deposit.



Plate 83: General photo RS CA18, facing south-west.



Plate 84: General photo of RS CA18, facing south-east.

1.46 RS CA19

RS CA19 consists of a sandstone overhang located in the mid slope of steeply inclined hills. The overhang has formed through chemical weathering and exfoliation. The overhang has diagonal cracking, seepage and has been affected by fire. The overhang has a sloped stone floor with steep slope below dripline



Plate 85: General photo RS CA19, facing south-west.



Plate 86: General photo RS CA19, facing north-west.

1.47 RS CA20

RS CA20 is a large sandstone overhang that has formed through chemical weathering and exfoliation. No Aboriginal objects or Potential Archaeological Deposit.



Plate 87: General photo RS CA20, facing south-west.



Plate 88: General photo of view from RS CA20, facing north-east.

1.48 RS CA21

RS CA21 is a large overhang that contains a stone floor with a build-up of exfoliated sandstone at the dripline. A large non active wasp nest on was located on the ceiling of the overhang. No Aboriginal objects or Potential Archaeological Deposit.



Plate 89: General photo RS CA21, facing north-west.



Plate 90: Detail photo of interior of RS CA21.

1.49 RS CA22

RS CA22 is a large overhang that contains a stone with small build-up of exfoliated sandstone conglomerate beneath the dripline. The overhang is actively weathering in a mid-slope position with a bird's nest present. Bushfire has affected the dripline and exterior of shelter. Macrovegetals visible similar erosion along patterns on block fall. No Aboriginal objects or Potential Archaeological Deposit.



Plate 91: General photo RS CA22 within the landscape, facing north-west.



Plate 92: General photo of RS CA22, facing south-west.

Contact Us

Niche Environment and Heritage
02 9630 5658
info@niche-eh.com

NSW Head Office – Sydney
PO Box 2443 North Parramatta
NSW 1750 Australia

QLD Head Office – Brisbane
PO Box 540 Sandgate
QLD 4017 Australia

Sydney
Brisbane
Cairns
Port Macquarie
Illawarra
Coffs Harbour
Central Coast
Gold Coast
Canberra



Our services

Ecology and biodiversity

Terrestrial
Freshwater
Marine and coastal
Research and monitoring
Wildlife Schools and training

Heritage management

Aboriginal heritage
Historical heritage
Conservation management
Community consultation
Archaeological, built and landscape values

Environmental management and approvals

Impact assessments
Development and activity approvals
Rehabilitation
Stakeholder consultation and facilitation
Project management

Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)
Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)

Appendix B: Aboriginal community consultation documents

Not included in this version of the report

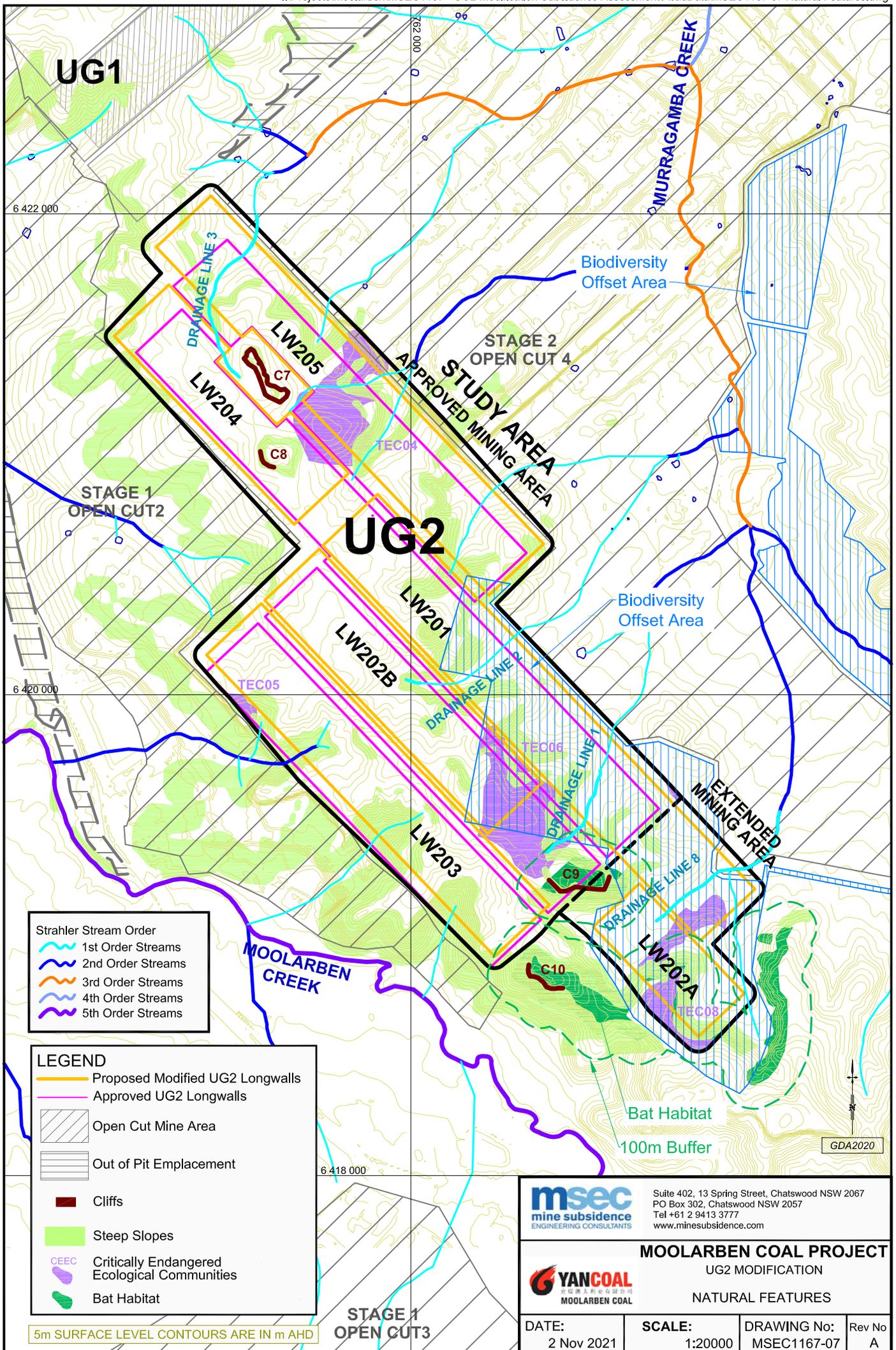
Appendix C: MSEC Tables and Figures

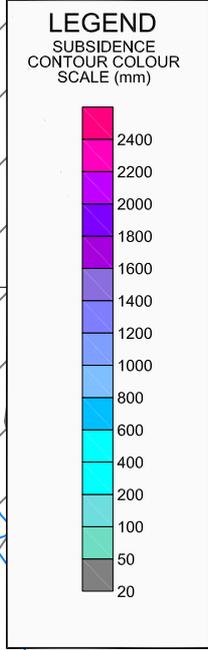
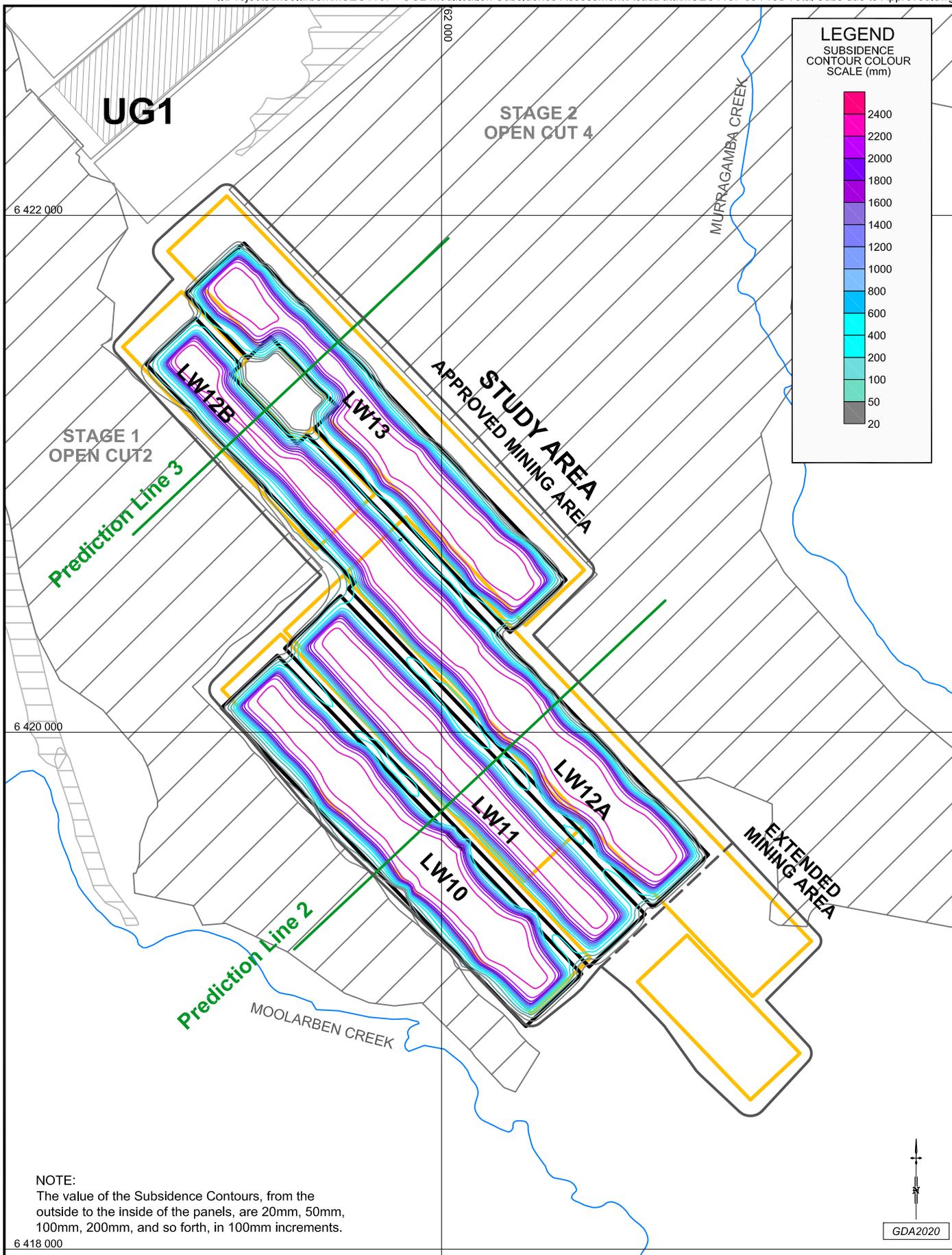
APPENDIX D. TABLES

**Table D.01 - Maximum Predicted Subsidence Parameters for the
Aboriginal Heritage Sites**

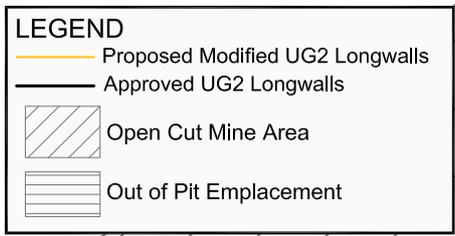
Site	Description	Maximum Predicted Subsidence based on the Approved Layout (LW10-13) (mm)	Maximum Predicted Subsidence based on the Modified Layout after LW201 (mm)	Maximum Predicted Subsidence based on the Modified Layout after LW202a (mm)	Maximum Predicted Subsidence based on the Modified Layout after LW202b (mm)	Maximum Predicted Subsidence based on the Modified Layout after LW203 (mm)	Maximum Predicted Subsidence based on the Modified Layout after LW204 (mm)	Maximum Predicted Subsidence based on the Modified Layout after LW205 (mm)	Maximum Predicted Tilt based on the Approved Layout (LW1-8) (mm/m)	Maximum Predicted Tilt based on the Modified Layout (mm/m)	Maximum Predicted Hogging Curvature based on the Approved Layout (LW1-8) (1/km)	Maximum Predicted Hogging Curvature based on the Modified Layout (1/km)	Maximum Predicted Sagging Curvature based on the Approved Layout (LW1-8) (1/km)	Maximum Predicted Sagging Curvature based on the Modified Layout (1/km)
PAD 10 Moolarben Coal	Rock Shelter with PAD	800	< 20	< 20	< 20	< 20	1850	1950	35.0	55.0	1.60	> 3	< 0.01	1.90
PAD 11 Moolarben Coal	Rock Shelter with PAD	1950	< 20	< 20	< 20	< 20	2350	2500	30.0	20.0	> 3	> 3	1.30	0.90
PAD 4 Moolarben Coal	PAD	1900	< 20	< 20	< 20	2350	2350	2350	< 0.5	19.0	> 3	> 3	0.03	0.95
PAD 5 Moolarben Coal	Rock Shelter with PAD	1900	< 20	< 20	< 20	2350	2350	2350	< 0.5	19.0	> 3	> 3	0.03	0.95
PAD 8 Moolarben Coal	Rock Shelter with Artefacts and PAD	1900	< 20	< 20	< 20	< 20	2350	2450	40.0	17.0	> 3	> 3	1.40	0.75
PAD 9 Moolarben Coal	Rock Shelter with PAD	1100	< 20	< 20	< 20	< 20	2000	2150	40.0	55.0	2.20	> 3	0.70	1.90
S1MC054	Artefacts	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 0.5	1.0	< 0.01	0.02	< 0.01	< 0.01
S1MC055	Rock Shelter with Artefacts	< 20	< 20	< 20	< 20	< 20	< 20	20	< 0.5	2.0	< 0.01	0.03	< 0.01	< 0.01
S1MC056	Rock Shelter with Artefacts	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 0.5	1.0	< 0.01	0.01	< 0.01	< 0.01
S1MC057	Artefacts	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01
S1MC074	Isolated Artefact	1900	< 20	< 20	< 20	2350	2350	2350	0.5	20.0	> 3	> 3	0.04	1.10
S1MC075	Isolated Artefact	1900	< 20	< 20	< 20	2300	2300	2300	1.0	35.0	> 3	> 3	0.07	2.70
S1MC076	Isolated Artefact	1900	< 20	< 20	< 20	2300	2300	2300	1.0	35.0	> 3	> 3	0.07	2.70
S1MC077	Isolated Artefact	1000	< 20	< 20	< 20	< 20	< 20	< 20	60.0	1.5	2.00	0.01	2.20	0.03
S1MC406	Artefacts	350	< 20	< 20	< 20	1900	1900	1900	14.0	60.0	0.70	> 3	< 0.01	2.50
S1MC407	Artefacts	1950	< 20	< 20	< 20	2400	2400	2400	8.5	1.0	> 3	> 3	0.35	0.07
S1MC409	Rock shelter with PAD	1950	< 20	< 20	< 20	2350	2350	2350	1.0	12.0	> 3	> 3	0.05	0.55
S1MC438	Isolated Artefact	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01
S2MC236	Rock Shelters with Art and Artefacts	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01
S2MC237	Isolated Artefact	1550	< 20	< 20	< 20	< 20	1950	1950	35.0	50.0	> 3	> 3	1.00	1.50
S2MC238	Artefacts	1650	< 20	< 20	< 20	< 20	< 20	175	50.0	3.0	> 3	0.30	2.50	< 0.01
S2MC239	Artefacts	1850	< 20	< 20	< 20	< 20	< 20	2400	35.0	1.5	> 3	> 3	2.60	0.10
S2MC411	Artefacts	1150	< 20	< 20	< 20	< 20	< 20	1400	40.0	55.0	2.30	2.30	0.95	2.00
S2MC412	Isolated Artefact	1600	< 20	< 20	< 20	< 20	< 20	1550	7.0	50.0	> 3	2.60	0.08	2.00
S2MC413	Isolated Artefact	1150	< 20	< 20	< 20	< 20	< 20	150	45.0	2.0	2.30	0.25	1.60	< 0.01
S2MC414	Isolated Artefact	1600	< 20	< 20	< 20	< 20	2250	2350	40.0	55.0	> 3	> 3	1.40	2.10
S2MC415	Isolated Artefact	1550	< 20	< 20	< 20	< 20	1450	1500	55.0	85.0	> 3	2.50	> 3	> 3
S2MC416	Artefacts	1750	750	750	800	800	800	800	45.0	65.0	> 3	1.30	1.60	0.06
S2MC417	Artefacts	825	30	30	40	40	40	40	45.0	2.5	1.60	0.06	< 0.01	< 0.01
S2MC418	Isolated Artefact	625	< 20	< 20	< 20	< 20	1650	1800	30.0	55.0	1.20	2.90	< 0.01	2.00
S2MC419	Artefacts	225	< 20	< 20	< 20	< 20	450	575	7.0	25.0	0.45	0.95	< 0.01	< 0.01
S2MC420	Artefacts	1900	< 20	< 20	< 20	< 20	< 20	< 20	8.0	< 0.5	> 3	< 0.01	0.35	< 0.01
S2MC438	Isolated Artefact	1750	< 20	< 20	< 20	< 20	< 20	< 20	40.0	< 0.5	> 3	< 0.01	1.20	0.02
S2MC439	Rock Shelter with PAD	200	< 20	< 20	< 20	< 20	< 20	< 20	5.5	0.5	0.40	< 0.01	< 0.01	0.06
S2MC440	Rock Shelter with Artefacts and PAD	1750	< 20	< 20	< 20	< 20	< 20	< 20	40.0	< 0.5	> 3	< 0.01	> 3	< 0.01
S2MC441	Rock Shelter with Artefacts and PAD	30	< 20	< 20	< 20	< 20	< 20	< 20	1.5	< 0.5	0.06	< 0.01	< 0.01	< 0.01
S2MC442	Rock Shelter with PAD	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01
S2MC443	Rock Shelter with PAD	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01
S2MC444	Rock Shelter with PAD	800	< 20	< 20	< 20	< 20	< 20	< 20	40.0	< 0.5	1.60	< 0.01	1.50	< 0.01
S2MC445	Rock Shelter with PAD	1100	< 20	< 20	< 20	< 20	< 20	< 20	45.0	< 0.5	2.20	< 0.01	2.20	< 0.01
S2MC446	Rock Shelter with Artefacts and PAD	< 20	< 20	725	750	750	750	750	< 0.5	60.0	< 0.01	1.20	< 0.01	< 0.01
S2MC447	Rock shelter with artefacts	< 20	< 20	1550	1600	1600	1600	1600	< 0.5	55.0	< 0.01	2.60	< 0.01	2.30

APPENDIX E. DRAWINGS



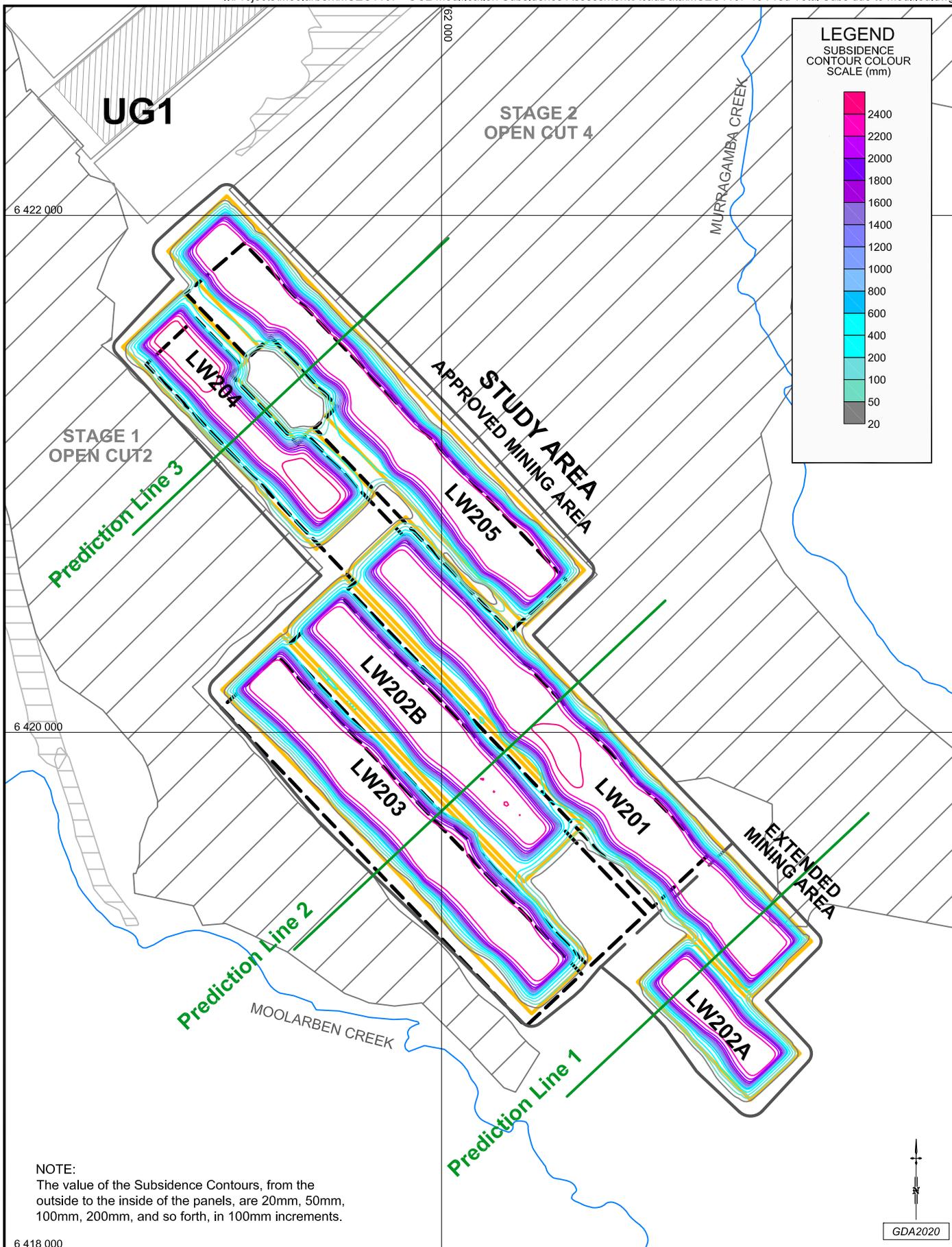


NOTE:
The value of the Subsidence Contours, from the outside to the inside of the panels, are 20mm, 50mm, 100mm, 200mm, and so forth, in 100mm increments.



		Suite 402, 13 Spring Street, Chatswood NSW 2067 PO Box 302, Chatswood NSW 2057 Tel +61 2 9413 3777 www.minesubsidence.com	
MOOLARBEN COAL PROJECT UG2 MODIFICATION PREDICTED TOTAL SUBSIDIENCE CONTOURS AFTER APPROVED LAYOUT			
	DATE: 2 Nov 2021	SCALE: 1:20000	DRAWING No: MSEC1167-09
		Rev No: A	

STAGE 1
OPEN CUT 3



NOTE:
The value of the Subsidence Contours, from the outside to the inside of the panels, are 20mm, 50mm, 100mm, 200mm, and so forth, in 100mm increments.

LEGEND

- Proposed Modified UG2 Longwalls
- Approved UG2 Longwalls
- Open Cut Mine Area
- Out of Pit Emplacement

		Suite 402, 13 Spring Street, Chatswood NSW 2067 PO Box 302, Chatswood NSW 2057 Tel +61 2 9413 3777 www.minesubsidence.com	
MOOLARBEN COAL PROJECT UG2 MODIFICATION PREDICTED TOTAL SUBSIDENCE CONTOURS DUE TO MODIFIED LAYOUT			
DATE: 2 Nov 2021	SCALE: 1:20000	DRAWING No: MSEC1167-10	Rev No A

STAGE 1
OPEN CUT 3

Contact Us

Niche Environment and Heritage
02 9630 5658
info@niche-eh.com

NSW Head Office – Sydney
PO Box 2443 North Parramatta
NSW 1750 Australia

QLD Head Office – Brisbane
PO Box 540 Sandgate
QLD 4017 Australia

Sydney
Brisbane
Cairns
Port Macquarie
Illawarra
Coffs Harbour
Central Coast
Gold Coast
Canberra



Our services

Ecology and biodiversity

Terrestrial
Freshwater
Marine and coastal
Research and monitoring
Wildlife Schools and training

Heritage management

Aboriginal heritage
Historical heritage
Conservation management
Community consultation
Archaeological, built and landscape values

Environmental management and approvals

Impact assessments
Development and activity approvals
Rehabilitation
Stakeholder consultation and facilitation
Project management

Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)
Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)