

MOOLARBEN COAL PROJECT

S t a g e 2

A P P E N D I X 9

Aboriginal Cultural Heritage Assessment

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES

MOOLARBEN COAL PROJECT: STAGE 2

MOOLARBEN COAL PROJECT
ABORIGINAL CULTURAL HERITAGE
ASSESSMENT REPORT
STAGE 2

**A report to
Moolarben Coal Mines Pty Limited**

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December 2008**



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1. Executive Summary

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, located in the western coal fields of NSW, 40km north-east of Mudgee and 25km east of Gulgong. Hamm (2006) has already reported on Stage 1 of the MCP. This report is concerned with the Stage 2 development of the MCP. The Stage 2 study area is approximately 37km² in size, being located to the immediate east of the approved Stage 1 MCP site.

Stage 2 MCP investigation area consists of two proposed Underground Mines (UG 1 and UG 2) and a large Open Cut Mine (Open Cut No. 4). The total area of potential mine impact is approximately 2260ha or 22.6km².

The most dominant environmental feature of the Stage 2 investigation area is the Murrumbidgee Creek and the surrounding sandstone ridgelines which run in a north-south direction creating a series of elongated valleys. Approximately 7.65km² (20.6%) of the study area was assessed on foot by a team of qualified archaeologists and local Aboriginal community members over a 40 day period during 2006, 2007 and 2008. A total of 49 survey foot transects were completed.

This assessment located a total of 4825 stone artefacts. This cultural record is made up of: 150 open stone artefact scatter sites of varying densities, 102 individual stone artefact isolated finds, five rock-shelter sites, a grinding groove site and 33 Potential Archaeological Deposits (PADS). A total of 258 Aboriginal sites have been identified in the investigation area. There are 18 existing Department of Environment and Climate Change (DECC) sites which have been re-recorded in light of this assessment and assigned their own S2MC site number. One of these sites have been given two separate DECC site numbers (i.e.36-3-016 & 36-3-0134)

A majority of this record (90%) is made up of exposed stone artefactual material eroding from areas of bare soil exposure with less than 50 artefacts in density. However, 33 of these open sites also contain PADs which are principally concentrated within the Murrumbidgee Creek catchment. There are 10 sites that contain over 100 artefacts within their surface assemblage. Twelve (12) sites were recorded as being of High Scientific Significance with one registered DECC site (37-3-0134) containing painted rock art that is assessed to be of regional significance. Thirty seven(37) sites were assessed to be of Medium Scientific Significance and 209 were assessed to be of Low Scientific Significance. The Murrumbidgee Creek Valley and adjacent Moolarben Ridge (Carr's Gap Ridge) are considered to be significant cultural landscape features.

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

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area. Parts of the Munghorn Gap Nature Reserve located to the south-east of Stage 2 MCP development area are considered to be significant from a contemporary Aboriginal cultural perspective.

No one was identified within the existing four Aboriginal groups as having cultural knowledge about the proposed Stage 2 MCP development area. Whilst local Aboriginal people generally expressed an interest in archaeological sites and their protection, there were no objections to the proposed coal mine project going ahead on cultural assessment grounds.

The proposed Stage 2 coal mining area and associated infrastructure areas are likely to impact on a total of 173 (67%) Aboriginal sites; a majority of these sites are located in the Open Cut 4 mine area within the Murrumbidgee Creek Valley. Seven sites of High Scientific Significance and 14 sites of Medium Scientific Significance will be totally impacted. Nine (9) sites are likely to be affected by Underground 1 and 2 mine development; however the level of subsidence impact is predicted to be low. It must be understood that the estimate of impact on Aboriginal sites and objects in MCP Stage 2 is made on a worst case scenario using mine plan overlays and GIS tools.

A cumulative review of regional impacts on Aboriginal heritage resources in the Ulan/Moolarben area shows that small low density artefact sites are under increasing threat due to the level of destruction of alluvial plain landforms across both mining and agricultural land. Not enough is known scientifically about the significance of Aboriginal heritage resources in Goulburn River National Park. A regionally funded research project would assist in providing valuable comparative scientific data urgently needed to understand regional significance of this valuable heritage resource which is permanently preserved.

Site 37-3-0134, which is located above the UG No. 2 mine development will be protected from any subsidence impacts by surrounding it within a buffer zone and conservation area. The level of impact on Murrumbidgee Creek and the subsequent loss of Aboriginal sites are of concern and mitigation will be required to offset this significant impact on this cultural resource. However, a total of 85 sites (33%) will be permanently conserved as a result of the Stage 2 MCP development. A majority of these sites are located to the north-east of the Stage 2 MCP area within a property called Red Hills / Splitters Hollow (Property Number 14). An important open site and set of grinding grooves will be conserved within the Powers' property (Property Number 44) located to the south-east of Open Cut 4.

It is the intention of Moolarben Coal Mines (MCM) Pty Ltd to apply for Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (as amended). To assist MCM in managing the identified Aboriginal heritage resources within the Stage 2 MCP area, MCM has given a commitment to implement an Aboriginal Cultural Heritage Management Plan in partnership with

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the four participating Aboriginal community groups. This plan will be developed using a Aboriginal Heritage planning workshop approach.

2. Introduction and Background

2.1 Study Area and Project Description

Stage 2 of the MCP is situated within the Moolarben EL6288 area which is located in the western coal fields of NSW, 40km north-east of Mudgee and 25km east of Gulgong. Immediately to the west is the approved Stage 1 and the Ulan Coal Mine and to the east the Wilpinjong Coal Mine. The Goulburn River runs through the north of the area, bisecting two underground blocks and forms a natural extraction limit. Adjoining national parks include the Goulburn River National Park to the north and the Munghorn Gap Nature Reserve to the south (see Figure 1: Appendix 2).

EL6288 covers an area of 11,000ha (110km²) comprising rural land, private and public lands and some public infrastructure. It is characterised by substantial topographical relief, with land elevation ranging from about 400m relief (RL) in valleys to 600m RL on adjacent ranges. A substantial portion is heavily vegetated, with some cleared land for pastoral use on the valley floors.

The Stage 2 MCP area consists of a large Open Cut 4 area (OC4), Underground No. 1 (UG1) area, Underground No. 2 (UG2) area and upgrade of the already approved Stage 1 Surface Facility site (see Figure 2, Appendix 2). Stage 2 will operate in conjunction with Stage 1 to make up the entire Moolarben Coal Project (MCP) complex. This mine operation area will contain three underground and four open cut coal mines with surface facilities comprising coal handling and preparation, run of mine (ROM) and clean coal stockpiling and rail loading at the (currently approved and to be upgraded by the Stage 2 Approval) Surface Facility site.

The project will also require the partial relocation of the Ulan-Wollar Road.

The Stage 2 application seeks approval to increase production from the whole of the MCP to 13 Mt/pa of product coal from a total of 17 Million tonnes per annum (Mtpa) ROM. OC4 will have a total production output of up to 12 Mtpa ROM, UG1 of up to 4 Mtpa and UG2 of up to 4 Mtpa ROM subject to production scheduling required to comply with the environmental criteria.

The Stage 2 application is for:

- Two underground mines below the sandstone ridges to produce up to 4 Mtpa ROM from UG1 and 4 Mtpa ROM from UG2.
- An open cut mine (OC4) within the floor of the Murragamba Valley producing up to 12 Mtpa ROM.
- Re-alignment and upgrade of Ulan-Wollar Road to provide a safer transport corridor.

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- Amended operation of the Stage 1 approved Surface Facilities with a capacity to handle 17 Mtpa ROM coal producing 13 Mtpa of product coal.

The underground mines will be located below sandstone ridges, whilst the open cut mine is in the floor of the Murrumbidgee Valley and adjoining valley to the east. The Ulan Seam, which ranges from around 11m to about 13m in thickness, will be mined with the full seam recovered in the open cut mines by the use of truck and excavator method and a partial section in the underground mines by the use of longwall extraction methods. Both domestic and export thermal coal will be produced.

Infrastructure will be located on either side of the Ulan Sandy Hollow railway line comprising coal stockpiling, washing plant and rail loading facilities. A balloon loop will enable coal to be railed to enter either Lithgow or Newcastle.

2.2 Legislative Requirements – NSW Department of Environment and Climate Change’s Role in Protecting Aboriginal Objects and Sites, Part 3A *Environmental Planning and Assessment Act 1979*

Stage 2 MCP is assessed under the same legislative requirements that regulated Stage 1 of the Moolarben Coal Project approval. Specific Aboriginal cultural heritage assessment and consultation requirements have been provided by the New South Wales Department of Environment and Climate Change (DECC) and the New South Wales Department of Planning through draft or working guidelines (see Appendix 6).

In addition to this, it is necessary for the proposed Stage 2 MCP to identify matters which are relevant in assessing whether a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* (EP & A Act) applies is likely to have an impact on Aboriginal cultural heritage. In order to comply with the above requirement, a proponent should consider the following when making an assessment:

- Justification for any likely impact(s), including any alternatives considered for the proposal.
- Any measures which will be implemented to avoid, mitigate or offset the likely impact(s).
- Demonstration that the input by affected Aboriginal communities has been considered when determining and assessing impacts, developing options, and making final recommendations to ensure that Aboriginal cultural heritage outcomes can be met by the proposed development.

The *National Parks and Wildlife Act 1974* (NPW Act) is the primary legislation regulating the protection of Aboriginal heritage through the administration of Part 6 of the NPW Act. DECC administers the NPW Act.

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Part 6 of the Act provides blanket protection for Aboriginal objects and Aboriginal places in New South Wales.

- An **Aboriginal object** is any deposit, object or material evidence (not being a handicraft made for sale) relating to Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains (as defined within the meaning of the NPW Act).
- An **Aboriginal place** is a place which has been declared so by the Minister administering the NPW Act because he or she believes that the place is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects.¹

DECC responsibilities under part 6 of the NPW Act are triggered where an activity is likely to impact on Aboriginal objects (also referred to as sites) and declared Aboriginal places. Such an activity requires the approval of the Director General of DECC under section 87 or section 90 of the NPW Act.² Section 91 of the Act requires that DECC be notified by any person who is aware of the location of an Aboriginal object within a reasonable time after discovery of that object.

The decision whether or not to issue a consent under section 90 and/or a permit under section 87 of the NPW Act is the responsibility of the Director General of DECC. It is the responsibility of the proponent to supply sufficient information to enable the Director General to make a decision.

Where approval is granted under Part 3A of the EP & A Act, 1979 consent under S90 and permits under s. 87 are no longer required.

Why DECC requires consultation

DECC recognises that:

- Aboriginal heritage has both cultural and scientific/archaeological significance and that both should be the subject of assessment to inform its decision-making.

¹ Aboriginal places are those that have been gazetted in accordance with section 84 of the NPW Act. It should be noted that the NPW Act does not provide protection for spiritual areas or natural resource areas that have no physical evidence of Aboriginal occupation or use, unless they have been declared an Aboriginal place.

² A DECC section 87 permit is required to disturb, move and or take possession of an Aboriginal object or disturb land for the purpose of discovering an Aboriginal object. A DECC section 90 consent is required to destroy, damage or deface an Aboriginal object or Aboriginal place. In the Act, these are collectively referred to as 'approvals'.

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- Aboriginal people are the primary determinants of the significance of their heritage.
- Aboriginal community involvement needs to occur early in the assessment process to ensure that their values and concerns are taken fully into account, and so that their own decision-making structures are able to function.
- Information arising out of consultation allows the consideration of Aboriginal community views about significance and impact, as well as the merits of management or mitigation measures to be considered in an informed way.

Hence, when administering its approval functions under the NPW Act, DECC requires applicants to consult with the Aboriginal community about the Aboriginal cultural heritage values (cultural significance) of Aboriginal objects and places within the area being considered for development.

However, community consultation is not a sign-off or approval process. The NPW Act establishes the Director General of DECC as the decision-maker. DECC recognises that its decisions will not always be consistent with the views of the Aboriginal community and that there may not always be agreement within the Aboriginal community. However, DECC will take into account all relevant information it receives as part of its decision-making process.

The community consultation process ensures Aboriginal communities have the opportunity to improve assessment outcomes by:

- Influencing the design of the assessment of cultural and scientific significance.
- Providing relevant information regarding the cultural significance values of the objects/places.
- Contributing to the development of cultural heritage management recommendations.
- Providing comment on draft assessment reports prior to their submission.

DECC acknowledges that it is Aboriginal people who should determine the cultural significance of Aboriginal heritage, and DECC has a strong commitment to working in partnership with Aboriginal people to manage and conserve Aboriginal Cultural Heritage.

DECC also recognises that Aboriginal Cultural Heritage includes both traditional and contemporary associations of Aboriginal people with the environment as well as physical sites. DECC has provided this study with an outline of Aboriginal consultation procedures required for Cultural Heritage work conducted in the Mudgee/Ulan region.

2.3 Definition of a 'Site'

The DECC advises developers and consultants that the term 'site' is used to group Aboriginal Objects or define a location where an Aboriginal Object or cultural item occurs. They propose general criteria to assist in the classification of a site. 'Sites' can be defined as follows:

- Exposures where archaeological evidence is revealed.
- A topographic or land form unit where occupation evidence has been recorded. This may be an entire landform unit (ridge, creek, valley) or part of a landform unit (saddle on ridge, creek bank).
- Sites which have physical boundaries defined by rocks (stone arrangement), earthworks (mounds) or cleared land (ceremonial ground).
- Sites defined by Aboriginal community groups as culturally significant.
- 'Arbitrary' or where the boundary is assigned for the convenience of recording (in cases where the site would probably be much larger if based on the criteria above). Arbitrary criteria include the use of a fence-line, dirt track or gully as a boundary. In some cases the area may simply be designated as 50m x 50m, or as a smaller sample plot, on the basis of convenience.
- Determined by artefact density. (In some cases a site boundary may be defined by the average number of flakes per square metre.) This is a specialised type of arbitrary criterion and justification of the rules used must be made explicit.
- As specified for a given study, through the chosen definition of a site or an isolated find. It is the consultant's responsibility to decide on an appropriate definition suited to the particular project, the research goals and comparability with other regional studies. DECC requires site forms to be completed for isolated finds.

2.4 Study Team

The study team for the Stage 2 MCP consisted of the principal archaeological consultant Giles Hamm with specialist consultant advice provided by Dr Peter Mitchell of GroundTruth Consulting and senior archaeological consultant Mr Wilfred Shawcross. Field staff support was provided by Ms Jodie Mitchell and Aboriginal members of the Mudgee LALC, the North-East Wiradjuri Native Title Claimants, Murong Gialinga Aboriginal Corporation and Warrabingina Native Title Claimants Aboriginal Corporation.

3 Partnership with Aboriginal Communities

3.1 Aboriginal Consultation: DECC Interim Guidelines

In January 2005, the DECC introduce new *Aboriginal Community Consultation Guidelines* in response to changes to legal definitions of what constituted adequate Aboriginal community consultation. In these guidelines DECC explains that:

- Aboriginal heritage has both cultural and scientific/archaeological significance and both should be the subject of assessment to inform its decision-making.
- Aboriginal people are the primary determinants of the significance of their heritage.
- Aboriginal community involvement needs to occur early in the assessment process to ensure that their values and concerns are taken fully into account, and so that their own decision-making structures are able to function.
- Information arising out of consultation allows the consideration of Aboriginal community views about significance and impact, as well as the merits of management or mitigation measures to be considered in an informed way.

Hence, when administering its approval functions under the NPW Act, DECC requires applicants to consult with the Aboriginal community about the Aboriginal cultural heritage values (cultural significance) of Aboriginal objects and places within the area being considered for development.

However, community consultation is not a sign-off or approval process. The NPW Act establishes the Director General of DECC as the decision-maker. DECC recognises that its decisions will not always be consistent with the views of the Aboriginal community and that there may not always be agreement within the Aboriginal community. However, DECC will take into account all relevant information it receives as part of its decision-making process.

The community consultation process ensures Aboriginal communities have the opportunity to improve assessment outcomes by:

- Influencing the design of the assessment of cultural and scientific significance.
- Providing relevant information regarding the cultural significance values of the objects/places.
- Contributing to the development of cultural heritage management recommendations.
- Providing comment on draft assessment reports prior to their submission.

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(DECC Interim Guidelines 2005)

To comply with the above process, DECC now requires developers to:

“... actively seek to identify stakeholder groups or people wishing to be consulted about the project and invite them to register their interest.

To this end, it will be sufficient for the proponent to provide written notification to:

(a) the bodies listed below:

- Local Aboriginal Land Council(s);*
- Registrar of Aboriginal Owners;*
- Native Title Services;*
- local council(s); and*
- Department of Environment and Climate Change (NSW); and*

(b) via an advertisement in the local print media.

The notification must set out details of the proposal and invite registrations from interested groups or individuals. A closing date for registration of interest must also be included. The time allowed should reflect consideration of the project's size and complexity, but must in all cases allow at least 10 working days to respond.

The proponent must record all registrations received in writing before the closing date. DECC requires the proponent to include all parties that have registered their interest in Step 2 below. Respondents that do not register by the due date may still participate in the consultation process in Step 3.” (DECC Interim Community Consultation Requirements for Applicants Guidelines 2005)

Following on from the Approved Stage 1 consultation process, and to comply with the consultation guidelines, MCM placed public notices in the *Mudgee Weekly* on 9 August 2006 and in the *Mudgee Guardian* on 11 August 2006 seeking expressions of interest from Aboriginal community groups who may have an interest in a proposed development project within the Stage 2 mine lease area. The Aboriginal groups and people that responded were:

- North-East Wiradjuri Native Title Claimants based in Ulan.
- Aleisha Lonsdale based in Mudgee.
- Warranha Ngumbaay also based in Mudgee.

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An initial consultation meeting concerning Stage 2 assessment was held with all Aboriginal groups who responded to the invitation to the meeting on 12 September 2006 in Mudgee with representatives of the above organisations and Moolarben Coal Pty Ltd (see Appendix 4). The purpose of this meeting was to introduce Stage 2 of the project and receive Aboriginal community input about how the Aboriginal cultural assessment was to be conducted (i.e. survey design etc.)

Another meeting to explain and discuss the study area, impact issues, survey methodology and site assessment for both Stage 1 and Stage 2 of the MCP was also held on 17 September 2006. This meeting was undertaken with Aboriginal women participants living around the Mudgee area who were members of the local Catchment Management Authority group in the Mudgee district (see Appendix 4). This meeting sort to explain the impact issues and seek feedback on any cultural or environmental issues. The meeting was arranged and conducted by Giles Hamm of ARAS Pty Ltd.

Through Giles Hamm, MCM also undertook a cultural assessment of areas important to Warranha Ngumbaay and Aleisha Lonsdale within the Stage 2 study area. This assessment entailed an onsite inspection of the Stage 2 MCP study area and the identification of sites of cultural significance that may be affected by the proposed Stage 2 mine development. This assessment and consultation work was carried out in November 2006 (See Section 11.5.)

Subsequent to these general consultation meetings, applications were sought for nominations for undertaking cultural heritage assessment work from the registered Aboriginal stakeholder groups for Stage 2 MCP Aboriginal cultural heritage assessment. Following the DECC guidelines process, the following groups were engaged for the field work: North-East Wiradjuri Native Claimants, Mudgee Local Aboriginal Land Council, Murong Gialinga Aboriginal and Torres Strait Islander Corporation and Warrabinga Native Title Claimants Aboriginal Corporation. It was agreed that a total of 8 Aboriginal field workers could be accommodated in the survey assessment.

The Aboriginal cultural heritage assessment of the Stage 2 MCP area was carried out over a 40 day period during October–November 2006, January–February 2007 and June–July 2008 by ARAS Pty Ltd and members of the above community (see Appendix 7). Following the completion of the assessment, each Aboriginal stakeholder community group has stated that it will provide a written comment concerning the proposal and the final reports' recommendations once they are finalised.

3.2 Aboriginal Community Groups' Consultation and Native Title Issues

DECC advised that four local Aboriginal organisations were identified as being the likely bodies that might assist with the project's consultation and these were:

- North-East Wiradjuri Claimants based in Ulan.

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- Mudgee Local Aboriginal Land Council based in Mudgee.
- Murong Gialinga Aboriginal and Torres Strait Islander Corporation based in Mudgee.
- Warrabinga Native Title Claimants Aboriginal Corporation based in Kandos.

3.3 Pre-Survey Design and Consultation Meetings: Stage 2 MCP

A meeting to discuss the Stage 2 MCP and Aboriginal cultural heritage work was undertaken in Mudgee at the Horatio Motel on 12 and 17 September 2006. The aim of the meetings was to:

- Explain the project.
- Provide an opportunity for the local Aboriginal community to have an input into the assessment process.

3.4 Aboriginal Cultural Heritage Assessment Process

Following the above consultation meetings, it was agreed that the assessment process would consist of two major components, these being:

- Archaeological assessment.
- Aboriginal cultural assessment.

The first component consisted of conducting an archaeological field survey of the main mine footprint site and surrounding land where infrastructure was being planned. This survey was carried out with members of four local Mudgee Aboriginal groups, during October–November 2006, January–February 2007 and June–July 2008.

The second component involved undertaking a cultural assessment. This component was undertaken with Warranha Ngumbaay and Aleisha Lonsdale (who were the only members of the Aboriginal stakeholder groups who requested to participate) in November 2006. This assessment involved carrying out an onsite inspection of the Stage 2 MCP study area and recording any places or sites of cultural significance (see Section 11.5 and Appendix 4).

It was agreed that Giles Hamm would prepare a draft final report for comment to each Aboriginal stakeholder group. It was also agreed that any comments or cultural knowledge concerning Aboriginal sites or objects of significance within the Stage 2 MCP area should be forwarded to Giles Hamm within two weeks of receiving his report.

3.5 Stage 2 MCP Aboriginal Consultation: Management Recommendations and Final Report stakeholder and community briefings.

On 30 July 2008, Moolarben Coal Mines Pty Ltd invited members of the Stage 2 MCP Aboriginal Stakeholder groups to a community consultation briefing. This meeting was held at Ulan Village. Also present at the meeting were Ms Edwina White of Moolarben Coal Mines Pty Ltd, Mr Alan Wells of Wells Environmental Services and Giles Hamm of Archaeological Risk Assessment Services Pty Ltd. The purpose of the meeting was to explain the results of the Aboriginal cultural heritage assessment for MCP Stage 2 project and also discuss the likely impacts from Stage 2 of the MCP development.

The meeting was attended by the following registered Aboriginal Stakeholder Holder groups (see Appendix 4):

- North-East Wiradjuri Pty Ltd based in Ulan.
- Mudgee Local Aboriginal Land Council based in Mudgee.
- Murong Gialinga Aboriginal and Torres Strait Islander Corporation based in Mudgee.
- Warrabinga Native Title Claimants Aboriginal Corporation based in Kandos.

Following an in-house briefing, a field inspection of the proposed MCP Stage 2 project area was undertaken. This inspection looked at a number of newly recorded Aboriginal sites and cultural landscapes for the Stage 2 MCP area and discussed possible management recommendations.

In addition to the above initial consultation meeting, another Aboriginal community consultation meeting was held for the Stage 2 MCP on 5 November 2008. The purpose of this meeting was to brief a wider audience within the local Aboriginal community as well informing the relevant registered Aboriginal community stakeholder groups about the final MCP Stage 2 Aboriginal cultural heritage report findings and recommendations. Notifications were sent out to prospective community members to attend this community briefing. (See Appendix 4.)

Audiovisual presentations were made to the meeting by Giles Hamm, cultural heritage consultant of Archaeological Risk Assessment Services Pty Ltd, and Mr Ian Callow, Project Manager for Moolarben Coal Mines Pty Ltd. Copies of the final draft of the Aboriginal cultural heritage assessment report were distributed to audience members and plans of the proposed Stage 2 MCP area were displayed on the night. The meeting finished with a question and answer session and audience members were asked to provide written feedback on the findings and proposed recommendations for the Stage 2 MCP Aboriginal cultural heritage

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assessment report. MCM also undertook to provide registered Aboriginal stakeholder groups with additional site-specific management information via Giles Hamm of Archaeological Risk Assessment Services Pty Ltd.

Site Tour Moolarben Coal Project Stage 2: 5th of December 2008

Following consultation with David Maynard board member of the Mudgee Local Aboriginal Land Council (see correspondence of the Appendix 4) it was agreed that Moolarben Coal Mines would conduct a cultural heritage site tour for members of the Aboriginal community who had not been involved in the original Stage 2 field assessment. The tour was guided by Moolarben's cultural heritage consultant Giles Hamm of Archaeological Risk Assessment Services Pty Ltd and its environmental manager Ms Edwina White.

The purpose of the tour was to show members of the Aboriginal community existing and newly recorded Aboriginal sites within the MCP Stage 2 area and discuss their likely management status. This management discussion covered issues such as conservation programmes, likely impacts to Aboriginal sites and objects and archaeological research salvage options. Due to the size of the proposed MCP Stage 2 development, not all sites could be inspected on the day. However a majority of sites of high scientific significance were inspected.

A total of 16 people participated in the site tour (See Appendix 4). Copies of a map showing the distribution of Aboriginal sites and objects recorded, overlaid by the proposed Stage 2 MCP development were distributed to interested tour members. At the end of the tour, participants were encouraged to write to Moolarben with their proposed recommendations concerning the management of Aboriginal sites and objects and their Aboriginal heritage values.

4 Moolarben Coal Project Stage 2: Description of Impacts

Stage 2 of the MCP is located east of Stage 1 and comprises an open cut coal mine and two (2) underground coal mines with associated infrastructure. The major components of Stage 2 include:

- OC4.
- UG1 and UG2.
- Production of up to 13 Mtpa of product coal.
- Coal handling and processing facilities for Stage 2 that integrate within the approved Stage 1 coal facilities.
- Supporting infrastructure (such as roads, workshops, bath houses and offices).

Figure 2: Appendix 2 illustrates the general arrangement of Stage 2.

The underground mines are located below sandstone ridges, whilst the open cut mine is in the floor of the Murrumbidgee Valley and adjoining valley to the east. The Ulan Seam, which ranges from around 11m to about 13m in thickness, will be mined with the full seam recovered in the open cut mines and a partial section in the underground mines. Both domestic and export thermal coal will be produced.

4.1 Open Cut Mines

The proposed OC4 occupies an area of approximately 1270ha. Refer to Figure 2: Appendix 2.

The full Ulan Seam (up to 13m thick) will be mined in two passes and processed separately. The Upper section of the coal seam is approximately 7.6m thick and the Lower coal seam section is approximately 4.8m thick.

Total OC4 resources are estimated at about 230 Mt. The minable coal reserve will take into account environmental and physical limitations. The base of weathering ranges from 7–40m with pit depths up to approximately 90m.

Access to the seam will be via a box cut. The initial out-of-pit overburden from the box cut and developing open cut will be located adjacent to the sandstone ridgelines where the depth of cover exceeds economical strip ratios for open cut mining. In-pit dumping will be undertaken as soon as practical.

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Conventional truck and shovel mining systems will be used with a haul-back system to maximise in-pit backfill of waste.

Access to OC4 will be from a private haul road for both heavy and light vehicles. Light vehicles may utilise the Ulan-Wollar Road to access some areas of the open cut.

Mining in OC4 will commence at the southern end of the Murragamba Valley and progress to the north and east.

Full resource recovery from OC4 will require the relocation and reinstatement of two drainage systems, the Murragamba Creek and an unnamed tributary to the east of Murragamba Creek. The design and scheduling of OC4 will be considerate to the effective relocation and reinstatement of these drainage systems.

The mine will have a life span of approximately 23 years at full extraction rates.

4.2 Underground Mine

Stage 2 will include UG1 and UG2 that have a combined area of approximately 990ha. UG1 is located beneath the sandstone ridgelines that divide approved OC1 and OC4, while UG2 is located beneath the sandstone ridgeline that divides approved OC2 from OC4.

Underground coal extraction will generally be within the D section of the Ulan Seam. Longwall methods will be used with an extraction thickness of approximately 3m in panel widths of up to 300m.

UG1 and UG2 have a depth of cover ranging from 60–147m, with the seam dipping 1.5 to 3 degrees to the north east.

Access

Access to UG1 will be via the approved Stage 1 high wall access within OC1; this will occur at approximately Years 3 to 4 of mining.

Access into UG2 will be via the high wall of OC4, or from the UG1 entry.

Associated with the access to the underground will be coal stockpile and handling facilities that will convey coal to a hopper for transport via truck or conveyor to the central ROM system.

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Access to the Stage 1 approved UG4 will be relocated south to enter from the OC1 northern high wall. This access will include the necessary coal handling facilities.

4.3 Coal Handling and Preparation Facilities

The proposed coal handling facilities are shown in Figure 2.

The ROM coal from the open cut mines will be unloaded from the trucks at the dump station located on the north western edge of OC1.

The underground ROM coal will be conveyed to the surface and stockpiled. Coal will then be reclaimed and conveyed to the raw coal stockpile at the CPP. The raw coal will be crushed and reclaimed to feed the CPP.

After washing, the coal will be conveyed to the product stockpiles. A rail loading loop and train loading bin will be constructed. The product coal will be reclaimed from the product stockpiles and loaded on to trains for transportation by rail to the various markets.

4.4 Surface Facilities

Other surface facilities will include buildings for the bathhouse, workshop, store and offices at both the Open Cut 1 and Underground 4 mines, including fuel store and car parking areas.

Water management infrastructure including bore field, dams, and drainage systems will be constructed together with access roads and other surface earthworks.

4.5 Infrastructure and Services

The Ulan Sandy Hollow Railway Line runs through the project area and the rail loading loop will be constructed adjacent to the existing rail line.

Power will be supplied at 66 kV from the existing country Energy Ulan Switchyard. The 66 kV power line will be run adjacent to the road and rail corridor to the Coal Handling facilities where a 66/11 kV substation will be constructed.

A water supply system including storage dams and tanks will be installed. Water will be sourced for mining operations according to an approved MCM water management strategy.

5 Objectives of the Study

The objectives of the Aboriginal cultural heritage impact assessment were to:

- Assess items of Aboriginal heritage significance including landscapes, areas, places, Aboriginal sites/objects and practices.
- Assess items of historic, scientific, aesthetic, anthropological, cultural, spiritual and/or archaeological (Aboriginal) significance.
- Determine whether the development proposal is likely to cause any impact or damage to Aboriginal objects or potential sites found within the study area.
- Provide management advice as to likely land-use restrictions posed by the location and significance of Aboriginal heritage objects or potential Aboriginal heritage objects located within the study area.
- Provide recommendations for any further cultural heritage work to mitigate any likely impacts as a result of the development.

6 Cultural Heritage Background Research and Previous Archaeological Work

6.1 Known Aboriginal Cultural Heritage Issues and Background Research

The consultant reviewed the DECC Aboriginal Heritage Information Management System (AHIMS) to determine if any known Aboriginal sites were registered near or on the land proposed for development. The results of the register search (see Appendix 1) show that there are 19 registered Aboriginal sites located within the study area. However, one site has been recorded twice and given separate DECC numbers. A significant number of known Aboriginal sites are also located within a 5km radius of the study area (see Table 1 below and Figure 3: Appendix 2).

Table 1: Known Aboriginal sites located within or near the study area within a 3–5km radius

Ulan ID#	Site Name	DECC Site #	Site Type	Eastings	Northings	Landform
62	Identifier 62 or S4	36-3-040	artefact scatter	756000	6428000	Simple slope
65	Identifier 65 or S3	36-3-041	artefact scatter and grinding grooves	756510	6428030	Creek flat
66	Identifier 66		isolated find	756550	6428338	Simple slope
67	Identifier 67		isolated find	756552	6428448	Simple slope
68	Identifier 68 or F3		isolated find	756464	6428520	Simple slope
69	Identifier 69 or F1		isolated find	756545	6428599	Simple slope
70	Identifier 70 or S5	36-3-038	isolated find	756000	6428000	Simple slope
71	Identifier 71 or F4	36-3-038	artefact scatter	756660	6428867	Simple slope
72	Identifier 72		artefact scatter	756701	6428906	Simple slope
	Cook Gap	36-3-0015	axe grinding groove	760387	6415931	
	Ulan; Murragamba	36-3-0016	shelter with art	760796	6421957	
	Wollar	36-3-0020	shelter with art	777958	6415823	
	Cooks Gap	36-3-0027	axe grinding groove	7603873	6415931	
	Ulan	36-3-0039	scarred tree	760828	6427722	
	Ulan Creek; Site 2	36-3-0042	axe grinding groove, shelter with art, shelter with deposit	762944	6428010	
	Ulan; Wilpinjong Creek	36-3-0044	Bora/ceremonial, carved trees	771442	6420278	
	Ulan Creek; Site 18	36-3-0060	open campsite	760215	6426006	
	Ulan Creek; Site 19	36-3-0061	open campsite	760878	6426622	
	Ulan Creek; Site 21	36-3-0063	open campsite	761207	6428074	

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Ulan ID#	Site Name	DECC Site #	Site Type	Eastings	Northings	Landform
	Bobadeen	36-3-0068	shelter with art	761661	6427966	
	Wollar; Gulgong	36-3-0074	open campsite	781478	6414502	
	Wattle Creek No.2	36-3-0098	shelter with art	769880	6422760	
	Yawanna No.2	36-3-0101	shelter with art	774740	6421270	
	Wilpinjong	36-3-0103	scarred tree	767950	6422190	
	Yawanna No.1	36-3-0106	shelter with art	774780	6421260	
	Yawanna No.3	36-3-0115	axe grinding groove	774800	6420900	
	Yawanna No.4	36-3-0116	open campsite	775200	6420600	
	Deridgeree No.3	36-3-0124	axe grinding groove	777480	6427480	
	Wattle Creek No.1	36-3-0133	shelter with art	769500	6422630	
	*Murragamba No.1	36-3-0134	shelter with art	761300	6421170	
	Moolarben Creek MC1	36-3-0222	open campsite	760420	6420820	Alluvial flat
	MC2	36-3-0223	open campsite	760420	6420880	Alluvial flat
	MC4	36-3-0241	artefact	763161	6421650	Alluvial flat
	MC11	36-3-0237	artefact	763384	6421070	Alluvial flat
	MC10	36-3-0238	artefact	763226	6422860	Alluvial flat
	MC8	36-3-0239	artefact	763193	6422680	Alluvial flat
	MC6	36-3-0240	artefact	763113	6421940	Alluvial flat
	WC/1	36-3-0287	art (pigment or engraved)	765680	6425480	Alluvial flat
	*MC7	36-3-0337	open campsite	763136	6422480	Alluvial flat
	N/A	36-3-0690	N/A	N/A	N/A	N/A
	N/A	36-3-0691	N/A	N/A	N/A	N/A
	N/A	36-3-0692	N/A	N/A	N/A	N/A
	N/A	36-3-0693	N/A	N/A	N/A	N/A
	N/A	36-3-0694	N/A	N/A	N/A	N/A
	N/A	36-3-0695	N/A	N/A	N/A	N/A
	N/A	36-3-0696	N/A	N/A	N/A	N/A
	N/A	36-3-0697	N/A	N/A	N/A	N/A
	N/A	36-3-0698	N/A	N/A	N/A	N/A
	N/A	36-3-0699	N/A	N/A	N/A	N/A

6.1.1 Known Registered DECC Aboriginal Sites within MCP Stage 2 area

The 18 registered DECC Aboriginal sites located within MCP Stage 2 area are: 36-3-0016, 36-3-0134, 36-3-0237, 36-3-0238, 36-3-0239, 36-3-0240, 36-3-0241, 36-3-0287, 36-3-0337, 36-3-0690, 36-3-0691, 36-3-0692, 36-3-0693, 36-3-0694,

36-3-0695, 36-3-0696, 36-3-0697, 36-3-0698, 36-3-0699 (see Table 1 above). A majority of these sites are described below however some have no existing documentation available:

Site Descriptions

36-3-0016 (see Appendix 1): This rock-shelter site with art was originally 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. Known as 'Hands in the Rock Cave'; it contains hands, iguana 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.

36-3-0134 (see Appendix 1): This is the same site as was reported by McCarthy in 1944. Warren Bluff recorded it in November 1987 calling it 'Murragamba 1'. The site was described as a large shelter in cliff-line with good deposit at northern end measuring 23m in length x 2.5m in height and 7m in depth with pencil charcoal paint over art names scratched in rock lying on flour. The owner was identified as Mr MJ Carlisle.

The site became known to local Aboriginal people in the mid 1980s and in 1999 the DECC investigated the site 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 comments 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.

36-3-0237: This site was recorded in 2001 by David Maynard as part of a Telstra cable survey and is described as an open artefact scatter/campsite located at the edge of a spur near Murragamba Road, approximately 170m from Murragamba Creek. It contains a scatter of 14 artefacts all made up of quartz material except one piece of green volcanic material. The assemblage is described as flakes, broken flakes and one retouched item (backed artefact).

36-3-0238: This site was recorded in 2001 by David Maynard as part of a Telstra cable survey and is described as an open artefact scatter/campsite located the edge of a spur near Murragamba Road, approximately 70m from Murragamba

Creek. It contains a scatter of six artefacts all made up of quartz material. The assemblage is described as flakes, flaked pebble and broken flakes.

36-3-0239: This site was recorded in 2001 by David Maynard as part of a Telstra cable survey and is described as an open artefact scatter/campsite located the edge of a spur near Murragamba road, approximately 60m from Murragamba Creek. It contains a scatter of three artefacts made up of quartz material and tuff. The assemblage is described as core, flakes, and broken blade.

36-3-0240: This site was recorded in 2001 by David Maynard as part of a Telstra cable survey and is described as an isolated find located the edge of a spur near Murragamba road, approximately 15m from Murragamba Creek. It contains a single complete flake of white chert.

36-3-0241: This site was recorded in 2001 by David Maynard as part of a Telstra cable survey and is described as an open artefact scatter/campsite located on the edge of a spur near Murragamba Road, approximately 70m from Murragamba Creek. It contains a scatter of 19 artefacts principally made up of quartz and tuff material. The assemblage is described as flakes and broken flakes.

36-3-0287: There is no information currently available from DECC about this site or its site card.

36-3-0337: MC 7. This site was recorded in 2001 by David Maynard as part of a Telstra cable survey and is described as an open artefact scatter/campsite located the edge of a spur near Murragamba road, approximately 50m from Murragamba Creek. It contains a scatter of 32 artefacts principally made up of quartz and tuff material. The assemblage is described as flakes and broken flakes with a flake tool.

36-3-0690-36-3-0699: There is no information currently available from DECC about these sites or their site cards.

6.2 Ethno-historical Accounts and Aboriginal Cultural Geography

Ulan and surrounding areas lie within the Wiradjuri cultural/linguistic grouping. Tindale (1974) and Horton (1994) show the Wiradjuri language boundary extending to the north-east of Merriwa Plateau. The most comprehensive overview of ethno-historical work completed in the study region comes from Pearson (1984). From his PhD research on the Upper Macquarie River Valley and his ethno-historical analysis, Pearson provides several broad cultural hypotheses about the nature of the local Aboriginal occupation. The most significant hypothesis concerns population size and clan territories.

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Pearson argues that:

“The evidence given by these and other 19th century observers suggests that the Upper Macquarie was inhabited by large localised groups of Aborigines who in normal conditions of daily life were divided into groups of up to twenty individuals...The small groups coalesce relatively quickly into groups of 80-150 people to take advantage of a guaranteed or desirable resource (such as seasonal food resources or goods offered by the Wellington mission.” (Pearson 1984, p 60)

Pearson goes on to make the case that there was likely to be no significant seasonal factor that may have affected local Aboriginal migrations in the well watered Upper Macquarie. Early observers such as Barron Field (1822) and Colo (1826) estimated that a single family group (i.e. clan) in the Upper Macquarie and Hawkesbury regions may have used a territory with a circumference of 40–60km.

Pearson also speculates that there may have been three distinct clan territories centred on Bathurst, Wellington and Mudgee/Rylstone. Natural boundaries (i.e. creeks, rivers, valleys) may have separated these territories. Using the primary resources of mixed woodland and grasslands; which are found along the edges of the Bathurst Plains, the Bell River Valley, above Wellington and the Cudgegong River flats and around the upper Capertee Valley near Mudgee, a total population estimate is put at 500–600 Aboriginal people just before European settlement.

Some Aboriginal people living in the Bathurst/Lithgow/Mudgee district today are likely to have descended from one of these clans with at least two clans belonging to the Mudgee-Rylstone grouping: (i.e. Dabee and Budgee Budgee clan groupings). Aboriginal people living in the broader Dubbo, Wellington, Sydney, Bathurst, Lithgow and Mudgee region also claim ancestral links to historical Aboriginal figures such as: Thomas Governor, Aaron, Phillips Rayner, Windradyne, Dianna Mudgee, Sophia Allsopp, Peggy and Jimmy Lambert, John Bloodsworth, Thullagumauli and Penagraa (also known as Penaguin).

Authors such as Howitt (1904) have also written on Wiradjuri customs and traditions, the most significance of these being the *Burbung ceremony*. This ceremony is associated with male initiation and involves the preparation of special earth mounds and usually the application of red ochre. A messenger is sent out to neighbouring groups who are invited to attend a ceremony where young men are ready to be initiated. Ethnographic accounts of Wiradjuri people are also to be found in the historical writings of Dawson (1881), Mitchell (1864) and Lawson (1822).

Kabila (1998) has written on historically significant sites to Wiradjuri people in the Upper Macquarie Valley and in particular places such as: Wellington, Wellington Town Common, Bell River Flats and Apsley Mission. There are no historical accounts however of Aboriginal people living near Ulan or within the MCP study area.

6.3 Registered Sites of Cultural Significance

A search of the DECC AHIMS show there are no known places or sites of cultural significance located near the study area. According to Glen Morris Senior Aboriginal Sites Officer with DECC, records from the NSW National Parks and Wildlife Service Sacred Sites Survey show that there were no living Aboriginal people interviewed in the 1980s who knew of places or sites of sacred value located near the study area (Glen Morris pers comm. 2005).

Site types that have been typically recorded in the general region include (see Figure 3: Appendix 2):

- Open campsites made up of stone artefacts dominated by tuff, silcrete and quartz assemblages and sometimes containing hearth material in the form of burnt or cracked sandstone heat retainers. These sites vary in complexity and density depending on their physical condition in the modern landscape and their proximity to major resource zones.
- Scarred Trees representing Aboriginal removal of bark material to make shelters, dishes, canoes, string, shields, boomerangs and carved trees. Within the study area most Aboriginal scars are found on River Red Gum (*Eucalyptus camaldensis*) or Blakely's Red Gum (*Eucalyptus blakelyi*), White Box (*Eucalyptus albens*) and Grey Box (*Eucalyptus largiflorens*). There is a strong correlation between large canoe type scars and more permanent river watercourses (i.e. associated with the use of the Goulburn, Cudgegong and Macquarie River flood plains).
- Carved Trees represent important Aboriginal ceremonial or burial marker locations. They are usually carved on high quality timber such as Red Gum. A slab of bark is removed and then the inner wood tissue is carved using a stone axe or heavy duty cutting tool. Common designs found on carved trees are diamond or linear cross hatching motifs.
- Burial sites are sites that show evidence of Aboriginal burial in discrete locations. Burials in the study region are usually associated with major areas of occupation found next to rivers, lagoons, lakes, waterholes and some creeks. Skeletal material is normally discovered eroding out of sandy deposits, where interment is easiest. Burials may occur in an isolated context or they may be part of a larger cemetery.
- Bora rings are sites containing an arrangement of natural stone to represent ceremonial or ritual practice. They are often found near traditional ceremonial grounds in areas of abundant surface rock. Rocks may be arranged in a circular fashion or oval shapes signifying important ritual meaning for a ceremony. Often bora rings are found isolated on ridge tops or flat hilltops overlooking a significant stretch of country.

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- Art sites. These types of sites reflect Aboriginal use of sandstone outcrops for the purpose of painting, engraving or drawing traditional designs. Art sites are often found in areas where people are using country that has good sources of sandstone in the form of rock-shelters, which offer cover from the elements or may be located next to a stream or river.
- Common symbols found in art sites are hand stencils, figurative art representing animal or human forms, tracks of animals and patterns of lines or circles that may represent landscape elements to a traditional story.
- Axe grinding grooves. These types of sites are associated with Aboriginal people using sandstone outcrops to sharpen stone implements and in particular stone axes. Grinding grooves are usually 5–20cm in length and 2–3cm in depth depending on how often the person is using the groove section. Grooves may be found in clusters and are usually concentrated around a surface rock pool where people use water to assist them in sharpening an edge.
- Contact sites. A contact site is site where there is evidence of Aboriginal people living traditionally in close proximity to European settlement. Aboriginal people may be using European items in traditional hunting and gathering practices, for instance bottle glass as a substitute for stone, or metal as a substitute for bone or stone.
- Sites may be associated with Aboriginal people working for European settlers, such as gathering bark sheeting for bark slab huts. Often historic items associated with that contact would be found in certain traditional campsites.
- Waterhole/well. These types of sites, as well as being important places for obtaining water, may also be sacred places and of religious significance to living Aboriginal people.

6.4 Food Resources

Edible plant species likely to be found within the study area are represented by Yams (*Dioscorea*), Native Cherry (*Exocarpos cupressiformis*), Emu Bush (*Eremophila*), Scrub Nettle (*Urtica incisa*), Kurrajong roots (*Brachychiton populneus*), Geebungs (*Persoonia*), Wild Tomatoes (*Solanum*), Bulbine Lily (*Bulbine bulbosa*) and Flax Lily (*Dianella*).

Animal species exploited would have probably been Swamp Wallaby (*Wallabia bicolor*), Eastern Wallaroo (*Macropus robustus*), Grey Kangaroo (*Macropus major*) Kangaroo Rat (*Dipodomys*) and Ring-tail Possum (*Pseudocheirus laniginosus*). Gould's Goanna (*Varanus gouldi*) would have been the main reptile species eaten. In the creeks and rivers, Yellow Belly (*Macquaria ambigua*) and Yabbies (*Cherax destructor*) would also have been readily available.

6.5 Stone Raw Materials for Tool Manufacture

Geologically, the most common outcrops observed are quartz, greywacke with acid volcanics, with tuffs, slates and siltstones also being common. Many of the likely stone raw material supplies in the Study Area are likely to have been extracted from creek bed gravel sources.

6.6 Early Contact

Aboriginal occupation around Ulan/Moolarben appears to have been relatively undisturbed by European settlement until at least the late 1820s. Surveyors William Lawson and George Cox both led expeditions to the Cudgegong River area in 1821–22 to locate new grazing pastures. Over the next few years new pastoral runs were taken up in the Mudgee/Wellington area. More settlement followed, causing conflict with the local Aboriginal population. A period of martial law was instituted by Governor Brisbane between Bathurst, Wellington and Mudgee in 1824. There was considerable resistance by local Aboriginal people, led by Windradyne a senior Wiradjuri guerrilla leader. Intense fighting occurred from 1824–26. Many Aboriginal people were killed but actual numbers are hard to estimate.

Reverend Gunther, of Wellington Mission, reported on Aboriginal living conditions between Wellington–Dubbo–Cassilis–Mudgee in 1839–40. He observed that most Aborigines he met were living on European stations by the late 1840s (Gunther, Journal 1839–40).

The clearing of creek flats and adjoining foot hills and the establishment of small farms progressed slowly from the 1850s onwards. Development impacts were usually associated with the physical impact of clearing or logging – mainly to gain grazing land or supply supports for use in early mine shafts. Ploughing along creek flats has occurred for many years. The majority of the present day land-use within the study area is associated with sheep and cattle production.

Coal was first discovered and worked at Ulan in the 1920s and mined sporadically through the 1950s (Connell Wagner 1992b). The Ulan No. 1 Underground Mine produced coal from 1942 and the Ulan No. 2 Underground Mine was developed in 1957. In 1977, mine site facilities were commissioned and the Ulan No. 2 Underground Mine was further developed.

Open-cut mining was located within the Ulan Creek valley near its confluence with the Goulburn River. The open-cut mine and associated activities such as haul roads have impacted mainly cleared and cultivated land.

Underground mining has proceeded northward from the open-cut mine, below some areas sampled during previous archaeological surveys. Studies of the extent and distribution of subsidence effects in this area provide some indication of what is likely to happen in areas overlying the proposed north and north-westward extensions of the Ulan Coal Mine (Haglund 1992).

6.7 Chronology of Aboriginal Occupation in the Central Western and North-West Slopes

Chronology of Aboriginal occupation within the broader region is known to be at least 29,000–34,000 years Before Present (BP) (Kamminga & Mulvaney 1999). The Pleistocene sites of Cuddie Springs and Tambar Springs provide some evidence of early human exploitation of open plain landforms which also contain megafaunal species (i.e. Diprotodonts). Attenbrow (2003) reports a date of 11,050 +/- 135 years BP for a rock-shelter site occupation (Loggers Rock-shelter Site) within the Upper Mangrove catchment.

In 1994, Patrick Gaynor obtained a date of 20,000 years BP from Crazy Man Rock-shelter in the Warrumbungles National Park. In 1970 David Moore completed excavation of a small rock-shelter at Bobadeen. This excavation site adjoins but is not within the Moolarben Coal Mine exploration license (EL). The Bobadeen shelter excavation produced a basal occupation date of 5500 years BP (Moore 1970, 1981). In 1961, Tindale completed an excavation at Noola Rock-shelter in the Rylstone area and suggested a date of approximately 12,000 years BP for basal occupation. Another site, Botobolar 5 has been dated to 5770 +/- 100 years BP.

Excavations within the Ulan Mine Lease are limited to a salvage excavation and several test excavations. The age of occupation of the sites has been assessed as less than 5000 years old. Technological attributes of stone artefacts present at sites in Ulan have not been the subject of comparison with other sites in the Central Tablelands or Hunter Valley regions, with the exception of Moore's (1970) excavation at Bobadeen. Moore's (1970) investigations also provide a date of 7000-8000 years BP for the Ulan region, while Pearson (1981) recovered an occupation date of 5500 BP at a shelter site at Botobolar (Kuskie & Clarke 2005).

Haglund's archaeological surveys, test excavations of rock-shelters and open sites and surface collection of stone artefacts were all completed within the Ulan mine lease area in the early 80s. A salvage of shelter site 36-3-177 was the first major sub-surface investigation within Ulan Coal Mine Lease areas.

6.8 Local Archaeological Studies

A majority of Aboriginal sites recorded in or near the MCP Stage 2 study area have been recorded by several different types of Aboriginal heritage assessment. These can generally be described as:

- Telecommunication and power-line environmental surveys such as those undertaken by David Maynard and Siobhan Lavelle for Telstra and Country Energy.
- Volunteer heritage site recordings such as those undertaken by Fred McCarthy of the Australian Museum and Mr Warren Bluff.

- Academic archaeological research undertaken by Dr Mike Pearson in 1981.
- Environmental assessment of coal mining leases such as those undertaken by Haglund and Associates for Ulan Mine, Hamm for Moolarben Coal Mine Stage 1, Navin/Officer for Wilpinjong Mine and Kuskie and Clarke for Ulan Coal Mine.

6.8.1 Ulan Coal Mine Lease Archaeological Assessment: Overview

Prior to 1980, three sites were listed by AHIMS in the immediate vicinity of the Ulan Coal Mine Lease (UCML). Since 1980, there have been a number of Aboriginal heritage assessments of the existing Ulan mining lease as part of EIA and other studies, resulting in the recording and registration of over 440 Aboriginal sites. Aboriginal Heritage investigations of the Ulan Mine Lease (i.e. Ulan Colliery and No. 2 Underground mine have been carried out (see Haglund 1980, 1981b, 1992 and Corkill 1991). These archaeological assessments also reported archaeological site descriptions, as well as oral history, and describe test excavations carried out on rock-shelter sites and surface collections. Archaeological surveys of Ulan Coal's ML1468 by Haglund (1999a, 1999b) for the EIS have been reported. A salvage excavation was also undertaken within one rock-shelter site (Haglund 1996a). Archaeological surveys have also been carried out on the northward extension of underground mining, including Longwall Panels 11 and 12 (Haglund 1996b) and Longwall Panels 13-17 (Edgar 1997).

Archaeological salvage excavations have been carried out on SG5 rock-shelter site within Longwall Panel 13 (Haglund 2001a, 2001b, White 2001). Archaeological surveys have also been undertaken for areas west of the existing open cut mine, an irrigation area and other infrastructure facilities (Haglund 1999c, 1999d; Kuskie 2004; Kuskie & Clarke 2005a). Detailed archaeological surveys of portions of the ML1468 area in advance of underground mining, including Panels 18–22 (Kuskie & Webster 2001), Panels 23-26 and W1 (Kuskie & Clarke 2005b) and Panels W2 and W3 (Kuskie & Clarke 2007).

6.8.2 Haglund's Assessment Studies: 1980–99

Haglund and Associates completed a series of archaeological assessments at Ulan Coal Mine covering a period of almost 20 years. Parts of the Ulan mine were previously surveyed by Haglund (1980, 1981a, 1981b, 1992 and 1999d). Haglund's initial assessment (1980) involved a preliminary archaeological survey of the Ulan Colliery and No. 2 Underground Mine areas. Six Aboriginal sites and numerous isolated finds were identified, largely within the area proposed for open cut mining.

Between 1980–1981 and 1991–1992 Haglund carried out a series of archaeological surveys of mine leases covering parts of the Ulan Mine Exploration area (see Figure 4: Appendix 2). She identified at least 60 Aboriginal archaeological sites within UCML mining leases. Corkill (1991)

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undertook an archaeological survey along a 4km route of a proposed coal conveyor belt and an area to be impacted by mine infrastructure development. Two artefact scatters and one isolated find were located during the survey. One artefact scatter (UC1), located on 'a level bench on the west bank of Ulan Creek in the vicinity of the confluence with an unnamed tributary', comprised 50–100 artefacts, predominantly of quartz and chert (Corkill 1991). The other artefact scatter site (UC2) comprised four artefacts on a long exposure adjacent to a road junction and was not to be impacted by the proposed works (Corkill 1991). Chert and quartz were also present at this site which had a high level of disturbance due to earlier road works. An isolated find (distal end of a quartz flake) was located on a track. Corkill recommended that the full recording of site UC1 be completed and arrangements made to ensure the protection of the site during construction (Corkill 1991) of the Ulan lease area (refer Figure 3 Edgar 1997). Haglund commented that large portions of existing lease area had yet to be inspected. Table 2 below summarises her findings.

Table 2: Sites recorded as a result of Haglund's 1990s assessments

Report Code	Field Code	Land Form	Size	Boundary Criteria	Deposit Type	Visible Artefacts	Materials represented	Condition	Comments
WV/8	Kwk4	Hill crest; low hill in valley	N/A		Sandy with leaf litter, vis<10%				
MC6	Kbd2	Valley floor and foot slopes			Pale sand with grass	1C, 5F	2 quartz, 1 chert, 2 quartzite, 1 petrified wood	Many wombat holes	Patchy visibility
MC7	Kbd4	Valley floor			Sand with grass	Not recorded		Many wombat holes	Not recorded due to failing light
MC8	Bt2	Hill slope	c.30m	Fence and edge of track	Decaying rock and red sand	c.20 fragments	Quartz and chert	Trampled, eroded, disturbed	Visible artefacts damaged, site may continue beyond fence (woodland)
MC10	Mc13	Valley floor and foot slopes	10m x10m	Track and erosion scar	Eroding B horizon	1C, 3F	3 chert, 1 quartz	Graded, wash, eroding	Site may continue both sides of track, poor visibility

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Report Code	Field Code	Land Form	Size	Boundary Criteria	Deposit Type	Visible Artefacts	Materials represented	Condition	Comments
MC12	Mc12	Hill slope	c.10m x10m		Sandy, rocky	2F, >3FF	Chert	Wash, ploughing	Probable remains of minor knapping event
MC13	Kht1	Creek banks, hill slope	C30m dlam.	Edge of clearing	Coarse sand and rock frags = lag	>50 C, F, Ff	Quartz	Severe erosion, disturbed	Severely affected by logging erosion. <10 artefacts/m square
MC14	Kht2	Hillside	c.60m (?)	Track	Eroding colluvium	F, Ff	Quartz	Track, severe erosion and wash	Appears to relate to MC13 nearby; 1 artefact? 5-10m of track
MC15	Mc14	Ridge crest	x.20m dlam	Tracks (intersecting)	Sandy, silty soil, A2-B horizon	C, F, Ff and traffic prod.	Quartz	Traffic, graded, eroded	Some artefacts crushed, many traffic products
BO1	Kl1	Hill slope	50mx 20m	Exposures	Topsoil, degrading	C and F (sample recording)	Quartz	Parts much disturbed, road, ploughing	Low lying areas may retain good deposit
BO2	Krm3	Hill slope	c.5mx 2m	Exposure on track	Topsoil, degrading	2C, 4F and 1Fp	Quartz	Track worn, slope cleared	Single knapping event. Small area, extends beyond track
BO3	Krm2	Hill slope	c.6mx 2m	Patchy exposure	Topsoil, degrading	2F	Quartz	Disturbed by post clearing	Minor knapping/ discard event?
BO4	Krm1	Hill slope	c.30m x2m	Exposure along track	Topsoil, degrading	Core, 3F	Quartz, chert	Soil profile disturbed by road ploughing	Remains of minor, disturbed scatters of background scatter?

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Report Code	Field Code	Land Form	Size	Boundary Criteria	Deposit Type	Visible Artefacts	Materials represented	Condition	Comments
BO8	Bc/11	Creek bank and footslopes	c.100 mx 50m	Exposure along track and near dam	Topsoil, degrading	1C, 2F, 7FF	Quartz, chert	Surface graded, possibly ripped	Areas between track and creek may retain some less disturbed deposit
BO9	Area 1	Flat crest of low ridge	Crest c.350 mx50 m	Patchy exposure	Degrading surface	1C, 1F	Quartz	Severely eroded	Very sparse, little or no potential for research
DU3	Area 2	Rock platform above deep gullies and minor creeks	c.300 mx 20m	Exposed rock platform	Bare rock	Sample of c.40 artefacts recorded: C, F, FF backed pieces, hammer and anvil stones	Quartz, chert, basalt, quartzite, petrified wood	Exposed to wash	Represents repeated activities? Probably linked to shelter site just below western end

Note: C=Core, F=Flake, Ff=Flake fragment, Fp=Flaked piece.

Haglund's studies aimed to collect available background information, including oral history, and to get at least 50% survey coverage of surfaces affected by the proposed open-cut mining and associated works. She explains that:

“A less intensive sampling of other areas aimed to define the types of sites likely to be present, patterns of distribution and, if possible, probable frequencies. Three levels of intensity of survey coverage were aimed for: 100% survey of open sites and some selected areas and, in some areas, 25% survey or single traverse to assess topography, visibility and similarity to areas of more detailed survey.

Samples of stone artefacts were collected from sites which would be destroyed by the proposed mining activities, and selected rock-shelters adjacent to the proposed open-cut mine were tested for the presence of stone artefacts, but no extensive excavation had been carried out within the mine area prior to the 1996 salvage excavation.” (Haglund 1997:34)

In these two years, Haglund reported on the results of two surveys conducted in the existing mine and proposed open and underground operations at Ulan. The areas examined are located north-west of the Goulburn River, encompassing land units featuring a limited alluvial plain cut by minor tributaries of that river and prominent high ridge structures of sandstone outcrops.

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As a data set, these results apply to past habitation in relatively close proximity (800–2500m) of a major waterway and accordingly have potential for setting up comparative insights for the Moolarben Coal Project. To the south of the mine is a subset of habitation phenomena in the ephemeral catchment that makes up the head waters of this major river system.

In 1992, Haglund also surveyed a proposed access route, an area proposed for surface facilities for an extension of the underground mine as well as carrying out sample surveys of three areas of different topography, concentrating on valleys bordered by cliff faces. One of the sample areas overlapped somewhat with the present study area.

She explains that:

“As survey conditions were different during the 1996 season, a portion of the overlap was re-surveyed (= the east part of the Brokenback Unit).

The surface scatters of stone artefacts identified within CCL 741 during previous surveys were found mainly within cleared, often cultivated, areas.

The scatters were seen on and in yellow podsollic soils and yellow earth soils which both form firm and well drained surfaces which may be affected by sheet-flooding and severe erosion, but are unlikely to become unpleasantly boggy. In these cleared areas the surface often seemed lowered by deflation of surface wash. The artefacts were mostly exposed on the surface or covered by a thin layer of accumulated debris and turf, except on alluvial flats close to the creek bank or in minor sandy patches where the cover could be deeper and exposure occurred mainly in the sides of small gullies or erosion scars.

Some of the erosion was possibly recent, and due to prolonged droughts. However, some artefacts with a heavy growth of lichen must have been exposed for considerable amounts of time. Given the soil characteristics, there was and is little chance of finding organic archaeological material in these open sites.” (Haglund 1997:25)

Haglund (1996b) conducted the salvage excavation of DECC site #36-3-177, a rock-shelter site situated in the vicinity of longwall panels 10 and 11 which was considered necessary because longwall mining of these panels was scheduled to take place and the potential for the site to be detrimentally affected by subsidence could not be discounted. Salvage excavation was conducted over three days and a total area of 10m² was excavated (Haglund 1996b). A total of 391 lithic artefacts and 374 flaking debris items were recovered from this excavation; predominantly quartz (68%) then with chert (28%) and igneous rock and petrified wood which were also present. The bulk of the excavated assemblage comprised flakes (52%) and flake fragments (26). Other artefact types recovered included cores, core fragments, flaked pieces and modified flakes (Haglund 1996b).

Haglund's investigation of reduction sequences at site #36-3-177 largely followed Witter's (1992) technological analysis methodology, and using this occupation model analysed the stone tool assemblage in terms of the profiles forwarded by Witter (1994). The assemblage recovered from the excavation most resembled that described for a 'vantage point / crafts station'. Haglund concluded, however, that the assemblage did not fit any one suggested model in particular (Haglund 1996b).

Haglund's interpretation of the Aboriginal heritage evidence recovered from site #36-3-177 was one of sporadic occupation associated with artefact manufacture and/or repair and that the shelter may represent a vantage point site at which casual manufacture took place (Haglund 1996b). The age of the site was assessed as being within the last 5000 years, although there was no datable material such as charcoal (Haglund 1996b).

Haglund (1996a), during another survey, located an isolated find northwest of site #36-3-177. This was a quartz flake with retouch and use-wear and was interpreted by Haglund (1996a) as representing an item lost or discarded in transit.

Haglund (1996c) also recorded eight rock-shelters and three artefact scatters which had the potential to be affected by longwall mining subsidence and the construction of a pumping station, access track and powerline associated with Longwall Panels 11 and 12; and recommended sub-surface testing for the open camp sites to be impacted and altering the route of the access track with an application for section 90 Consent for sites to be disturbed. Further investigation and consultation was recommended.

6.8.2.1 Site Location Modelling

Based on her three main Ulan survey assessments, Haglund (1997) argues that Ulan site location modelling can be explained in the following way:

"...it is likely that at least some water-holes, springs and soaks could be found to be closely associated with archaeological material. It is also possible that more extensive and intensive investigation will reveal examples of additional site types." (Haglund 1997: 26)

She further explains that:

"It should be noted that previous investigations have concentrated on two landforms, ridge slopes and/or valley floors, depending on what type of topography was most likely to be affected by particular proposed developments. These landforms are also, according to present models, those most likely to contain Aboriginal sites. However, judging from sample surveys in adjoining areas, open sites are likely to occur also on ridge crests, and quarry sites where there are outcrops of suitable rock, e.g. basalt." (Haglund 1997: 26)

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Both Edgar (1997) and Haglund (1999a) presented a complementary Aboriginal occupation model for the Ulan region involving:

- Regular seasonal occupation by a local Aboriginal group, resulting in evidence of a range of economic activities associated with repeated long-term occupation, including hearths, stone tool manufacture and curation.
- Intensive but short-term occupation by Aboriginal people from the surrounding regions for special ceremonies. Stone tool assemblages would reflect intensive food gathering and preparation, extensive art and other special activities.
- Ephemeral occupation resulting from travel through the area between the coast and further inland regions.

Edgar (1997) considered that the results of his survey support aspects of each of these occupations models and recommended that further work be conducted. A later survey by Haglund (1999a) provides evidence which primarily supports the first model of regular occupation.

6.8.2.2 Limitation of Sampling Methods and Previous Archaeological Assessment

Several factors from previous archaeological work are likely to affect the assessment of archaeological landscape values within the study area.

- The absence of any form of analysis of data sets to elicit discard patterning in the study area or indeed illuminate any of the primary characteristics of the archaeological record itself or the behavioural systems behind it.
- Site areas, density values, industrial attributes, tabulations of material types, landscape delineation, and similar elements in archaeological investigation that are designed to underscore the significance of cultural materials that may be lost if in fact the mine proposal proceeds as proposed are not adequately described.
- Haglund's overall assessment of significance is not comparable because she has too many lines of evidence which are fragmented and not discussed in any wholisitic way.
- Sites are discussed but not at an intersite level where comparability can be analysed.

6.8.3 Ulan Coal Mine Extensions Archaeological Assessment after 2000 Kuskie and Associates

Following on from the work of Haglund, Ulan Coal Mine engaged Peter Kuskie through his company South-East Archaeology Pty Ltd to undertake a series of archaeological assessments within parts of the Ulan Coal Mine that were being expanded for future development. Kuskie and Webster (2001) comprehensively surveyed Longwall Panels 18-22 in ML1468, a 498ha area, over 12 days in June and July 2001, involving direct coverage of 57.8ha (12% of the study area), resulting in an effective survey sample of about 4.7ha (1% of the study area). This area was subdivided into 205 survey areas, with all different environmental contexts sampled. Vegetation was noted as being the primary detection-limiting factor (Kuskie & Webster 2001).

Some 58 Aboriginal heritage sites were identified; 56 artefact scatters, one rock-shelter with archaeological deposit and one ochre quarry. Three sites (BO10, #36-3-205 and #36-3-207) previously reported within the area were included in this total. Another three previously recorded sites (Haglund 1999a) within the area (BO2, BO3, BO4) could not be relocated. In addition, six potential archaeological deposits were also identified. Artefacts were identified at a very low mean density of 0.0025 artefacts per square metre of effective survey coverage across the entire study area sample (Kuskie & Webster 2001).

Kuskie and Webster (2001) identified and recorded in detail a total of 117 stone artefacts during the investigation. The lithic item assemblage was dominated by quartz (79%), with six other stone materials occurring in much lower frequencies. Sandstone outcrops, alluvial and colluvial gravels, quartz, quartzite, volcanics and ochre were noted within the study area. A total of 14 lithic item types were recorded, comprising thirteen categories of artefacts and lithic fragments, items that could not be positively identified as artefacts. The lithic item assemblage was dominated by flakes and portions of flakes (51% of combined artefact total) and cores (26%). This evidence represented the dominance of non-specific stone flaking activities within the study area. Evidence of microblade manufacturing was very low, comprising 6% of the total assemblage. A very low frequency of utilised and/or retouched flaked artefacts was present (2% of the combined assemblage). Very low frequencies of tools indicative of other activities were identified. The flaked artefacts tend to be small in size (often less than 30mm in maximum dimension (Kuskie & Webster 2001).

This evidence indicates that Aboriginal utilisation of the Longwall Panels 18–22 study area was of a very low intensity and was probably infrequent and involved low numbers of people. Occupation was more likely focussed in surrounding areas where major watercourses and/or rock-shelters suitable for habitation are located (Kuskie & Webster 2001). Scientific significance of evidence within the Longwall Panels 18–22 study area was assessed as ranging from low to high within a local and regional context. Some 55 of the artefact scatter sites were

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assessed by Kuskie and Webster (2001) as being of low scientific significance in a local context.

Following minor archaeological surveys in 2003 and 2004, in 2005, Kuskie and Clarke completed an assessment of an area of the Western Open Cut for Ulan. During the initial surveys the then proposed western open cut extension area was subdivided into a total of 54 archaeological survey areas.

The total survey coverage of these survey areas equated to approximately 33,420m² or 3.3ha of ground. The total effective survey coverage of this sample area equated to about 3582m².

Surface visibility ranged between means of 10 and 20% in the survey areas. Archaeological visibility also ranged between means of 10 and 20%. Vegetation was the factor that typically limited surface visibility (Kuskie & Clarke 2005).

Following reinspection of the physically marked boundaries of the proposed new works, it was concluded that:

- No identified Aboriginal heritage sites are located directly within the *clean water diversionary dam study area*, west of the open cut, although site/locus OCE1/A and Haglund's Site S4 (Ulan ID #62, DECC #36-3-40) are situated within close proximity.
- One identified Aboriginal heritage site/locus, OCE1/A, extends marginally within the current *western open cut extension study area*, and another site/locus, OCE2/A, is situated within close proximity.

(Kuskie & Clarke 2005)

The sites west of the open cut are dominated by tuff, with quartz, chert and quartzite stone materials also present. However, the small size of the sample is noted.

Tuff is particularly notable west of the open cut in survey area OCE1 and west of the present study area in survey areas OCE34, 38, 39, 40 and 51 (South East Archaeology 2004), which include broad simple slopes, spur crests descending from the adjacent elevated terrain, and the main drainage depression. It occurs as tabular surface outcrops and has become incorporated into the gravels of the main watercourse (OCE40). In the lower portions of the simple slope (OCE34) tabular tuff is eroding from 0.15–0.20m below the present surface, and represents another source of the material. Many samples of the tuff examined were of sufficient quality for stone knapping (Kuskie & Clarke 2005).

In the then proposed western open-cut area examined by South East Archaeology in 2002 and 2003, a high frequency of tuff artefacts exhibited cortex, including 39% (of the tuff artefact total) with the tabular variety and 8% with a rougher, terrestrial cortex. A relatively high frequency of tuff cores were identified

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(26% of tuff artefacts), including many larger cores. The cores exhibiting cortex (80% of tuff cores) are particularly large, ranging from a maximum dimension of 60–200mm. Many of the tuff flakes exhibiting cortex (39% of tuff flakes) are also large in size (size classes 6–10). All of these factors are strongly indicative that the tuff used for artefact manufacturing was procured from a local source. The evidence is also indicative of procurement and at least initial reduction of tuff at several sites, particularly at the loci OCE1/A and OCE34/B. At the later locus, it could even be speculated that Aboriginal digging for the high quality tuff that is in abundance 15–20cm below the surface has occurred, possibly causing the formation of the erosion scour (Kuskie & Clarke 2005).

Quartz pebbles were noted in several localities within the study area and it is common in the pebbly sandstone of the adjacent elevated terrain. It can be inferred that this material was procured from colluvial gravels available within or in the immediate vicinity of the study area. Chert was a favoured material for manufacturing artefacts, as it breaks by the process of conchoidal fracture (breakage through force being applied stone on stone) and provides flakes that have sharp, durable edges. Chert is present in the local Illawarra Coal Measures.

Several artefacts were comprised of quartzite, and boulders of this material occur throughout the Ulan area and these may represent Permian era glacial erratics (Kuskie & Clarke 2005).

The small sample of lithic items recorded in or immediately adjacent to the western open-cut extension area predominantly includes flakes, cores and flake portions. These items represent general or non-specific knapping activities. However the presence of cores at site OCE1/A may relate to lithic procurement and reduction. The remainder of the items from the western open cut area include a chert utilised flake and a tuff utilised microblade – proximal portion. The utilised microblade portion and utilised flake are indicators of activities other than knapping, such as processing plant food or maintaining wooden implements (Kuskie & Clarke 2005).

The identified sites loci west of the open cut occur on all three of the landform units present (simple slope, spur crest and drainage depression). This result is consistent with the nature of the area, but does not indicate a particular focus of occupation within a particular environmental context. Evidence is distributed widely across the locality in typically very low numbers and densities (Kuskie & Clarke 2005).

Given the virtual absence of clear activity areas – locations where focused human activity has occurred – it can be argued that the evidence within the western open cut study area is predominantly indicative of low density background discard (Kuskie & Clarke 2005).

Kuskie & Clarke (2005) inferred on a preliminary basis from the evidence at the Aboriginal sites recorded within the present study and from other sources that:

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- Members of the Wiradjuri people predominantly occupied the study area, within the past 5000 years. Members of neighbouring cultural groups (particularly the Kamilaroi) may also have sporadically occupied the area and occupation may have extended as far back as 30,000 – 40,000 years (although it is uncertain that any evidence for this may remain).
- Aboriginal people used the entire study area, but at a very low intensity.
- Focused occupation was more likely to have occurred in rock-shelters or overhangs on the scarps and on the major creek flats, but even this may have been relatively sporadic or of low intensity.
- Sandstone bedrock within the main ephemeral tributary of Ulan Creek close to the western open-cut study area was used for the shaping and/or maintenance of ground-edge hatchets.
- The stone materials tuff and quartz were favoured for stone-working activities.
- The manufacturing of stone tools, particularly flaked implements for use in making or maintaining wooden tools or butchering or processing foods, was generally a casual or opportunistic activity. Non-specific stone flaking was a common activity.

(Kuskie & Clarke 2005)

6.8.3.1 Regional Context

The nature of the evidence from the study area can be compared with other studies and sites in the region, although such a comparison is constrained by the limited sample sizes.

Some of the notable similarities, particularly within the Longwall Panels 18–22 assessment of Kuskie and Webster (2001) and surveys of Haglund (1999a, 1999b), include:

- Stone artefacts being the dominant form of Aboriginal heritage evidence.
- Quartz being one of the dominant stone materials.
- A generally low mean density of artefacts.
- Dominance of non-specific stone flaking in the overall assemblage.
- Similar range of artefact types.

Estimated antiquity of the evidence. Some of the notable differences, particularly with the studies in the elevated sandstone terrain but also the open lowland terrain investigated by Kuskie and Webster (2001), include:

- The dominance of tuff and presence of tuff sources and potential tuff lithic quarries.
- Absence of rock-shelter art and/or occupation sites.
- Lower numbers and densities of artefacts than in several areas.

The majority of the items or context located within the study area do not appear to be unique in the region, with the possible exception of the evidence of tuff procurement and initial reduction (Kuskie & Clarke 2005).

6.8.3.2 Reassessment of Predictive Model of Site Location

In view of the survey results, the predictive model of site location can be reassessed (Kuskie & Clarke 2005).

The results provide no evidence to contradict the assessments that burial, carved tree, scarred tree, stone arrangement, mythological and rock-shelter with art and/or occupation deposit sites have a low to very low potential to occur within the study area (Kuskie & Clarke 2005).

No grinding groove sites were identified; hence the potential for grinding groove sites within the study area can be revised downward to very low (Kuskie & Clarke 2005).

The potential for lithic quarry sites was initially assessed as low. However, during the course of the investigation, sources of the stone material tuff were identified in widespread locations west of the open cut, including survey area OCE1 within the present study area. In at least one location, Aboriginal site OCE1/A, the evidence is indicative of procurement and possibly at least initial reduction of tuff. This is consistent with Hiscock and Mitchell's (1993:32) general definition of a lithic quarry site as a 'location of an exploited stone source'. However, within the revised study area boundaries, the potential for further evidence of lithic procurement to occur is considered to be low, although elsewhere west of the open cut where tuff of sufficient quality for knapping occurs this potential may be higher (Kuskie & Clarke 2005).

The prediction that artefact scatters have a moderate to high potential to occur across the level to gently inclined portions of landform elements (e.g. spur crests and simple slopes), particular adjacent to watercourses has been confirmed during this survey. Evidence was located in these contexts (Kuskie & Clarke 2005).

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There remains potential for further stone artefact evidence to occur across virtually the entire study area, albeit typically in low density consistent with background discard, interspersed by occasional areas of higher density in which localised activity areas have occurred. At site OCE1/A, positioned largely between the western open-cut extension and diversionary dam study areas, there remains potential for deposits of sufficient integrity to be of research value (cf. Koettig 1989; Kuskie & Kamminga 2000). However, in virtually all of the western open-cut extension and diversionary dam study areas, the potential for sub-surface deposits that are *in situ* or of possible research value appears to be low, considering the levels of ground disturbance, shallow upper soil unit and predictive model (Kuskie & Clarke 2005).

In 2007, Kuskie and Clarke, carried out an archaeological assessment of an area defined as SMP (*Subsidence Management Plan*) Area Longwall Panels: W2-W3 measuring approximately 478ha within the Ulan Coal Mine Lease. This development approval was part of a underground coal mine assessment. Twenty one percent of the study area was effectively sampled.

Twenty eight Aboriginal heritage sites were identified within the Longwall Panels W2-W3 SMP area, comprising a total of 22 artefact scatters (including 'isolated artefacts'), two rock-shelters with grinding grooves and artefacts, two rock-shelters with grinding grooves, and two rock-shelters with artefacts. Thirteen rock-shelters with Potential Archaeological Deposits (PADs) were also recorded (Kuskie & Clarke 2007).

Only 80 stone artefacts were recorded and Kuskie and Clarke concluded that:

“Artefacts occur at a very low mean density of 0.0022 artefacts per square metre of effective survey coverage (accounting for visibility), across the sampled area. This evidence indicates that Aboriginal utilisation of the study area was of a very low intensity. It was probably infrequent and involved low numbers of people. Occupation is more likely to have been focused in surrounding areas where major watercourses and/or rock-shelters suitable for habitation are located.” (Kuskie & Clarke 2007:3)

Three of the six rock-shelter sites were assessed as having low to moderate scientific significance within a local context, with one site (BB14/F) being assessed to be of moderate scientific significance within a local context, one site (MC1) as being of moderate to high significance within a local context, and one (MC2) as being of high significance within a local context and low to potentially moderate scientific significance within a regional context (Kuskie & Clarke 2007).

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6.8.3.3 Site Descriptions and Significance Ratings

Kuskie and Clarke (2007) describe each of the sites, which is reproduced below in Table 3 along with their original scientific descriptions.

Table 3: Sites recorded by Kuskie and Clarke in 2007 for UCML SMP Study (after Kuskie & Clarke 2007)

Site Name	DECC #	Ulan ID#	Site Type ³	MGA Eastings	MGA Northings	Scientific Significance ⁴
BB14/A PAD^			Rock-shelter with PAD	755121	6436503	-
BB14/B^			Artefact Scatter	755333	6436458	Low
BB14/F^			Rock-shelter with Artefacts	755125	6436393	Moderate
BO33/B^			Artefact Scatter	757870	6436419	Low
BO36/A^			Rock-shelter with Artefacts	757579	6436530	Low to Moderate
BO37/A			Artefact Scatter	758617	6436885	Low
BO38/A			Artefact Scatter	758465	6436824	Low
BO39/A			Artefact Scatter	758085	6437602	Low
BO40/A			Artefact Scatter	757917	6436956	Low
BQ3	36-3-292		Artefact Scatter	756425	6437144	Low
MC1		163	Rock-shelter with Artefacts and Grinding Grooves	756157	6437582	Moderate to High
MC2		164	Rock-shelter with Artefacts and Grinding Grooves	756191	6437687	High
MC32/C	36-3-376		Artefact Scatter	756541	6436881	Low
MC33/A PAD^			Rock-shelter with PAD	755299	6436592	-
MC34/A			Artefact Scatter	756458	6437087	Low
MC34/B			Artefact Scatter	756207	6437247	Low
MC34/C			Artefact Scatter	756033	6437212	Low
MC35/A			Artefact Scatter	755030	6437043	Low
MC36/A			Artefact Scatter	755524	6437155	Low
MC37/A			Artefact Scatter	755200	6436999	Low
MC38/A			Artefact Scatter	755443	6436931	Low
MC39/A			Rock-shelter with Grinding Grooves	755269	6437104	Low to Moderate
MC40/A PAD			Rock-shelter with PAD	755026	6437199	-
MC40/B PAD			Rock-shelter with PAD	755068	6437177	-

³ Artefact scatter refers to both scatters (multiple identified artefacts) and isolated finds (single identified artefact). Four rock-shelters (MC46A-D) and an artefact scatter (MC41/C) recorded during the present survey but outside of the SMP area are excluded. Potential Archaeological Deposits (PADs) in rock-shelters are listed but their significance is not assessed due to the absence of identified evidence.

⁴ Preliminary assessment of scientific significance within a local context based on the criteria outlined in Kuskie and Clarke (2007).

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Site Name	DECC #	Ulan ID#	Site Type ³	MGA Eastings	MGA Northings	Scientific Significance ⁴
MC40/C PAD			Rock-shelter with PAD	755072	6437188	-
MC40/D PAD			Rock-shelter with PAD	755012	6437162	-
MC41/A			Artefact Scatter	756063	6437732	Low
MC41/B			Artefact Scatter	756102	6437830	Low
MC41/D			Rock-shelter with Grinding Grooves	756106	6437785	Low to Moderate
MC41/E			Artefact Scatter	756387	6437713	Low
MC41/F PAD			Rock-shelter with PAD	756156	6437710	-
MC41/G PAD			Rock-shelter with PAD	756119	6437744	-
MC41/H PAD			Rock-shelter with PAD	756102	6437753	-
MC42/A			Artefact Scatter	756358	6437617	Low
MC43/A PAD			Rock-shelter with PAD	755868	6437774	-
MC44/A			Artefact Scatter	757155	6437367	Low
MC44/B			Artefact Scatter	756788	6436906	Low
MC45/A PAD			Rock-shelter with PAD	755518	6437429	-
MC45/B PAD			Rock-shelter with PAD	755492	6437462	-
MC45/C PAD			Rock-shelter with PAD	755417	6437443	-
MC45/D			Artefact Scatter	755037	6437856	Low

⁴Site occurs in previously approved SMP Area (W1) area of overlap with SMP Area (W2-W3).

6.8.3.4 Rock-shelter Sites

Site MC1 (Mona Creek 1)

Site MC1 is a large cavernous north-east facing rock-shelter with two openings at either end. It had previously been recorded by Haglund (1999b). A potential archaeological deposit was recorded during the Kuskie & Clarke 2007 survey and is considered to have high research potential. The sandstone surfaces of the shelter are subject to some exfoliation and disturbance to the deposit is potentially moderate, with animal burrows and a silty and sandy floor. Twenty-four artefacts were located within and around the shelter during the Kuskie & Clarke 2007 survey. Site MC1 also hosts a floating sandstone slab in the northern portion of the shelter, approximately 700mm in length, with three clearly defined grinding grooves. The grooves measure between 40–50mm wide and 300–400mm long. The grooves are shallow and clear, but slightly weathered.

Site MC2 (Mona Creek 2)

Site MC2 is a large cavernous south facing outcropping rock-shelter in a massive boulder. Site MC2 had previously been recorded by Edgar (Haglund 1999b). A potential archaeological deposit was recorded during the Kuskie & Clarke 2007 survey and is considered to have a moderate to high research potential. The sandstone surfaces of the shelter are stable, while disturbance to the deposit and surrounds is potentially moderate and primarily arises from animal burrowing and erosion. No visible artefacts were noted during the Kuskie & Clarke 2007

investigation. However, Haglund (1999b) noted three small quartz flakes. Haglund (1999b) also briefly reported the subsequent identification of a rare wooden implement, a boomerang, within the shelter. This item was not relocated during the present investigation and its precise provenance is uncertain.

Site MC2 also hosts a large floating sandstone slab in the central portion of the shelter, approximately 2m in length, with three clearly defined grinding grooves. The grooves identified measure between 60–90mm wide and 350–480mm long. The grooves are shallow and clear, but slightly weathered.

Site MC39/A

Site MC39/A is a south-westerly facing overhang, with substantial rubble overlying largely sandy and silty soils. Two grinding grooves occur on a freestanding/floating sandstone slab in the centre of the shelter. There is potential for further grooves which may be presently covered with silt. The grooves identified measure between 45–50mm wide and 240–260mm long. The grooves are shallow and clear, but slightly weathered. There is only potential for a shallow sub-surface deposit in a relatively small area, which may not be of research potential. No visible flaked stone artefacts are associated with site MC39/A.

Site MC41/D

Site MC41/D is a small westerly facing low shelter with a rocky and sandy floor. Two grinding grooves occur on a small, potentially portable freestanding/floating sandstone slab in the centre of the back of the shelter. The grooves identified measure between 35mm wide and 200–280mm long. The grooves are shallow and clear, but slightly weathered. There is low potential for a sub-surface deposit, particularly one that may be of research value. No visible flaked stone artefacts are associated with site MC41/D.

Site BB14/F

Site BB14/F is an exfoliating rock-shelter in a high sandstone rock formation, previously recorded by Kuskie and Clarke (2005b). A relatively shallow (c. 0.15m) potential archaeological deposit was recorded and is considered to have moderate to high research potential. The sandstone surfaces of the shelter are exfoliating, exposed and weathered, while disturbance to the deposit and surrounds is apparently moderate and primarily arises from animal burrowing and erosion. A single quartz flake portion was located approximately 3m west of the shelter opening.

Site BO36/A

Site BO36/A is a pair of moderately sized cavernous rock-shelters in a low-lying sandstone rock formation, previously recorded by Kuskie and Clarke (2005b). A relatively deep (c. 0.6m) potential deposit was recorded of the western shelter

and is considered to have low to moderate research potential. The research potential of the smaller eastern shelter is assessed as limited. The sandstone surfaces of the shelter are predominantly stable, while disturbance to the deposit and surrounds is apparently moderate and primarily arises from animal burrowing and vegetation. Eighteen artefacts were located within and around the western shelter.

6.8.3.5 Lithic Artefact Scatter Sites

A total of 22 artefact scatter sites (incorporating 'isolated artefacts') (BB14/B, BO33/B, BO37/A, BO/38/A, BO39/A, BO40/A, BQ3, MC32/C, MC34/A-C, MC35/A, MC36/A, MC37/A, MC38/A, MC41/A-B, MC41/E, MC42/A, MC44/A-B and MC45/D) occur in or within 50m of the Ulan Coal SMP area (W2-W3).

Nineteen of these sites were located and recorded during the Kuskie and Clarke 2007 survey. One site (MC32/C) was recorded by Kuskie and Clarke (2005b) on the margin of the current study area but could not be relocated during the present survey. Another two sites are situated in the portion of the Ulan Coal SMP area that overlaps with the previously approved Ulan Coal SMP area (W1).

The locations of these sites are marked on Figure 4 (see Appendix 2), and detailed descriptions are presented in the main reports (Kuskie & Clarke 2005b, 2007).

The sites recorded during the current survey range up to 2000m² in area (visible extent of evidence). Approximately two-thirds of the 'artefact scatter' sites comprise a single lithic artefact, which have been referred to in previous studies as 'isolated finds'. The remaining sites comprise two or more lithic items. Typically 'isolated artefacts' represent the only visible evidence of larger artefact scatters, in which low conditions of visibility have prevented the detection of further items.

A total of 80 lithic items were identified during the Kuskie and Clarke 2007 survey, including 40 artefacts in open artefact scatters and 24 artefacts associated with rock-shelters. This total includes 16 artefacts within the four rock-shelter sites (MC46/A-D) which lie marginally outside of the Ulan Coal SMP area. Artefact numbers range from 1 to 10 within each artefact scatter site recorded.

In general terms, the artefact densities identified within the study area are low by south-east Australian standards and indicate a generally low-intensity utilisation of the locality. The overall 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 (*cf.* Rich 1993; Kuskie & Kamminga 2000). This is interspersed by occasional focalised areas of slightly higher artefact density where activities or repeated activities have occurred.

6.8.4 Wilpinjong Coal Mine Assessment: Navin/ Officer 2005

In 2003, Excel Coal through its subsidiary Wilpinjong Coal Pty Limited, undertook to develop the Wilpinjong Coal Mine Operation. This new coal mine was located approximately 2km to the east of the current Stage 2 MCP. Part of this assessment included an assessment of Aboriginal cultural heritage and likely open cut mine and associated infrastructure impacts (i.e. Coal Handling and Preparation Plant). The mine development covered approximately 2800ha or 28km² in area and is generally described as the 'project disturbance area'. An Aboriginal cultural heritage survey was conducted by Navin Officer and members of the local Aboriginal community (i.e. Mudgee Local Aboriginal Land Council, Murong Gialinga Aboriginal and Torres Strait Islander Corporation and Warrabinga Native Title Claimants Aboriginal Corporation. Approximately 2510ha (25km²) of the Wilpinjong Coal Exploration Licence area were surveyed, including comprehensive survey of the Project Disturbance Area and sample survey or other areas adjacent to the Project Disturbance Area.

A total of 235 Aboriginal sites and objects were recorded as a result of the assessment (see Figure 5: Appendix 2). These Aboriginal sites and objects are described as:

- Isolated finds and artefact scatters in open contexts.
- Rock-shelters with surface artefacts (may also contain potential or confirmed archaeological deposits).
- Rock-shelters with potential or confirmed archaeological deposits.
- Rock-shelters with rock art.
- Possible and probable Aboriginal scar trees.
- Potential archaeological deposits in an open context.
- Reported places of Aboriginal cultural significance (reported by some Aboriginal people but disputed by others).

In addition, three non-Aboriginal scarred trees were recorded.

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Table 4: Aboriginal Sites and Objects Identified in the Wilpinjong Project Area (after Navin Officer 2005)

Number of objects and sites recorded	Site Type Recorded
70	Open artefact scatters
1	Open artefact scatter and procurement site
64	Isolated finds
19	Rock-shelters with surface artefacts (may also contain potential or confirmed archaeological deposit)
21	Rock-shelters with potential archaeological deposit (only)
3	Rock-shelters with rock art (may also contain surface artefacts and confirmed or potential archaeological deposit)
24	Possible Aboriginal scarred trees
15	Probably Aboriginal scarred trees
3	Surveyor's scarred trees (undebated European origin)
3	Probably surveyor scarred trees (debated origin)
1	Indeterminate tree feature (debated origin)
3	Other (debated origin) scarred trees
2	Potential archaeological deposits (PAD) (open context)
2	Reported places of Aboriginal cultural significance (disputed by some other Aboriginal representatives)
3	Springs/natural pothole ('waterhole' recorded at the request of an Aboriginal representative)
4	Other (debated origin) isolated finds, lithic scatters or stone arrangements

*“There are three sites with artefact densities of between 51 to 100, and 101 to 500 estimated on the surface. These sites are located near the banks of **Cumbo and Wilpinjong Creeks**, as well as some basal slope contexts. Two sites were recorded with more than an estimated **500 artefacts**. Both occur along the banks of **Wilpinjong Creek** and outside of the Project open cut mine and contained infrastructure area. The margin of one of these sites would potentially be disturbed by realignment of an electricity transmission line.*

Three rock-shelter sites with rock art were identified during the field program. All occur outside of the Project disturbance area and within sandstone and conglomerate rocks. Identifiable motifs include upward pointing tridents or arrows shapes, and red hand stencils.

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*Approximately **half** of the **recordings** identified during the survey are located within the Project Disturbance Area and would be subject to direct disturbance during the life of the Project. Approximately 10% of recordings are located within the Project Disturbance Area on the boundaries of the Project open cut pits and are also likely to be disturbed, subject to the detailed mine design. One site of high archaeological significance (within a local context) occurs within the Project Disturbance Area. This is a large open artefact scatter with more than 500 artefacts that may be impacted on its margin by the realignment of an electricity transmission line. No other recordings of high archaeological significance occur within the Project disturbance area. Eight stone material categories were recorded during the survey. The dominant categories were quartz (noted in 75% of all artefact occurrences), and tuff (36%).*

Just under half of the recorded Aboriginal sites occur within valley floor contexts, a third within basal valley slope contexts, 19% occur on mid valley slope contexts and 4% in upper valley contexts.” (Navin Officer: Fii-iii 2005)

6.8.5 Moolarben Coal Project Assessment of Stage 1: Hamm

In 2005 and 2006 Hamm (2006) undertook an assessment of Aboriginal cultural heritage values for the proposed Moolarben Coal Project Stage 1, located in the western coal fields of NSW, 40km north-east of Mudgee and 25km east of Gulgong. The study covered an area of approximately 35km² of low undulating hills and hillslopes from 400–680m above sea level on sandstone plateaus with extensive rock outcrop. Narrabeen Sandstone is the dominant parent rock. Parts have lower colluvial slopes of sandstone plateaus escarpments with low undulating rises and creek flats. Moolarben Creek flows through part of the study area. The landscape is heavily vegetated with some clearing for pastoral activity around the village of Ulan, and the locality of Moolarben along the Moolarben Creek. Approximately 4.2km² of land was foot surveyed from approximately 6.8km² of land available to be surveyed due to available surface visibility.

The assessment located and recorded a total of 1598 Aboriginal objects (302 sites). This cultural record was made up of: 63 open stone artefact scatter sites of varying densities, 219 individual stone artefact isolated finds, 18 rock-shelter sites, a grinding groove site and a scarred tree site. A majority of this record (87%) is made up of exposed stone artefactual material eroding from areas of bare soil exposure with less than five artefacts in density (see Figures 6 & 7: Appendix 2).

The most concentrated occupation areas located within the Stage 1 study area were:

- Central Moolarben Creek Alluvial Flats: Mayberry Property at Open Cut 3.

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- Southern Moolarben Creek Alluvial Creek Flats and Ridges: Stokes Property Open Cut 3 Extended.
- Underground No. 4 Northern Ridge Lines: Westwood Property.
- Bora Creek Alluvial Flats: Ulan Coal Mines Property.

The principal Aboriginal objects recorded in the assessment were stone artefacts. A total of 1597 stone artefacts were recorded. Quartz raw material dominated all assemblage components for MCP Stage 1 sites, accounting for 81.6% of the total raw material count. The next most commonly used raw material was Tuff, accounting for 10.6% of the total assemblage count. Silcrete was also used, but in much lower proportions.

A majority of surface assemblages recorded were made up of Broken Flakes, followed by Flaked Pieces and Complete Flakes. Retouched or used items only accounted for 2.2% of the total assemblage contents. Cores made up approximately 8.5% of the total assemblage content. A majority of cores were multi-platform type made from quartz and tuff materials. A total of four backed pieces (i.e. geometrics) were identified with three being recorded, within Transect 4 Underground No. 4. All three backed pieces are made from Tuff material.

A majority of flakes (Complete and Broken Proximal) contained approximately 75% broad platforms with 18% containing focal platforms. Cortex is found on approximately 12% of all stone artefact items. A comparison was made of the size of Complete Flakes. Graphing shows that a majority of quartz Complete Flakes recorded were between 10–40mm in length and 10–25mm wide. Whilst the Complete Flake size distribution for Tuff was much broader, showing a more diverse flake selection process operating.

Of a total of 302 sites recorded for the Stage 1 project area, eight sites (ie. S1MC: 103, 230, 264, 280 (36-3-0042), 282, 283, 286, 287 (see Figures 6 and 7: Appendix 2) are considered to be of high archaeological significance. However, given some of these sites are located within a disturbed context, further archaeological investigation may not be warranted. The remaining 294 sites were considered to be of medium or low archaeological significance. From an Aboriginal cultural assessment point of view, the most sensitive Aboriginal cultural landscape is located within the northern area of Underground No. 4 (i.e. near 'The Drip'). However, general Aboriginal community consultation advice has stated that all sites (archaeological or cultural) are of value, but none of the community members interviewed objected to the mining proposal going ahead.

A significant percentage of open alluvial plains and flats assessed in MCP Stage 1 have been disturbed due to historic farming practices, especially broad acre clearing for ploughing and pasture improvement. As a result of this activity, approximately 80% of Moolarben Creek's modern day channel has been heavily affected by sheet erosion as a result of agriculture. It is argued that this long-

term impact may also be responsible for a lack of intact rich open sites which are more common along Murrumbidgee and Wilpinjong Creeks. The presence of natural springs and soaks is likely to have heavily influenced the location of major open space Aboriginal sites occupation for the Moolarben Creek catchment and surrounding ridgelines. Although rock-shelters were used by Aboriginal people in the MCP Stage 1 study area they were more specific in their purpose (i.e. to carry out rock art and ceremony) and less likely to contain significant long term occupation evidence.

6.9 Regional Studies, Current Research Issues and Occupation Models

The most comprehensive overview of archaeological work completed near the study region comes from Attenbrow (1981, 1982, 1987, 1997, 2003, 2004), Vinnicombe (1980), Pearson (1981), and MacDonald (1992).

6.9.1 Attenbrow

In her landmark study of the Upper Mangrove Creek area, Attenbrow investigated ways in which chronological and spatial changes in density of archaeological sites and stone artefacts can be interpreted and explained in terms of demography and human behaviour.

The research aim of her doctoral thesis was to investigate pre-colonial land-use and subsistence strategies in the coastal regions of south-eastern New South Wales, land between the Great Dividing Range and its associated ranges and the ocean shoreline. Her main study area however focussed on the Upper Mangrove Creek catchment, which is dominated by forested hills, ranges and dissected sandstone plateaux. The Upper Mangrove Creek catchment lies within the coastal hinterland. The Upper Mangrove area is located approximately 100km south-east of the study area.

Her fieldwork results which include excavation and survey, show 80 archaeological traits at 59 archaeological sites, with 10 isolated finds, and 167 potential habitation shelters being recorded in the random sampling units (see also Attenbrow 1987). The archaeological evidence showed there were 35 archaeological deposits, 22 rock art images, 22 grinding groove areas, and one burial. Thirty-two archaeological traits were located in rock-shelters, five in open deposits and 22 on open rock (sandstone exposures or rock platforms).

The 10 isolated finds were all stone artefacts on open deposits (Attenbrow 1987). The average density of sites and archaeological traits in the random sampling units, and the inferred density of sites and traits in the total catchment, is circa 6/km² and circa 8/km² respectively.

Attenbrow explains the significance of these results:

“Sites/archaeological traits were recorded in all topographic zones. However, the number and density of sites in each topographic zone varies,

as does the number and density of each type of trait and the contents of each of the traits. Two of the three main traits – archaeological deposits and images – are found in all topographic zones. Grinding areas have a more restricted distribution in the random sampling units being recorded in only the periphery ridgetops, subsidiary valley bottoms and subsidiary ridgetops. However, they have been found in other zones in the catchment outside the random sampling units – albeit in small numbers (two on peninsula ridgetops and two in the main valley bottom).

The number of sites in each zone varies between two and 24, and the site density between 2/km² and 12/km². The total number of traits in each zone varies from three to 26, while their density varies from 3/km² to 15/km². The highest frequencies of sites and traits are found on periphery ridgetops, though subsidiary ridgetops also have a high frequency of traits. The high frequencies of sites and traits in these two zones are a function of the larger area of land within these categories. The highest density of sites and traits is in the main valley bottoms. The lowest frequency and density of sites and traits were recorded on the peninsula ridgetops and the main ridgetops.” (Attenbrow 2004: 96–97)

6.9.1.1 Site Location and Land-Use Model

Attenbrow’s explanation for what the above archaeological evidence means is explained in the following way:

“On this basis, it is proposed that the catchment’s inhabitants were relatively mobile hunter-gatherers who moved between many short-term base camps within their country, with group size varying according to weather, season and locality. While in the catchment, family groups stayed at base camps for several nights undertaking a range of domestic tasks, members going out daily to obtain food and raw materials.

Tasks undertaken at activity locations away from base camps may have included: (a) hunting, butchering, fishing (including eels) and shellfishing (freshwater mussel), plant and honey collecting; (b) procuring raw materials, such as stone, wood, plant fibre and resin; and, (c) religious or ritual responsibilities.

During these daily forays, to places inside or outside the catchment, damaged tools and implements would have been mended, and food prepared and/or eaten at locations away from the base camp. People also may have sought protection in rock-shelters during the day from the extreme heat of summer, the frosts and cold winds of winter, and the rain at any time of the year. Individuals or small groups would have made occasional longer trips for subsistence, trade or social purposes to places which necessitated the use of overnight/transit camps away from their base camps. Large gatherings for ceremonial purposes probably occurred at locations outside the catchment.

Within the catchment, in addition to the numerous archaeological deposits (habitations), there are also many sites with images (mostly pigment drawings in shelters) and grinding grooves (and a scarred tree outside the random sampling units). Together, this suite of archaeological sites demonstrates that many of the activities described above were carried out.

Overnight camping and a range of domestic tasks were undertaken at habitations. The grinding grooves indicate that the shaping and sharpening of ground-edged implements occurred, and the pigment and engraved images were likely created in association with both religious and secular activities. Although there is no outcropping bedrock in the catchment from which stone artefacts can be made, pebbles and cobbles eroded from the Hawkesbury sandstone and conglomerate beds in the Narrabeen sandstones are available on the ridgetops and in creek beds.

Some catchment habitations may have been used as transit camps by people travelling from one locality to another on ceremonial business or to procure raw materials by direct access or trade – for example, along the historically documented route between the Hunter Valley and Brisbane Waters via the Wollombi Valley and the ridge forming the catchment's eastern boundary, which also linked with other routes extending west as far as Mudgee-Rylstone.” (McCarthy 1936: 2-3; 1939a: 1; 1939b: 407; 1939c: 100) (Attenbrow 2004: 73-74.)

For the assessment of habitation, Attenbrow (2004) uses the terms ‘base camp’, ‘transit camp’ and ‘activity locations’ to define how Aboriginal people used the landscape of the Upper Mangrove Creek catchment. There are both short-term and long-term base camps identified as sites of intense or transitory use. What remains unknown about these sites is whether their function and use varied over time. One issue that is important to consider is whether assemblage variability can be analysed identifying types of domestic activities.

6.9.2 Vinnicombe

In 1979, Pat Vinnicombe (1980) undertook a regional archaeological assessment of the Gosford/Wyong area within the Sydney Basin. The study set out to survey an area containing three major eco-systems, each of which, theoretically, would reflect different land use patterns (Plog 1976:143). An intensive survey was then made of a sample area of each eco-system, identifying the general classes of sites and plotting their frequency and distribution.

An assessment of the relationship between the sites and easily identifiable features of the natural environment, for example, geology, altitude ranges, drainage characteristics, and routes was made. The study's observations were then used to extrapolate to the entire study area and thus predict where different types of sites would be likely to occur, and in what numbers.

Vinnicombe's (1980) three eco-systems pre-selected for intensive survey were:-

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1. *Open coastline and coastal estuary* – fully tidal, high salinity, e.g. Brisbane Water and Bouddi Peninsula.
2. *Riverine estuary* – tidal margins, low salinity, e.g. junction of Mangrove Creek with the Hawkesbury River.
3. *Inland sclerophyll forest* – upper valley catchment, fresh water, e.g. Upper Mangrove Creek.

Surveys of these three major eco-systems were supplemented by spot surveys in other areas selected at random during the course of the study (Vinnicombe 1980).

Her results proved to be very important in terms of site locational modelling. Her study recorded over 240 sites. Below she explains her results in relation to environmental site location factors such as water, type of sandstone, land-unit, aspect, site size, site contents etc:

“Site location and prediction is discussed in relation to water resources, geology, topography, and aspect. Site content is based on data distilled from the 243 sites located and recorded during the course of intensive surveys. In addition to the above are the many sites which were recorded during spot surveys and ad hoc inspections.

Rock-shelters were numerically predominant among the sites located. The combined number from the three intensive surveys was 127 shelter sites and 469 potential habitation shelters, totally 596 shelters in all.....

Generally speaking, the availability of water was not found to be a critical factor in site location. Indeed, where shelters have art but no appreciable habitation deposit, water is not a pre-requisite to site selection. Although the initial assessment of the availability of water in relation to shelters near ridge tops is that permanent water could be obtained only from major creeks in the valley far below, or from seasonal creeks in the nearest lateral or side gully, an intimate knowledge of the terrain often proves this assumption to be incorrect. In many places, especially on terraces near ridge tops, or in association with exposed bands of rock, there are rock holes and aquifers or seepages of water. Many of these are dependable even in very dry weather, and a small amount of preparatory excavation in the clay substrate near seepages or drips will allow a sufficient collection of water for drinking purposes.

The majority of rock-shelters are located on steep valley slopes in Hawkesbury Sandstone. They may be distributed anywhere up and down the slope, but are usually associated with exposed sandstone bands. The average elevation above creek level (not sea level) is 50–60m (Exhibit 4). Both the highest exposure of Hawkesbury Sandstone where the plateau

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falls away, and the lowest exposure when the Hawkesbury Sandstone meets the Narrabeen Group, are preferred localities for shelters.

Habitation sites are more likely to occur near the valley floors while art sites tend to occur in the larger shelters immediately below the ridge top.

ii. Size

The size of rock-shelter sites varies considerably, and there is no inter-correlation between shelter length, depth or height. The size of shelter selected as a site in the Bouddi Peninsula ranges from length 0.5–42m, depth 1–14m, height 1–7m, and floor area 1.2–196m². At Spencer the sizes range from length 2.5–26.5m, depth 0.5–15m, height 1–24m, and floor area 2–300m². At Upper Mangrove, the sizes range from length 2.5–26.5m, depth 1–7m, height 1.15–8m, and floor area 3–172m².

All sizes of rock-shelters therefore have to be inspected.

iii. Orientation

Utilised shelters may face in any direction, but a preference is shown for shelters with a northerly or north-westerly aspect, that is, shelters which obtain the sun. Conversely, a minority of sites seem to be selected because they are cool and shaded and face in a southerly direction.

Where valleys are steep and narrow, the south-facing rock bands tend to weather into profiles less suited to habitation than those that are north-facing. There are therefore less potentially habitable shelters to choose from on steep southerly aspects.

At the valley heads where hillslopes are more open and gentle, the geomorphological differences in weathering appear less marked. Shelters suitable for habitation are equally distributed in all directions, but preferences for the choice of northerly shelters are more marked.

iv. Content – Archaeological deposit

Rock-shelter deposits may range from a thin scatter of debris on bedrock with little or no evidence of artefacts or other human usage, to thick accumulations of habitation and sedimentary refuse which may include stone artefacts, bone, shell, ash and more rarely vegetable remains.

v. Content – Art

Location: *Although many art sites are located high up in shelters immediately below the plateau escarpment, art sites may occur at any level of the valley slope, on any aspect, and in any size of shelter. Sometimes situations where art occurs do not even rate as a habitation*

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shelter from the human usage point of view – they are too small and too low to have been used as camp sites. Some art sites appear to have been selected because of unusual features produced by cavernous weathering. Shelters with re-curved ceilings, complex honeycomb weathering and rhythmic or concentric graining are frequently chosen as art galleries.

Within the shelters, the images may be on walls and ceilings, high or low. Art may also be found on the recurved area of the ceiling so that it can only be seen from inside the shelter looking outwards. Images are also often placed within niches or frames of honeycombing, in association with striking iron-stain patterns, or they follow the natural contours of the rock. The disposition of images in relation to one another is also often dictated by natural conformities in the rock.

Techniques: *Rock-shelter art may take the form of wet pigment paintings (rare), wet pigment stencils of hands and artefacts (distribution restricted to certain sites only) and dry pigment drawings (the most common technique in the study area).*

Paintings are predominantly in red pigment, though white and black may also occur.

Stencils are predominantly in white, followed by red, with less common examples in shades of yellow ochre or pink. No black stencils were observed.

The dry pigment drawings are predominantly in black. This is usually assumed to be charcoal, but analytical tests are currently being made to establish whether this is indeed the case. It is possible that some black pigment may be manganese rather than charcoal. Other colours used in the dry pigment drawings are red ochre, white (presumably kaolin though no tests have been made) and more rarely, yellow ochre.

Rock-shelters may also contain examples of engravings in pecked or abraded outline, in fully pecked intaglio techniques, or fully pecked and abraded technique. There are also examples of lightly scratched engravings in which there is a colour difference in the rock rather than an incised line, and what may be areas of rock rubbed smooth without any indication of pigment. Examples of rock engravings within shelters are rare.

Subjects: *The number of images in any given site may vary from one to hundreds. Although the most impressive galleries are often those with the greatest number of images, numbers of superimpositions do not necessarily reflect importance. Some of the smaller sites contain unique compositions or unique subject matter.*

The subjects portrayed are varied.

Stencils are usually of hands or forearms and artefacts such as boomerangs, axes and sticks. Objects other than these are rare. Although shields feature prominently in the engravings, they were not noted among stencils or drawings. Hand stencils include those of children as well as of adults. Both left and right hands occur. No mutilation was noted. The majority of Aboriginal women in the Broken Bay area had the terminal two joints of the little finger on the left amputated when young. It may therefore be deduced that if women stencilled their hands, they refrained from stencilling the left hand.

Paintings and drawings include human beings, both male (indicated by genitalia and the pubic apron associated with initiation) and female (indicated by breasts protruding laterally from the torso). Humans are often represented with arms held high up in the manner adopted when dancing. There are also therianthropomorphic figures which combine both human and animal characteristics. The combination of human with lizard or goanna-like features are the most common.

Of the animals portrayed, macropods are dominant. Emu, fish, echidnas and reptiles are also present. There is marked selectivity in the animals chosen for representation, and noticeable omissions from the art record. With the above exceptions, the smaller animals are neglected, or very rarely represented.

c. Open Camp Sites

i. Location

Open camp sites undoubtedly occur, but they are now sub-surface and are no longer visible. Apart from the shore-line middens, too little data have been obtained on open sites for any reliable predictions to be made. Of the five open sites that were seen during the course of the study, two were on alluvial banks of a creek, and the remaining three were on a high plateau. Theoretically, open sites may occur in any position where the terrain is sufficiently flat to make a camp, and where water is available.

e. Grinding Grooves

i. Location

The great majority of grinding grooves are found on exposures of Hawkesbury Sandstone in creek beds at the heads of valleys. Exceptions do occur on exposure of the Narrabeen Group, principally the Undifferentiated and Gosford Formations, where grooves may be associated with wet sclerophyll or rainforest-type vegetation. In the Brisbane Water survey area, where there is but limited Hawkesbury Sandstone, the number of grooves was markedly lower than in the other areas where Hawkesbury Sandstone is dominant.

Grooves often occur at or near the top of a waterfall immediately above the intersection between the Narrabeen and Hawkesbury Formations, or at the top of a waterfall on a steep side-gully. They are also likely to occur around rock pools on ridge tops or on rock platforms near aquifers. In these situations, grooves are often but not always associated with engravings, and sometimes with water diversion channels. Sometimes there are also associated circular depressions, varying in diameter from 3–8cms, which do occur in nature, but which may also be associated with functional use.

ii. Content and discussion

Grinding groove sites may vary in number from a single groove to hundreds in a single locality, for example Somersby Falls. Since it is calculated that an average groove would take approximately 6 hours to grind, the number of working hours represented by the larger sites is considerable.

Within the survey areas, the greatest number of grooves located at any one site was 81 in Spencer, and 80 in Upper Mangrove Creek, with the average number of grooves per site being 16.5 and 13.5 for the respective areas.

Variation in size between the areas was not found to be great although the length of groove at Upper Mangrove Creek tended to be shorter than at Brisbane Water or Spencer. The average length of groove over the whole area was calculated to be 29.3 cm, width 7.5 cm, and depth 1.2cm. This calculation excludes a number of outsize grooves, much wider than the average, and usually longer as well as deeper. These grooves suggest a usage other than that of grinding axes.” (Vinnicombe 1980:24-26).

6.9.2.1 Vinnicombe’s Conclusion

In her estimation of site density across the entire 1634km² of Gosford/Wyong region, Vinnicombe (excluding some 550km² of siltstone and shale) argues for an average site density of 18 sites/ km². She predicted that 13 times more sites are likely to be located in an area of 1579km².

In her analysis of significance the key site attribute factors Vinnicombe argued for were:

- Aspect.
- Content and likely Potential Archaeological Deposits (PADs).
- Location in the landscape.

6.10 Potential Archaeological Deposits

Vinnicombe (1980) in her work in the Gosford/Wyong region introduced the concept of PH; or Potential Habitation Shelter. Later Sullivan (1978) further refined the term to Potential Archaeological Deposit. Here Vinnicombe explains the basis of her argument for assessing PADs:

“A satisfactory accumulation of deposit therefore only occurs if the site was utilized to the extent that a more or less level platform became built up, or if blocks of stone fallen from the roof of the shelter formed lintels against which the deposit accumulated. Shelters with a deposit suitable for excavation are mostly of the latter category. Evidence of casual and infrequent use of shelters with outward sloping floors may well have slipped downslope beyond the drip-line, and subsequently become concealed by vegetation and leaf litter. And where there has been some accumulation of deposit, the continued process of deposition from active erosion of the shelter or from external slope-wash, may conceal evidence of human occupation. Test pits excavated in shelters with floor deposits but with no visible surface artefacts have proved that 10 out of 14 such tested sites do in fact contain evidence of usage (Vinnicombe and Attenbrow 1978; Attenbrow 1980). It is therefore certain that many more shelters were utilised by the Aborigines than is suggested by the present study, which is based principally on surface evidence.” (Vinnicombe 1980:VIII:3-4)

The recording and testing of PADs by Attenbrow in the Mangrove Creek Dam study revealed much additional evidence about Aboriginal occupation of the area. By the end of the Attenbrow’s excavation program, 24 sites with archaeological deposit had been identified, *one-third* of which were identified only through the testing of PADs.

6.11 Research Issues Arising from Attenbrow’s work

A number of research questions/approaches arise out of Attenbrow’s work and these can be summarised in the following way:

- It would be fruitful to look at the various aspects of a larger catchment’s archaeological record as an integrated body of data (cf. Nelson 1991: 57–8, 89–90).
- All archaeological traits and their assemblages, all materials and manufacturing processes and their tool-kits should be considered.
- The issue of raw material selection and reduction sequences as they relate to the concept of mobility and risk, and the degree of risk involved in acquiring a certain resource needs to be considered (Myers 1989: 84, 90–1; Odell 1996: 53; Torrence 1989a: 61–2, 2001: 88).

- The incorporation of such test excavations in future development projects where potential archaeological deposits exist, whether in rock-shelters or in open countryside, is essential (Attenbrow: 2004:245).

6.12 Macdonald: Early Ceremonial Use of Ridge-Systems

In her 1992 study of a site known as Mt Yengo 1 (Big Yengo 1) located above the McDonald River within the Hunter Range (some 70km south-east of the study area), Joe MacDonald recorded engravings which appear to be older than an initial occupation date of 5980 ±290 years BP for the main shelter site. Further dating and excavation has shown the most intensive period of occupation for this site is between 2000 and 1500 years BP declining after 540 ±180 years BP. The most interesting evidence for this site is the difference between the stencil art work and the rock engravings. The latter appears much older and therefore there is a possibility that early occupation of the Hunter Range is associated with ceremonial use of elevated ridge systems. At least 90% of the engravings are of circles with two of them having a pecked central dot. There are macropod and bird tracks pecked solid (intaglio technique). MacDonald has described this art style as Panaramitee.

The painted and stencil art contains figurative styles with two anthropomorphs, an emu and an eel present. Hand stencils, bird tracks and parallel lines are the most commonly recorded motifs. Also included in the stencilled art are boomerangs, clubs, straight sticks and axe motifs. MacDonald also reports a rare art style technique called 'paint wash' (MacDonald 1992).

6.13 Site Prediction and Site Location Factors

Site selection factors can be broadly classified as factors that influence hunter-gatherer prehistoric land-use patterns. Significant among these factors are environmental and social parameters for settlement. Environmental factors can be summarised as involving access to permanent water, availability of flat dry ground, avoidance of cold air drainage, access to a variety of resource zones, visible aspect across variable terrain, protection from prevailing winds and terrain or topography providing access to other settlement areas.

Social or cultural factors can be summarised as involving territorial boundaries, social grouping and family size, ceremonial and ritual requirements, mobility networks and seasonal resource requirements.

According to Vinnicombe (1980), Attenbrow (1987, 2003, 2004), Pearson (1981), Haglund (1981, 1997) Kuskie and Clarke (2001) and more recently Navin and Officer (2005) at Wilpinjong, Hamm (2006) MCP Stage 1 and Kuskie and Clarke (2007) at Ulan, several topographic and landform factors will influence where sites are likely to be found within or near the study area. These can be summarised accordingly:

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- The presence of water with extensive artefact scatters close to relatively permanent water (springs, soaks, rivers and permanent creeks) and sparse artefact scatters adjacent to the intermittent streams is important.
- Following Attenbrow (2004) and Vinnicombe's (1980) example: Rock-shelters without archaeological evidence, but with particular dimensions and characteristics, are likely to contain archaeological materials. These rock-shelters are called *potential archaeological deposits* (PAD shelters). A rock-shelter was deemed to be a PAD if it had dimensions of 2m x 1m or space for at least two people to gain 'adequate shelter'. The following criteria were used in the field:
 1. *Floor space*: suitable for two people to sleep in a curled-up position, that is, flat and horizontal with a minimum area of 2m x 1 m.
 2. *Height*: sufficient for two people to stand or stoop in a comfortable working position, that is at least 1.2m high.
 3. *Protection*: the overhang is deep enough (from dripline to back wall) to protect the floor area from weather, that is, 1m minimum.
 4. *Dryness*: the floor (or part of it), and inside the rock-shelter generally, must be dry.
 5. *Accessibility*: the rock-shelter must be easily accessible.
- Campsites are likely to be well above flood levels while minor sites will tend to be on well-drained areas such as minor spurs, low hills or the banks of deeply incised streams.
- Sites within forest landscapes are likely to occur within 150m of water sources.
- Valley floor and basal valley slope landforms are likely to contain the greatest diversity of occupational materials with upper valley slopes the least likely to contain site potential.

It is clear from the above review that site locations within the Goulburn River and its tributaries like Wilpinjong, Moolarben Creek and Murrumbidgee Creek floodplains are significantly influenced by elevated ground which can provide a safe haven from flood waters and access to ecological resources. The density and quality of spring-fed stream systems is another important site location factor. The shape and width of open and closed valleys is also likely to be important, especially when winter and summer weather conditions are considered.

Rich ecotones are likely to be found where lowlands dissect floodplain land units producing rich wetlands and swamps. These places are more than likely to have been favoured by Aboriginal people living in pre-European landscapes. Another

important site location factor is likely to be access to stone tool raw material resources as a majority of reported artefacts are made from quartz, cherts and tuffs and some of these raw materials may outcrop on some ridge systems.

6.14 Site Visibility-Site Detection Factors

One of the most important factors in locating sites or artefacts on the ground is whether they can be detected or discovered easily. A number of discovery factors will affect how well sites or artefacts are located within a survey area. Schiffer, Sullivan and Klinger (1978) provide a useful summary of what the most important factors are likely to be in detecting sites or artefacts on the ground (see Table 5 below, taken from Dancey, 1981)

Table 5: Site detection factors that may affect an archaeological survey (after Dancey 1981)

General Factors	Definition	Specific Examples
Abundance	The frequency or prevalence of site or artefact type in the study area.	Sites and artefacts occur in highly variable quantities, from rare to abundant.
Clustering	The degree to which archaeological materials are spatially aggregated.	Various degrees of clustering may be found between dispersed and clustered.
Obtrusiveness	The probability that particular archaeological material can be discovered by a specific technique.	Artefact size, composition, surface morphology, heat retention, and other physical, chemical and Biological properties.
Visibility	The extent to which an observer can detect the presence of archaeological materials at or below a given place.	Site area, artefact density, artefact size, surface area of exposure, frequency of exposure.
Accessibility	The effort required to reach a particular place.	Climate, biotic environment, terrain, roads, land holding patterns.

6.15 Significance of Water and Access to Plant and Animal Resources

Two environmental factors are likely to be important to interpreting the archaeological evidence from this study; the location of spring-fed systems and the productivity of ecotones between catchments.

We know from work undertaken by Brayshaw (1986) Pearson (1981) and Vinnicombe (1980) that Aboriginal use of a range of plant and animal resources in and around the Ulan Region was dependent on understanding seasonal availability. Much of this evidence comes from observation made of coastal Aboriginal populations or observations made near first settled districts (i.e. Bathurst, Mudgee, Newcastle, Parramatta, etc.) rather than in remote

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mountainous terrain. Table 6 below, sets out the more common economic plant and animal foods recorded by early settlers and observers.

Table 6: Common economic plant and animal foods recorded by early settlers and observers

Species Name	Source	Common Name/ Use
<i>Blechnum</i>	Barrallier (1802)	Rhizome/fern roots roasted in ashes
<i>Dioscorea traversa</i>	Backhouse (1843)	Yam. Often found near brooks
<i>Doryanthus excelsa</i>	Three-D (1843)	Giant Lily. Stems and roots roasted cooked and made into paste/Johnny cake.
<i>Zamia spiralis</i>	Threkeld (1843) Backhouse (1843)	Cycads. Seeds soaked for several weeks in swamp. Pounded and roasted.
<i>Exocarpus cupressiformis</i>	Cunningham (1825)	Native/Wild Cherry
<i>Sterculia heterophyllus</i>	(Cunningham 1843)	Kurrajong. Capsules roasted and made into paste.
<i>Themeda australis</i>	(Cunningham 1823)	Grass seeds ground for paste like Johnny cakes.
<i>Xanthorrhoea resinosa arborea</i>	(Threkeld in Gunson 1974)	Grass Tree. Nectar eaten from flower stems – stems used for spear shafts. Resin used in hafting.
<i>Acmena smithii</i>	Hunter (1793)	Lillipilli. Edible fruit.
<i>Persoonia sp</i>	Hunter (1793)	Geebung. Fruits eaten or flowers.
<i>Doryanthes excelsa</i>	Backhouse (1836)	Giant/Gynea Lily. Stems roasted and eaten.
<i>Lomandra longifolia</i>	Threkeld in Gunson (1974)	Long Leaf Mat Rush Edible stems and strips for making dilly bags and reed mats.
<i>Ostrea angasi</i> <i>Anadara trapezia</i> <i>Velesunio sp.</i> <i>Pyrazus ebeninus</i>	Threkeld in Gunson (1974) Ebsworth (1826)	Lakes and shallow estuaries. Mud Oyster Sydney Cockle Freshwater Mussel Mud Whelks.
<i>Anguillidae</i>	Collins (1798)	Freshwater eels Caught in narrow channels near lakes and rivers using basket nets

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Species Name	Source	Common Name/ Use
<i>Macropus major</i> <i>Macropus robustus</i> <i>Wallabia bicolour</i>	Fawcett (1898)	Eastern grey kangaroo Eastern Wallaroo Swamp wallaby Caught by netting in forested areas. Burning patches of grass to attract new growth and game.
<i>Perameles nasuta</i>	Ebsworth (1826)	Long Nose Bandicoot
<i>Trichosurus vulpecular</i> <i>Pseudocheirus laniginosus</i>	Dawson (1830) Meredith (1846)	Possums – ring tail and brush tail. Caught by cutting hole into trunk of tree. Access by cutting toe holes in tree. Important food staple. Favoured in spring.
<i>Tachyglossus aculeatus</i>	Collins (1798)	Echidna. Cooked in ovens. Eggs highly prized.
<i>Varanus varius</i>	Backhouse (1843)	Lace monitor or goanna
<i>Egernia sp.</i> <i>Agamidae sp</i> <i>Monelix spilotes</i>	Backhouse (1843) Graham (1863) Oxley (1820)	Lizards and snakes Skinks, dragons and pythons. Cooked roasted. Cooked in pit.
<i>Dromaius novaehollandiae</i>	Collins (1798) Hunter (1793)	Emu. Hunted using boomerang and clubs.
Grubs	Backhouse (1863) Meredith (1844)	Root grubs from gum trees. Seen as luxuries.
Waterfowl various species	Mundy (1815)	Caught in nets in major wetlands. Hunted using large boomerangs.
<i>Chelonda longicolis</i>	Backhouse (1843)	Tortoise. Caught sunning on logs in rivers.
Fish various species	Meredith (1844) Graham (1839)	Mullet, catfish, cod and perch. Caught using nets, snares and spears. Some nets made from stringy bark.

6.16 Site Definition and Problems of Site Recording

A significant issue in recording hunter-gatherer open space occupation is how to define an occupation location or 'site'. The DECC advise developers and Consultants that the term 'site' is used to group objects or define a location where a relic or cultural item occurs. The general criterion used to define sites is set out below. Sites may be:

- Exposures where archaeological evidence is revealed.

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- Topographic or land form units where occupation evidence has been recorded. This may be an entire landform unit (ridge, creek, valley) or part of a landform unit (saddle on ridge, creek bank).
- Locations having physical boundaries defined by rocks (stone arrangement), or earthworks (mounds) or cleared land (ceremonial ground).
- Locations having cultural significance to Aboriginal community groups.
- Locations having an arbitrary boundary or the assignment of a boundary for the convenience of recording (in cases where the site would probably be much larger if based on the criteria above). Arbitrary criteria include the use of a fence-line, dirt track or gully as a boundary. In some cases the area may simply be designated as 50m x 50m, or as a smaller sample plot, on the basis of convenience.
- Locations having a specific artefact density. In some cases a site boundary may be defined by the average number of flakes per square metre. This is a specialised type of arbitrary criterion and justification of the rules used must be made explicit.

The chosen definition of a site or isolated find needs to be specified for the study. It is the Consultant's responsibility to decide on an appropriate definition, suited to the particular project, the research goals and comparability with other regional studies. DECC requires site forms to be completed for isolated finds.

In addition to the above, the NPW Act 1974 (amended) also defines an Aboriginal object as:

“any deposit, object, or material evidence (not being a handicraft for sale) relating to indigenous and non European habitation of the area that comprises New South Wales being habitation both prior to and concurrent with the occupation of that area by persons of European extraction and includes Aboriginal remains.” (NPW Act 1974, section 5: Part 1 pp: 8–9)

Other issues concerning site integrity, site formation and factors of disturbance have been argued by a number of authors. The work of Schiffer (1987) helped describe the patterns of transformational processes, both cultural and non-cultural that create the archaeological record. Following on from this Hurst Thomas (1991) argues four distinct cultural processes that affect the final condition of the archaeological record (i.e. especially for open space occupation). These processes are defined as 'deposition, reclamation, disturbance and re-use' (Hurst Thomas 1991:132). These processes are briefly described below.

Deposition: These are actions, usually cultural in origin, that cause the accumulation of the archaeological record. This can be simple discard of cultural material at a site, burying the dead or the construction of a hearth. Size of

cultural objects is one major influence on the way cultural objects are incorporated into the cultural deposit. This is called the 'size-sorting effect'.

Reclamation: This is the process whereby archaeological material is reincorporated back into a systemic context. Examples of this would be people re-using occupation areas or new people settling on an old campsite location that has been abandoned by another family group.

Disturbance: This process mainly refers to human or natural actions, which transform the archaeological record from its origin depositional context. Human actions would refer to prehistoric land-use patterns where materials are swept away or moved from a campsite to clear the ground. Modern human actions would be: Vegetation clearing on hill-slopes increasing sheet erosion and removing small artefacts that are redeposited on lower slopes and flats. Removal of old trees containing scars or carvings on them. Dam building and road building causing an increase in surface erosion and possible destruction of buried deposits. Cattle walking across sites causing artefacts to be scuffed, broken or working edges damaged. Trees falling over causing displacement of sub surface artefacts. Bushfire causing a heat distortion effect with surface artefacts and the collection of charcoal. Natural processes can refer to downslope slippage, gully and sheet erosion, and bioturbation by tree roots and insects.

Re-use: This process usually refers to how people may re-use cultural objects in a different way for a different purpose. An example could be stone tools used for another purpose or hearth stones used as anvils etc.

Given the above site disturbance factors, any comparison of open sites and their content can only be used as an indication of land-use in land unit context. The comparison will be limited in determining the true extent of occupation, unless ground exposure is uniform across several land units and measured at a consistent scale.

6.17 Stone Technology and its Variability

Hunter gatherer occupation sites or campsites (ie. rock-shelter or open space) are likely to have a broad range of tool types due to the variety of activities undertaken at a site over a certain period of time. These types of sites are contrasted to the more specialised sites where food gathering or hunting requires a more restricted range of tool kit. Tools that are broken or exhausted are often found at these types of sites as well as resharpening flakes from a tool user carrying out tool maintenance (Kooyman 2000).

Lithic analysis can also lead to information about where a tool may have been manufactured and why it was discarded. The analysis of lithic debitage can also provide information on whether the tool was manufactured close to a quarry site or transported from a distance. Evidence such as the amount of decortification flakes, unmodified or broken flakes or flakes with specific types of platform can all lead to an understanding of the stages of tool manufacture.

Modelling of prehistoric hunter gather behaviours using lithic analysis has led some researchers to speculate on the level of sedentism or mobility. The assumption that mobility of a group limits the type of the toolkit has been put forward by a number of researchers (Walker 1978, Bleed 1986, Bamforth 1986). Conversely, greater sedentism usually means groups will have a greater range of resources to choose from at one site and thus their toolkits will contain more variety (Odell 1994). The more mobile a group is the more likely it is to standardise its core technology (Odell 1994).

Curation of tools is another important consideration in assessing lithic variability. Odell (1996) argues that curation will usually reduce the need for raw material supply. This leads on to the concept of gearing up or preparing tools in advance of use. This further raises the question of the functionality and versatility of tool types that may or may not tell us something about how prehistoric hunters maximised opportunity when using a range of landscape in the past.

6.18 Sample Size Considerations and Inter-Site Comparisons

An article by Hiscock (2001) on the effects of sample size on the interpretation of archaeological patterning of Holocene stone artefact assemblages requires some consideration in comparing sites across landscapes. The central issue for most consulting reports is the recording of rarer types of artefacts (i.e. backed artefacts) in relation to the entire site assemblage. Comparing the variation of assemblages between sites and using this to define site function may be refuted on the grounds that the sample sizes of site assemblages are too small to provide statistically valid comparisons.

Hiscock explains his proposition by using a hypothetical example:

“Even in sites where only one specific kind of knapping activity takes place, such as the manufacture of backed artefacts, the various objects employed and created will be probably discarded at different rates. For instance, many flakes will be rapidly discarded, cores are likely to be discarded less frequently, backed artefacts less frequently still, and hammerstones may be rarely thrown away.

These differences in the likelihood of discard relate to a number of factors, including the length of ‘use-life’ of each kind of object. When only a few of these objects have been discarded it is likely that the assemblages will be dominated by only those classes of object that are discarded frequently such as flakes and cores in this example. As occupation of the site continues and the size of the assemblage grows with further discard of material, it is likely that objects such as backed artefacts and hammerstones may be eventually discarded.” (Hiscock 2001:50)

Hiscock further argues that a sample required to contain all possible categories of artefacts in a particular locality is proportional to the relative abundance of the rarest artefact type. Thus while some sites or regions with sample sizes of

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between 50–100 may be adequate, sites in other regions with 1000– 10,000 may be too small to provide a more complete assemblage composition. As Orton (1992) has put it, there is no absolute sample size in which all sites or regions are likely to contain an adequate sample of the total variation in assemblage composition.

7 Environmental and Landscape Context

7.1 Land System Features of Study Area: General Characteristics

The study area falls within the Sydney Basin physiographic land system (Murphy & Laurie 1998). Generally the land is described as having low undulating hills and hillslopes from 400–680m above sea level on sandstone plateaus with extensive rock outcrop. Narrabeen Sandstone is the dominant parent rock along ridgelines. Parts have lower colluvial slopes of sandstone plateaux escarpments with low undulating rises and creek flats. Three soil landscapes are found within the study area and these are: Lees Pinch, Ulan, Bald Hill and Munghorn Plateau (Murphy & Laurie 1998; See Figures 8 & 9: Appendix 2 and Table 7 below).

Table 7: Soil Landscapes of the study area (after Jammell Environmental Planning Services 2005)

Landscapes	Landform	Lithology	Typical soils	Limitations
Ulan	Low undulating rises and creek flats. Elevations between 360–570m. Slopes between 2–10%. Local relief varies between 10–40m.	<i>Undifferentiated and Illawarra Coal Measures</i> Shale, sandstone, conglomerate, chert, coal and torbanite.	Yellow podzolic, yellow solodic/solonetz, yellow and brown earths, and earthy sands.	Mod. to high erosion hazard and susceptible to soil structure degradation. Imperfectly drained on the lower slopes and depressions. High soil salinity levels and low soil fertility.
Lees Pinch	Sandstone plateau and hillslopes with boulder debris. Elevations between 400–680m. Slopes between 15–40%. Local relief from 60–240m.	<i>Narrabeen Group and Illawarra Coal Measures</i> Sandstone, Wollar sandstone, conglomeratic sandstone, chert, shale coal, torbanite.	Shallow siliceous sands, shallow acids, yellow earths, yellow podzolics.	Steep slopes are high erosion hazard when cover is low. Very low fertility, acidic surfaces. Low to very low water holding capacity and high permeability.
Munghorn Plateau	Low undulating hills form plateaux from 600–700m. Slopes from 3 – 10% and local relief varies from 20–60m.	<i>Narrabeen Group and Illawarra Coal Measures</i> Sandstone, Wollar sandstone, conglomeratic sandstone, chert, shale coal, torbanite.	Shallow siliceous sands, shallow acids, yellow earths, yellow podzolics.	High to very high erosion hazard when ground cover is low. Low soil fertility and low water holding capacity.

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Landscape	Landform	Lithology	Typical soils	Limitations
Bald Hill	Low hillocks with elevations from 460–600m. Slopes 10–35%. Local Relief from 60– 20m. Drainage lines are 300–500m apart	<i>Tertiary Basalt</i> , Olivine basalt, dolerite, teschenite.	Euchrozems – chocolates Intergrades, Chocolates.	Steep slopes with rock outcrops; stoniness; mod to high fertility and water holding capacity.

Source: Adopted from DLWC (1998) and Jammell (2005).

7.2 Landform Units Distribution in the Study Area

The study area is dominated by numerous intermittent watercourses which flow into Moolarben, Murragamba and Wilpinjong Creek systems. To the north and west of the study flows the Goulburn River. The area is bounded by a series of sandstone ridge systems (i.e. Moolarben, Munghorn and Lennox) of Narrabeen Sandstone which reach elevations of 620m. Within the alluvial valley of Moolarben Creek, low undulating rises and flats dominate the topography. Relief is 10–40m. The Ulan soil landscape makes up approximately 60–70% of the entire study area, followed by the Munghorn Plateau approximately 15% (see Figures 8 & 9: Appendix 2).

7.3 Climate, Geology and Soils

The climate of the study area has been defined by Edwards (1979) and is described as having rainfall of 575–670mm, with hot summers and mild to cold winters. The study area is reasonably protected from severe southerly and westerly winds. The geology consists of Triassic Narrabeen Sandstones overlying Permian Sedimentary rocks of the Illawarra Coal Measures. Shale, sandstones, conglomerate, chert, red and green mudstones are found within the study area (Murphy & Laurie 1998). Research shows the greatest influence on soil development within the study area has been the bedrock sandy conglomerate(s) and throughout the majority of soil profiles examined, textures generally ranged from gravely sandy clay loams to sandy clays.

7.4 Vegetation Communities

The vegetation of the study area has been characterised by Aitkens (2008). His general vegetation community description is set out below.

7.4.1 Vegetation of the Valley Floor

Woodland remnants throughout the predominantly cleared valleys are generally restricted to creek lines and road corridors. Some areas of remnant vegetation also exist as isolated patches within the agricultural landscape. Many of these remnant woodlands and forests are floristically variable, with some being characterised by White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and

Blakely's Redgum (*E. Blakelyi*). The community characterised by these species is listed as 'critically endangered' under the *Threatened Species Conservation Act 1995* (TSC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Grassy White Box Woodland). Woodlands dominated by Rough-barked Apple (*Angophora floribunda*) are commonly found along the creek lines, often in association with Yellow Box (*E. melliodora*) and Blakely's Redgum (*E. Blakelyi*). The adjoining sandy terraces of the Permian geological period also host monotypic communities dominated by Rough-barked Apple (*A. floribunda*). More clayey soils support communities dominated by Grey Box (*E. moluccana*).

Near the juncture of the Triassic and Permian geological formations is a layer of tuff that supports Slaty Box (*E. dawsonii*) woodlands. This vegetation community often supports a grassy understorey similar to the White Box Grassy Woodlands of the central tablelands. Immediately upslope of the Slaty Box (*E. dawsonii*) Woodlands near the footslope to the adjoining ridgeline midslopes are Ironbark forests dominated by Narrow-leaved Ironbark (*E. crebra*). Other species may include Caley's Ironbark (*E. caleyi*), Broad-leaved Ironbark (*E. nubula*), Red Stringybark (*E. macrohyncha*) and Grey Gum (*E. punctata*). *Goodenia macbarronii*, an annual herb that is listed as threatened on the TSC Act and EPBC Act, has been located within the majority of these communities, particularly near the juncture between the Triassic and Permian geological formations.

7.4.2 Vegetation of the Mid-slopes

The majority of the mid-slopes throughout the locality are vegetated due to the unsuitability of these landscapes for agriculture. A variety of communities occur along these slopes with some being characterised by White Box (*E. albens*), while others being dominated by Ironbark. Soils derived from sandstone are generally characterised by Ironbarks such as Narrow-leaved Ironbark (*E. crebra*) and Broad-leaved Ironbark (*E. fibrosa*). Grey Gum (*E. punctata*) also occurs in association with these species.

Mid slopes with soils derived from shale are generally steep and are relatively fertile in comparison to the sandstone dominated communities, thus supporting a vegetation community dominated by White Box (*E. albens*). Similar vegetation dominated by White Box (*E. albens*) is also found on basalt derived soils, which is comparatively of greater grass and herb diversity than the shale derived woodlands. The understorey of White Box (*E. albens*) is generally grassy with few shrubs. This community is likely to fall under the 'endangered' listing, as specified on the schedules of the TSC Act and EPBC Act (Grassy White Box Woodland).

7.4.3 Vegetation of the Ridgelines

The majority of the ridgelines throughout the locality are vegetated rather than utilised for agriculture, probably due to the poor soil fertility that is associated with Triassic sandstone geologies. Principally, two communities occur throughout this

landscape, these being Scribbly Gum (*E. rossii*) woodlands and Ironbark forests. Shale enriched sandy soils are generally characterised by Ironbarks such as Black Cyperus Pine (*Callitris endlicheri*), Narrow-leaved Ironbark (*E. crebra*) and Broad-leaved Ironbark (*E. fibrosa*). Grey Gum (*E. punctata*) and Stringybark (*E. euginoides*) also occur in association with these species. The predominantly shrubby understorey of this broad vegetation class is mostly dominated by prickly species such as *Acrotriche rigida*.

Sandier infertile soils generally support woodland vegetation dominated by Scribbly Gum (*E. rossii*) and Narrow-leaved Ironbark (*E. crebra*). Rocky outcrops throughout these landscapes support localised occurrences of mallee dominated by Dwyer's Redgum (*E. dwyeri*) and various heath species. Creek lines within these landscapes are generally characterised by Scribbly Gum (*E. rossii*) and Parramatta Redgum (*E. parramattensis*), particularly in the first order ephemeral drainage lines. Semi-permanent creeklines are generally supportive of Scribbly Gum (*E. rossii*), Rough barked Apple (*A. floribunda*) and Blakely's Redgum (*E. Blakelyi*).

7.5 Land-use History, Soil Disturbance and Ground Visibility

Settlement near Ulan began in the 1850s (Tickle 2006; Roberts 1974). The first agricultural leases were taken up in 1840s. The first houses built date to the 1850s, with one of the first ones being owned by the McDonalds and constructed of stone. Much of the land clearing began after the 1860s, as gradually pockets of timbered country were removed of scrub. River flats and large creek flats were favoured for cropping areas, with wheat and oats being the main crop types used. This activity brought about some ploughing and surface erosion causing run-off and no doubt disturbing potential Aboriginal occupation.

An area just to the north of where an early bridge crossed the Goulburn River on the Cassilis road is considered to have had permanent water and was favoured by local Aboriginal people as a good source of water.

8 Assessment Methodology: Archaeological and Cultural

The Consultant decided to approach the archaeological and cultural assessment design process using the following method:

- Review previous archaeological survey methods and assess their usefulness.
- Consult the local Aboriginal community as to how the ground survey should be carried out and at what scale.
- Consider the rarity of the type of landform that was to be assessed.
- Consult local Aboriginal community groups on how the cultural assessment should be conducted.

8.1 Coverage Data

The survey coverage data was recorded in the following way:

Survey team/survey unit
Survey transect location (GPS MGA)
Land unit
Slope
Exposure/feature type
Visibility of ground surface
Vegetation cover
Vegetation type
Land-use
Drainage type
Distance to water
Soil and rock type
Erosion type
Cultural evidence present

8.2 Field Recording Methods

The consultant put together an eight person survey team consisting of himself, an assistant archaeologist and eight Aboriginal field assistants. The survey was conducted over a 40 day period during October and November 2006, January and February 2007, and additional survey work was also conducted in June 2008. Sample areas were defined by three main constraints (see Figure 10: Appendix 2):

- Areas designated within the Stage 2 MCP development area.
- Available bare ground surface to detect sites.
- The level of disturbance likely for mine development activity areas.

The main mine footprint area of disturbance is located within OC4 following the course of Murragamba Creek Valley and the proposed Infrastructure area. Two areas known as UG1 and UG2 are also proposed for underground mine development.

8.2.1 Field Assessment Search Strategies

The development of effective techniques for detecting archaeological cultural materials is an essential objective of the field assessment search strategy to provide accurate characterisations of significant attributes of the surface archaeology in the Moolarben Coal Project (MCP). Design issues, both practical and theoretical, were addressed in setting out the overall strategy for the search team to pursue in its daily operation. At the centre of the approach is a sampling strategy utilising transects to obtain data sets from key landscape units that will be impacted by the proposal to mine coal at Moolarben.

Several principles underlying the search team's activity identify the techniques that were applied to ensure that data sets were obtained in a consistent and standardised manner. The approach applied in the course of the survey also takes into account past land-use practices that may alter or otherwise modify the preservation, visibility and distribution of cultural deposits that were formed in the landscape prior to the arrival of pastoralism. The following discussion reviews the key elements in the search design.

8.2.2 Transect Definition

In this study, the area of the land unit designated for survey is referred to as the 'transect' which is the land that is set aside from surrounding landscape for the purpose of obtaining sample records. It is an area with clearly delineated boundaries that can be systematically mapped for the purposes of describing its archaeological content. The ideal shape of a transect is a linear polygon that gains at least one of its boundaries by an obvious line such as a fence, track, a row of trees, or a row of flags to serve as a guide to orient the search team at the time of initial formation.

In practice, the area finally searched, however, often mirrored the shape of a pasture or was constrained at least at one of its borders by natural features such as the sinuous alignment of a creek bed, rocky outcrops, or the outer margins of a farm track. Some transects coincided entirely with human made boundaries, such as vehicle tracks, boundary fences, and walking trails because of heightened ground exposure levels offered by these features.

8.2.3 Transect Placement

The placement of transects was influenced most strongly by combined theoretical and practical considerations. While detailed rationale are presented in the context of individual transects below, the general principles are summarised here as follows.

8.2.3.1 Practical Constraints

- Access is limited to land with owner permission and is conditional on owner requests to avoid damage to crops, stock disturbance, or scheduled activities such as lambing, ploughing, etc. Fluctuating conditions of access in some cases prevented the completion of survey activity and in one instance access was withdrawn at the time of survey.
- Heavy rainfall created saturated conditions that either prevented access in certain situations or postponed survey activity for a period of time.
- Precipitous topography, especially in escarpment landscape, limited access and confined routine inspection of rock-shelters to areas with greater ease of access that did not require advanced climbing skills.
- Steep terrain presented safety risks to search team personnel and therefore searches were managed according to the health needs of members to ensure that they were not taking unacceptable risks.
- The land unit that was most suitable on theoretical grounds for sampling was frequently not available or was only partially available at the time of the survey and accordingly less than an optimum data set could be obtained.
- A portion of the land unit that was considered to have less than 20% surface visibility was usually eliminated owing to a reduced opportunity to detect the surface archaeology.
- Transect placement attempted to avoid land in which extensive drainage diversion channels and associated surface scraping were considered to have severely altered the surface archaeology. Land modification of this type was most pronounced in the low-to-mid-slope landscapes in Open Cut 4 where Murragamba Creek had created washouts or colluvium slope wash was severe.

8.2.3.2 Aboriginal Inputs to Placement

The opinions of Aboriginal members of the search team were routinely sought in the placement of transects within the open cut study area. This resulted in the creation or widening of search areas in OC4 (2 transects covering spurs intersecting with ridgelines above the Murragamba Creek Valley) and undertaking

additional survey transects on the western side of Munghorn Nature Reserve (i.e. Transect 42).

8.2.3.3 Theoretical Issues

- A principal theory underpinning the sampling strategy considers that the energy available for human habitation increases along an axis running down the catchment and accordingly residential patterns will be influenced by the flow of water. This model suggests that the biomass increases and the food chain lengthens with the accumulation and flow of water in the drainage network from its headwaters to the lower catchment and that cultural responses to gravity can be measured in terms of discard patterns as a function of topographic relief.
- In its simplest form, this model is based on the theory that the influence of human populations on one another is inversely proportional to the distance between them and that occupation intensity and technological and economic diversity as expressed in terms of artefact density, functional diversity, and organisational complexity will increase downstream. The energy harnessed in a given landscape is derived from the flow of resources originating further up the catchment under the influence of such factors as windfall energy transfer through the habitat (profits), habitat stability, precipitation rates, environmental stress and the distribution of natural resources in the landscape, just to name a few examples of environmental factors.
- Transect alignment to document these responses should then ensure that this pattern is adequately captured by obtaining samples representing topographic relief, prominent soil types, and major vegetation regimes. Transects should be oriented at right angles and parallel to gradient change and they should furthermore sample cultural materials discarded at various points between the lowest and highest elevations in the study area. The ideal orientation of the sample areas sought in the MCP extended along drainage lines, from the drainage line up slope into mid-slope locations, and again parallel and at right angles to ridge tops and escarpment systems. The selection of areas in which to conduct the search, while guided by theoretical concerns, was nevertheless influenced by the practical constraints discussed above.

8.2.4 Transect Size

The transect should be large enough to record the primary attributes of depositional characteristics of cultural materials discarded at any one point in the landscape, concentrating especially on clustering behaviour, boundary limits, site size, industrial character, and artefact density. The most appropriate size is typically determined experimentally during the course of the survey (see Figure 10: Appendix 2).

8.3 Survey Search Techniques: How They Were Done and Their Objectives

8.3.1 Basic Search Technique

The basic search technique (BST) deployed for this project is designed to detect the highest number of artefacts across the entire transect area to give a reasonably accurate account of 100% of the visible surface archaeology. To accomplish this, search team personnel were asked to space themselves at intervals of 6–8m at a starting point in the transect and move slowly forward in a line searching the ground surface and flagging any cultural materials identified as they passed over them (see Plate 1). Individuals were encouraged to fully search areas with the greatest exposure, such as scalds and eroded surfaces, openings in vegetation and cuttings.

Plate 1: Seen here surveying OC3 at Stage 1 Moolarben Creek applying BST in wet conditions, the search team formed comparatively straight lines in open pastures to locate and flag cultural materials on the ground. With ground visibility here estimated to average $50\pm 10\%$, the team effectively identified all medium to large sized stone artefacts in the transect.



Objects were picked up for inspection to confirm artefact identification and if doubts arose, the supervising archaeologist was asked to make a judgment. The progress of the search was expected to slow considerably in areas of high visibility to enable comprehensive detection to take place. This process commenced at an established boundary, such as a fence or a line of trees and when the full length of the transect was searched, the team reversed the process towards the opposite end, with the inside boundary of the search being marked by a line of flags.

A series of sweeps would then be taken in this manner until all of the transect had been inspected. Shape irregularities in the transect required customised

adjustments of this process to guarantee that all areas were covered uniformly. This technique prevents gaps or holes from occurring in the area actually searched and allowed the search to progress rapidly and effectively across all of the area contained within the transect.

The size of the search team varied from 6–8 members depending on the availability of personnel at any given time. The supervising archaeologist was present at all times and is included in this figure of team size.

Variations in the objectives and field conditions gave rise to the development of additional search techniques. Descriptions of these are as follows.

8.3.2 The Walk-Over Search Technique

The walk over search technique (WOST) is aimed at gaining a first impression of the larger cultural materials in a transect in which impairment in visibility caused by standing vegetation, fallen timber, and heavy rock scree rendered detection of smaller objects nearly impossible to achieve. Rock-shelters, scarred trees, boulder faces with grinding grooves, rock water holes, and artistic images are typically identified in a walk over. Smaller objects in the cultural materials inventory such as stone flakes and other elements in the stone technology are considered too small and unobtrusive to routinely detect in this type of setting using this technique. This approach was applied in the Moolarben surveys on or at the boundary of ridge-top transects and in gully landscapes in which the prevailing impediments to detection are heavy forest cover, abundant plant litter, differential lighting conditions, and abundant boulder fields and rock outcrops.

8.3.3 Intensive Search Technique

The objective of the intensive search technique (IST) is to closely examine surface exposure in which low numbers of artefacts are expected to occur but detection is considered to be difficult due to abundant gravel or stone accumulation that hamper identification. This technique was deployed in creek beds running through gully floor sediments, which typically are exposed in vertical embankments, infill fans, or animal burrows in OC4. It was occasionally employed in the alluvial valley transects in order to investigate small scale fine grain artefact concentrations where visibility patterns allowed only limited vision. Whether carried out in the valley or gully landforms, the search proceeded at a crawl, often with team members stooping over or assuming positions on their knees. The purpose of this technique is to gain detailed artefact records of habitation in potentially significant landscape features where exposure is geographically so limited as to require special search responses.

8.3.4 Shelter Search Technique

Natural rock-shelters, overhangs, and shelters created by leaning stone slabs were specifically targeted for systematic inspection by the shelter search

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technique (SST), with four objectives being identified. These were to identify and describe:

- Artefacts on both floor sediments and the adjacent talus slope that typically forms at the outside edge of sandstone ceilings beyond the dripline. Searches of the talus were expected to be thorough and comprehensive, but compliance rates depended on the preference of individual search team members, some devoting seconds, others minutes of search time.
- Sedimentary sections exposing floor deposits created in animal burrows or by erosion so as to evaluate the depth of accumulation and possible artefact content.
- Artistic images on the walls and ceiling of the enclosed space.
- Grinding grooves in rocks inside or adjacent to the shelter.

8.3.5 Principles of the Search

There are several technical issues addressed in the design of the search as an operation that were addressed in the MCP (Moolarben Coal Project). These are as follows:

- The principle of searching areas within a given transect where visibility permitted detection was seen as a major objective of the search strategy. Where visibility was greater than an estimated 50%, search team personnel were asked to inspect 100% of the ground surface. Conversely, where visibility was less than an estimated 20%, and hence detection levels were greatly reduced, the area was considered unsuitable.
- Some cultural materials such as anvils, cores, hammers and grinding stones are large enough to locate despite limitation in visibility. Conversely, the smaller component of core reduction processes in tool manufacture is typically too small to consistently detect by the techniques adopted in this project.
- An essential objective of the basic search technique was to ensure that uniform coverage was maintained so that artefact inventories could be regarded as a reliable indicator of the surface archaeology. This approach is considered to produce more accurate records than the practice adopted by previous projects of spacing searchers 50m apart and allowing rapid movement across the transect regardless of different conditions of visibility.

8.3.6 Visibility In Transects

The effective coverage maintained by survey personnel is a measure of both the area of the ground surface that is available for viewing and that which is in some

way obscured from vision. Visibility is usually expressed in terms of a percentage of the visible surface area and should be accompanied with an expression of the variability across the search area. Some of the factors affecting visibility include the standing vegetation, breakdown products of plant fibre, layers of sediment overfill, and accumulations of stone, timber and other naturally occurring materials. A comparison of survey results between transects should take in to account the influence differences in visibility exert on the findings. The following observations summarise the main issues encountered in calculating visibility across landforms surveyed up to this point.

8.3.7 Pastures

Pastures blanket the valley floor and extend upwards to mid-slope locations where rocks commonly outcrop. They constitute more that 90% of the development footprint. A freshly ploughed pasture offers the best visibility until crop growth or grazing changes the character of ground cover and the nature of the ground surface itself. A comparison of three groups of transects on the drainage lines illustrates the role localized environmental and land use patterns strongly influence the detection of cultural materials in pastures with different histories.



Plate 2: Shown here in Survey Transect (encompassing an erosion gully caused by diversion of surface runoff through a railroad culvert) is a typical example of marked differences in visibility patterns seen at a micro-scale between the red soil and the stubble in the surrounding pasture. Visibility of the red soil is estimated at greater than 90%, whereas that of the pasture varies between 30-70% per square metre due to different quantities of loose plant material, live weeds, and matting formed by a combination of both plant material and fine sediment. Search team members were asked to slow the search to concentrate in areas of high visibility such as this. As expected, no artefacts were discovered here.

The paddocks with the best visibility in conditions presenting the lowest degree of variability are located on Murragamba Creek in OC4 (Transects 16–19 See Figure 10 Appendix 2) and where recent sheep grazing had removed topsoil in Transects 21 and 23. Both were freshly ploughed 2–3 months prior to the survey and exhibited short crop growth that is estimated to obscure 10% of the ground surface, giving an effective coverage of 90%. In these cases, the tilling appears to have

imposed uniform visibility by removing the vegetation and therefore the effective cover applies evenly across each of the sample transects.

Where a survey transect is nearly devoid of vegetation and is by definition 'bare', trampling by cattle when the soil was saturated has compressed almost all rock into the ground within some fenced paddocks. In this situation, artefact detection is difficult to achieve locally owing to the formation of a fine sediment coating, which obscures an estimated 30% of the ground surface. Accordingly the visibility factor is 70% \pm 10 for this small transect.

8.3.8 Mid-Slope Transects

The visibility in transects located in this section of the landscape is generally the product of partial vegetation modification at the upper margins of the cultivation zone and the existence of natural stands of vegetation that may contain a mixture of indigenous and exotic species. Exposures with greater than 20% visibility are typically confined to former residential clearings, farm or logging tracks, and fire affected openings and the opportunities for artefact detection are necessarily limited. Searches have accordingly concentrated on these areas wherever possible owing to the generally closed nature of the forest setting generally. In light of this the visibility observed in the tracks, while highly variable, provided the best opportunity to examine the surface archaeology. As measured across the full width of track transects, the visibility ranges in this position in the landscape type between 30–80%.

8.3.9 Ridge Top and Escarpment Transects



Plate 3: Typical rock escarpment



Plate 4: Typical rock-shelters and overhangs

Visibility estimates for the higher more precipitous settings in the study area are much more difficult to calculate than any other landscape type owing to contrasting vegetation growth patterns, plant litter, and the imposing contribution presented by sandstone formations and their associated scree slopes (see Plate 3). Bare rock is present everywhere including on animal paths and beneath the understorey that typically is dense and difficult for searchers to penetrate (see Plate 4).

Soil appears to be limited in distribution on slopes and is typically exceedingly thin. Lighting conditions, sometimes presenting as harsh contrasts of light and dark or made dim on overcast days, significantly hampered artefact recognition. The only location in this landscape in which artefact searches could realistically succeed in the time schedules provided included animal paths or tracks and around the opening of shelters. Visibility of these particular areas is estimated to vary between 60–95% per square metre, but the areas themselves are unlikely to represent as much 5% of the total transect area being searched.

8.4 Recording Field Results

A team of archaeologists followed the search team through the field survey and compiled records containing essential data for a subsequent analysis and characterisation of the area's local archaeology. At least one archaeologist with advanced professional experience was engaged in this process with the team and made all final decisions in respect to environmental description of the transect and the content of cultural materials flagged by the team of searchers.

8.5 Recording Archaeological Data

In addition to the above, the consultant drew a sketch map of each site relating any local features to the site's landscape context. Artefactual data was recorded about artefact types, artefact size and attribute criteria summarised below in Table 8.

Table 8: Artefact types, artefact size and attribute criteria

Artefact type	(see Glossary of Terms Appendix 5)
Artefact dimensions	All artefacts were measured according to maximum length, width and thickness in mm. A vernier calliper was used for all block measurements.
Raw material	Type of raw material
Raw material cortex	This was recorded as a% of the total artefact surface
Platform type	Board or focal
Termination type	Feather, hinge, plunge
Present or absence of retouch	Number of edges
Use-wear	Only where the evidence was clear using a x10 hand lens

8.6 Cultural Assessment Process

The consultant invited members of the Aboriginal community groups to participate in a cultural assessment process. This was done both informally and formally, through letter and a community consultation meeting (see Appendix 4).

9 Survey Coverage Data

The survey area consists of three main landform types (see Figures 8 & 9: Appendix 2):

- Ulan Soil Landscape: consisting principally of Murragamba and 'Eastern Creek' Valleys.
- Lees Pinch Soil Landscape: consisting of Sandstone Mid Slopes and Rock outcrops of Moolarben Ridge, Wilpinjong Ridge and Munghorn Ridge.
- Munghorn Plateau: consisting elevated steep upper slopes, cliff-lines, ridge crests, tors and pinnacles Moolarben Ridge and parts of Munghorn Ridge.

Factors limiting survey coverage were:

- Tree and leaf litter ground cover.
- Grass cover.
- Disturbed soil areas such as quarry locations and associated vehicle tracks.
- Tree clearing within the forest.

The total Stage 2 MCP area is approximately 37km². Of this 37km² area, approximately 70% (25.9km²) has no ground surface visibility due to forest or pasture grass vegetation cover (see Figure 10: Appendix 2). Apart from sandstone formations (cliff lines features, pinnacles and tors) within the escarpment areas, sheet erosion caused by animal grazing, forestry track development and some road and quarry extraction areas were the only available ground surface to assess for buried or exposed artefactual material.

A total of 49 transects were completed within the Stage 2 MCP area (see Figure 10: Appendix 2 and Plates 1–10 Appendix 3). A total of 62 rock-shelter/overhang sites were investigated for potential Aboriginal occupation evidence.

The assessment of scarred trees was made based on the criteria that older mature Box and Red Gum species were likely to contain cultural scars and therefore were targeted by surveyors on the ground.

9.1 Effective Survey Coverage Analysis

Effective Coverage is defined as a statement of how much of the survey area was covered which could have revealed sites.

Thus the formula for effective coverage is:

$$\frac{(\text{sample area}) \times (\text{coverage}) \times (\text{exposure}) \times (\text{visibility}) \times (\text{background})}{\text{effective coverage}} =$$

9.2 Areas Foot Surveyed: Stage 2 MCP Area

9.2.1 Stage 2 MCP Area

Total area of Stage 2 MCP = 37km² (37,000,000m²)

Total area available for foot survey = 11km² (11,000,000m²)

Approximately [70]% or [7.65km²] 7,650,000m² of available Stage 2 MCP was surveyed on foot (see Figure 10: Appendix 2).

Background = 75%

Average visibility = 25%

Exposure = 50%

Effective Coverage is defined as a statement of how much of the survey area was covered which could have revealed sites.

$$[7,650,000]\text{m}^2 \times [0.50] \times [0.25] \times [0.75] = [717,187.5]\text{m}^2$$

Thus 6.5% of the available foot survey area was effectively covered.

10 Archaeological Survey Result and Recording of Sites

A total of 4825 stone artefacts have been recorded as a result of the survey assessment (258 sites). This cultural record is made up of: 150 open stone artefact scatter sites of varying densities, 102 individual stone artefact isolated finds, 5 rock-shelter sites, 1 grinding groove site and 33 Potential Archaeological Deposits (PADS). Some sites comprised more than one of the above cultural records.

A total of 258 Aboriginal sites have been identified in the investigation area. A majority of this record (90%) is made up of exposed stone artefactual material eroding from areas of bare soil exposure with an artefact density of less than 50. However, 33 of these open sites also contain Potential Archaeological Deposits which are principally concentrated within the Murragamba Creek catchment and Wilpinjong North Creek catchment. There are 10 sites that contain over 100 artefacts within their surface assemblage (see Figure 11: Appendix 2).

There are also known registered Aboriginal sites that are also likely to be effected by the MCP Stage 2 proposal, which contain both open campsites and isolated finds: 36-3-0237-36-3-0241, 36-3-0337, 36-3-0690 to 36-3-0699 and a rock-shelter site containing painted art: 36-3-0134 (see Figure 11: Appendix 2 and Table 9 below).

The most concentrated occupation areas located within the MCP Stage 2 study area are:

- Murragamba Creek Central and Southern portions within 100m either side of the creek channel, Alluvial Flats: OC4.
- 'Eastern Creek' a tributary of Wilpinjong Creek, within 100m either side of the Alluvial Flats: OC4.
- Headwaters of Wilpinjong North Creek catchment: within 100m either side of the creek. Alluvial Flats on Red Hills Property.
- Moolarben Ridge south of Carr's Gap and Trig Station eastern flank of the ridge.

(See Figure 12: Appendix 2.)

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MOOLARBEN COAL PROJECT: STAGE 2

Table 9: Showing survey results of the MCP Stage 2 assessment

S2MC= Stage 2 Moolarben Coal

MCP Survey Area Stage 2	Site Name	Site Type	Eastings	Northings	Artefact Density	Impact Status	MCP Stage 2 Transect
Infrastructure	S2MC 1	Isolated Find	763454	6426266	1	High	T1
Infrastructure	S2MC 2	Isolated Find	763893	6425480	1	High	T2
Infrastructure	S2MC 3	Artefact Scatter	764147	6425290	5	None	T2
Infrastructure	S2MC 4	Isolated Find	763996	6425355	1	High	T2
Infrastructure	S2MC 5	Artefact Scatter and PAD	763592	6424924	2	High	T3
Infrastructure	S2MC 6	Artefact Scatter and PAD	763750	6424949	25	High	T3
Underground No. 1	S2MC 7	Isolated Find	763625	6425020	1	Low	T3
Underground No. 1	S2MC 8	Isolated Find	762810	6425021	1	Low	T5
Underground No. 1	S2MC 9	Isolated Find	762818	6424980	1	Low	T5
Underground No. 1	S2MC 10	Artefact Scatter	762899	6425019	3	Low	T5
Underground No. 1	S2MC 11	Isolated Find	762932	6425019	1	Low	T5
Infrastructure	S2MC 12	Isolated Find	762928	6425072	1	High	T5
Open Cut 4	S2MC 13	Isolated Find	763963	6424498	1	Low	T6
Open Cut 4	S2MC 14	Artefact Scatter and PAD	764599	6424642	16	None	T7
Open Cut 4	S2MC 15	Artefact Scatter and PAD	764474	6424713	28	None	T7
Open Cut 4	S2MC 16	Artefact Scatter	764356	6424682	2	None	T7
Open Cut 4	S2MC 17	Artefact Scatter	763927	6423811	27	High	T8
Open Cut 4	S2MC 18	Artefact Scatter and PAD	763623	6423760	15	High	T9
Open Cut 4	S2MC 19	Isolated Find	763569	6423675	1	High	T9
Open Cut 4	S2MC 20	Artefact Scatter	763544	6423690	3	High	T9
Open Cut 4	S2MC 21	Isolated Find	763492	6423781	1	High	T9
Open Cut 4	S2MC 22	Artefact Scatter	763514	6423298	6	High	T10
Open Cut 4	S2MC 23	Isolated Find	763533	6423263	1	High	T10
Open Cut 4	S2MC 24	Isolated Find	763527	6423238	1	High	T10
Open Cut 4	S2MC 25	Isolated Find	763577	6423216	1	High	T10
Open Cut 4	S2MC 29	Artefact Scatter	762864	6422165	12	High	T11
Open Cut 4	S2MC 30	Artefact Scatter	762907	6422288	58	High	T11
Open Cut 4	S2MC 31	Isolated Find	762915	6422176	1	High	T11
Open Cut 4	S2MC 32	Artefact Scatter	762993	6422509	8	High	T11
Open Cut 4	S2MC 33	Artefact Scatter	763087	6422508	6	High	T11
Open Cut 4	S2MC 34	Isolated Find	763086	6422475	1	High	T11
Open Cut 4	S2MC 35	Isolated Find	763022	6422318	1	High	T11
Open Cut 4	S2MC 36	Isolated Find	763213	6422447	1	High	T11
Open Cut 4	S2MC 37	Isolated Find	763228	6422422	1	High	T11
Open Cut 4	S2MC 38	Artefact Scatter	763224	6422287	2	High	T11
Open Cut 4	S2MC 39	Artefact Scatter	763171	6422268	9	High	T11
Open Cut 4	S2MC 40	Artefact Scatter	763149	6422219	12	High	T11
Open Cut 4	S2MC 41	Isolated Find	763226	6422196	1	High	T11

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MOOLARBEN COAL PROJECT: STAGE 2

MCP Survey Area Stage 2	Site Name	Site Type	Eastings	Northings	Artefact Density	Impact Status	MCP Stage 2 Transect
Open Cut 4	S2MC 42	Artefact Scatter	763239	6422576	47	High	T12
Open Cut 4	S2MC 43	Artefact Scatter and PAD	763401	6421479	152	High	T13
Open Cut 4	S2MC 44	Artefact Scatter	763280	6421535	18	High	T13
Open Cut 4	S2MC 45	Artefact Scatter and PAD	763308	6421596	16	High	T13
Open Cut 4	S2MC 46	Artefact Scatter and PAD	763230	6421656	20	High	T13
Open Cut 4	S2MC 47	Artefact Scatter and PAD	763167	6421714	5	High	T13
Open Cut 4	S2MC 48	Artefact Scatter	763246	6421790	17	High	T13
Open Cut 4	S2MC 49	Isolated Find	763398	6420819	1	None	T14
Open Cut 4	S2MC 50	Artefact Scatter	763428	6421011	68	None	T14
Open Cut 4	S2MC 51	Artefact Scatter and PAD	763330	6421014	17	High	T14
Open Cut 4	S2MC 52	Isolated Find	763353	6420804	1	None	T14
Open Cut 4	S2MC 53	Artefact Scatter	763336	6421261	43	None	T14
Open Cut 4	S2MC 54	Artefact Scatter and PAD	763657	6420483	85	None	T15
Open Cut 4	S2MC 55	Artefact Scatter	763774	6420431	18	None	T15
Open Cut 4	S2MC 56	Artefact Scatter	763691	6420485	110	None	T15
Open Cut 4	S2MC 57	Artefact Scatter	763637	6420656	53	None	T15
Open Cut 4	S2MC 58	Artefact Scatter	763598	6420782	98	None	T15
Open Cut 4	S2MC 59	Artefact Scatter	763611	6421022	25	None	T15
Open Cut 4	S2MC 59a	Artefact Scatter	764768	6420522	6	None	T15
Open Cut 4	SCMC 59b	Isolated Find	763799	6420542	1	High	T15
Open Cut 4	S2MC 60	Isolated Find	764013	6420264	1	High	T16
Open Cut 4	S2MC 61	Artefact Scatter	763960	6420196	51	High	T16
Open Cut 4	S2MC 62	Artefact Scatter and PAD	764021	6420153	67	High	T16
Open Cut 4	S2MC 63	Artefact Scatter and PAD	763726	6420346	28	None	T17
Open Cut 4	S2MC 64	Artefact Scatter and PAD	763797	6420228	627	High	T17
Open Cut 4	S2MC 65	Artefact Scatter	764111	6420070	21	None	T18
Open Cut 4	S2MC 66	Isolated Find	764188	6420011	1	None	T18
Open Cut 4	S2MC 67	Artefact Scatter	764124	6420085	13	None	T18
Open Cut 4	S2MC 68	Isolated Find	764195	6420109	1	High	T18
Open Cut 4	S2MC 69	Isolated Find	764218	6420104	1	None	T18
Open Cut 4	S2MC 70	Artefact Scatter	764210	6420157	3	High	T18
Open Cut 4	S2MC 71	Artefact Scatter	764256	6420152	4	High	T18
Open Cut 4	S2MC 72	Artefact Scatter	764347	6419476	4	High	T19
Open Cut 4	S2MC 73	Isolated Find	764388	6419544	1	High	T19
Open Cut 4	S2MC 74	Artefact Scatter	764501	6419323	9	High	T19
Open Cut 4	S2MC 75	Isolated Find	764521	6419399	1	High	T19
Open Cut 4	S2MC 76	Artefact Scatter	764419	6419453	60	High	T19
Open Cut 4	S2MC 77	Artefact Scatter	764551	6419111	4	High	T19
Open Cut 4	S2MC 78	Artefact Scatter	764412	6419206	2	High	T19
Open Cut 4	S2MC 79	Isolated Find	764365	6419285	1	High	T19
Open Cut 4	S2MC 80	Artefact Scatter	764366	6419143	2	High	T19

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MOOLARBEN COAL PROJECT: STAGE 2

MCP Survey Area Stage 2	Site Name	Site Type	Eastings	Northings	Artefact Density	Impact Status	MCP Stage 2 Transect
Open Cut 4	S2MC 81	Artefact Scatter	764243	6419145	52	High	T19
Open Cut 4	S2MC 82	Artefact Scatter	764867	6419455	3	High	T20
Open Cut 4	S2MC 83	Isolated Find	764761	6419508	1	None	T20
Open Cut 4	S2MC 84	Isolated Find	764767	6419546	1	None	T20
Open Cut 4	S2MC 85	Isolated Find	764703	6419623	1	None	T20
Open Cut 4	S2MC 86	Artefact Scatter and PAD	764632	6419671	6	None	T20
Open Cut 4	S2MC 87	Artefact Scatter	764641	6419545	13	High	T20
Open Cut 4	S2MC 88	Artefact Scatter	764524	6419624	4	High	T20
Open Cut 4	S2MC 89	Artefact Scatter	764167	6419140	93	None	T21
Open Cut 4	S2MC 90	Isolated Find	764218	6419283	1	High	T21
Open Cut 4	S2MC 91	Isolated Find	764219	6419320	1	High	T21
Open Cut 4	S2MC 92	Isolated Find	764116	6419333	1	High	T21
Open Cut 4	S2MC 93	Artefact Scatter	764127	6419266	3	High	T21
Open Cut 4	S2MC 94	Isolated Find	764078	6419242	1	High	T21
Open Cut 4	S2MC 95	Isolated Find	763986	6419379	1	High	T21
Open Cut 4	S2MC 96	Artefact Scatter	763968	6419309	3	High	T21
Open Cut 4	S2MC 97	Artefact Scatter	764011	6419162	7	None	T21
Open Cut 4	S2MC 98	Isolated Find	764653	6418836	1	High	T22
Open Cut 4	S2MC 99	Isolated Find	764662	6418925	1	High	T22
Open Cut 4	S2MC100	Artefact Scatter	764628	6418985	4	None	T22
Open Cut 4	S2MC 101	Artefact Scatter	765127	6418276	9	High	T23
Open Cut 4	S2MC 102	Isolated Find	765073	6418353	1	High	T23
Open Cut 4	S2MC 103	Isolated Find	765026	6418396	1	High	T23
Open Cut 4	S2MC 104	Artefact Scatter	765186	6418467	8	High	T24
Open Cut 4	S2MC 105	Isolated Find	765124	6418515	1	High	T24
Open Cut 4	S2MC 106	Isolated Find	765111	6418559	1	High	T24
Open Cut 4	S2MC107	Isolated Find	763292	6423420	1	High	T25
Open Cut 4	S2MC 108	Artefact Scatter	763221	6423355	2	High	T25
Open Cut 4	S2MC109	Artefact Scatter	763245	6423435	5	High	T25
Open Cut 4	S2MC 110	Isolated Find	763247	6423496	1	High	T25
Open Cut 4	S2MC 111	Artefact Scatter	763173	6423555	3	None	T25
Open Cut 4	S2MC 112	Artefact Scatter	763144	6423363	2	High	T25
Open Cut 4	S2MC113	Isolated Find	763109	6423414	1	High	T25
Open Cut 4	S2MC 114	Artefact Scatter	763054	6423414	4	High	T25
Open Cut 4	S2MC 115	Isolated Find	767058	6422282	1	None	T26
Open Cut 4	S2MC 116	Artefact Scatter	766969	6422391	2	None	T26
Open Cut 4	S2MC 117	Isolated Find	766137	6423144	1	High	T26
Open Cut 4	S2MC 118	Isolated Find	766022	6423648	1	High	T28
Open Cut 4	S2MC 119	Artefact Scatter and PAD	765280	6423247	14	High	T29
Open Cut 4	S2MC 120	Isolated Find	765349	6423292	1	High	T29
Open Cut 4	S2MC 121	Isolated Find	765351	6423204	1	High	T29
Open Cut 4	S2MC 122	Artefact Scatter and PAD	765239	6422923	33	High	T30

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MOOLARBEN COAL PROJECT: STAGE 2

MCP Survey Area Stage 2	Site Name	Site Type	Eastings	Northings	Artefact Density	Impact Status	MCP Stage 2 Transect
Open Cut 4	S2MC 123	Artefact Scatter and PAD	765215	6422776	255	High	T30
Open Cut 4	S2MC 124	Artefact Scatter and PAD	765137	6422712	171	High	T30
Open Cut 4	S2MC 125	Artefact Scatter	765088	6422558	30	High	T30
Open Cut 4	S2MC 126	Artefact Scatter and PAD	765168	6422417	7	High	T30
Open Cut 4	S2MC 127	Isolated Find	762552	6422517	1	High	T30
Open Cut 4	S2MC128	Artefact Scatter	765165	6422569	5	High	T30
Open Cut 4	S2MC129	Artefact Scatter	765163	6422587	2	High	T30
Open Cut 4	S2MC130	Artefact Scatter	765213	6422569	2	High	T30
Open Cut 4	S2MC131	Isolated Find	765238	6422580	1	High	T30
Open Cut 4	S2MC132	Artefact Scatter	765219	6422646	10	High	T30
Open Cut 4	S2MC133	Artefact Scatter	765304	6422681	2	High	T30
Open Cut 4	S2MC134	Artefact Scatter	765303	6422758	50	High	T30
Open Cut 4	S2MC135	Artefact Scatter	765316	6422855	4	High	T30
Open Cut 4	S2MC136	Isolated Find	765331	6423024	1	High	T30
Open Cut 4	S2MC137	Isolated Find	765393	6423134	1	High	T30
Open Cut 4	S2MC138	Isolated Find	765367	6423633	1	High	T30
Open Cut 4	S2MC139	Isolated Find	765452	6423685	1	High	T30
Open Cut 4	S2MC140	Artefact Scatter	765292	6423580	3	High	T30
Open Cut 4	S2MC141	Artefact Scatter	765282	6423484	6	High	T30
Open Cut 4	S2MC142	Isolated Find	7665137	6421782	1	High	T31
Open Cut 4	S2MC143	Isolated Find	765437	6422018	1	High	T32
Open Cut 4	S2MC144	Isolated Find	765425	6421959	1	High	T32
Open Cut 4	S2MC145	Artefact Scatter	765423	6421850	2	High	T32
Open Cut 4	S2MC146	Artefact Scatter	765430	6421663	2	High	T32
Open Cut 4	S2MC147	Isolated Find	765473	6421682	1	High	T32
Powers Property Conservation Area	S2MC148	Artefact Scatter	766469	6419281	6	None	T33
Powers Property Conservation Area	S2MC149	Isolated Find	766480	6419235	1	None	T33
Powers Property Conservation Area	S2MC150	Artefact Scatter	766392	6419371	64	None	T33
Powers Property Conservation Area	S2MC151	Grind Grooves/Artefact Scatter	766386	6419437	17	None	T33
Powers Property Conservation Area	S2MC152	Artefact Scatter	766430	6419270	2	None	T33
Powers Property Conservation Area	S2MC153	Artefact Scatter	766167	6419284	67	None	T33
Powers Property Conservation Area	S2MC154	Artefact Scatter and PAD	766156	6419379	49	None	T33
Open Cut 4	S2MC155	Isolated Find	765636	6419917	1	None	T34
Open Cut 4	S2MC156	Artefact Scatter	765842	6419949	12	None	T34
Open Cut 4	S2MC157	Artefact Scatter	765692	6420186	5	None	T34
Open Cut 4	S2MC158	Isolated Find and PAD	765856	6420241	1	High	T34

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MCP Survey Area Stage 2	Site Name	Site Type	Eastings	Northings	Artefact Density	Impact Status	MCP Stage 2 Transect
Open Cut 4	S2MC159	Isolated Find and PAD	765825	6420330	1	High	T34
Open Cut 4	S2MC160	Isolated Find	765854	6420423	1	High	T34
Open Cut 4	S2MC161	Artefact Scatter	765857	6420381	2	High	T34
Open Cut 4	S2MC162	Artefact Scatter	765464	6421594	26	High	T35
Open Cut 4	S2MC163	Artefact Scatter	765460	6421512	2	High	T35
Open Cut 4	S2MC164	Isolated Find	765605	6421171	1	High	T35
Open Cut 4	S2MC165	Artefact Scatter	765563	6421225	2	High	T35
Open Cut 4	S2MC166	Isolated Find	765561	6421163	1	High	T35
Open Cut 4	S2MC167	Isolated Find	765492	6421165	1	High	T35
Open Cut 4	S2MC168	Artefact Scatter	765504	6421228	2	High	T35
Open Cut 4	S2MC169	Isolated Find	765786	6420744	1	High	T35
Open Cut 4	S2MC170	Artefact Scatter	766140	6420074	2	None	T35
Open Cut 4	S2MC171	Artefact Scatter	765965	6420659	4	High	T36
Open Cut 4	S2MC172	Artefact Scatter	765916	6420791	3	High	T36
Open Cut 4	S2MC173	Isolated Find	764816	6422857	1	High	T37
Open Cut 4	S2MC174	Isolated Find	764831	6422763	1	High	T37
Open Cut 4	S2MC175	Isolated Find	764630	6422219	1	High	T37
Open Cut 4	S2MC176	Artefact Scatter	763310	6422975	3	High	T38
Open Cut 4	S2MC177	Artefact Scatter	763292	6422884	2	High	T38
Open Cut 4	S2MC178	Artefact Scatter	763320	6422819	8	High	T38
Open Cut 4	S2MC179	Artefact Scatter	763315	6422895	8	High	T38
Open Cut 4	S2MC180	Artefact Scatter	763348	6422969	2	High	T38
Open Cut 4	S2MC181	Artefact Scatter	763367	6423035	3	High	T38
Open Cut 4	S2MC182	Isolated Find	763420	6423022	1	High	T38
Open Cut 4	S2MC183	Artefact Scatter	763540	6422937	5	High	T38
Open Cut 4	S2MC184	Isolated Find	763512	6422894	1	High	T38
Open Cut 4	S2MC185	Isolated Find	763401	6422810	1	High	T38
Open Cut 4	S2MC186	Artefact Scatter	763589	6423143	2	High	T38
Open Cut 4	S2MC187	Isolated Find	763124	6422657	1	High	T39
Open Cut 4	S2MC188	Artefact Scatter	763169	6422625	2	High	T39
Open Cut 4	S2MC189	Isolated Find	763172	6422639	1	High	T39
Open Cut 4	S2MC190	Isolated Find	762881	6422748	1	High	T39
Open Cut 4	S2MC191	Artefact Scatter	762995	6422625	2	High	T39
Open Cut 4	S2MC192	Isolated Find	763077	6422559	1	High	T39
Open Cut 4	S2MC193	Artefact Scatter	763126	6422520	2	High	T39
Open Cut 4	S2MC194	Artefact Scatter	763075	6422634	3	High	T39
Conservation Area Red Hills	S2MC195	Artefact Scatter	764894	6425757	3	None	T40
Conservation Area Red Hills	S2MC196	Artefact Scatter	764900	6425851	8	None	T40
Conservation Area Red Hills	S2MC197	Artefact Scatter and PAD	764995	6425835	13	None	T40

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MOOLARBEN COAL PROJECT: STAGE 2

MCP Survey Area Stage 2	Site Name	Site Type	Eastings	Northings	Artefact Density	Impact Status	MCP Stage 2 Transect
Conservation Area Red Hills	S2MC198	Artefact Scatter	765094	6425881	2	None	T40
Conservation Area Red Hills	S2MC199	Artefact Scatter	765173	6425859	7	None	T40
Conservation Area Red Hills	S2MC 200	Artefact Scatter and PAD	765104	6425966	260	None	T40
Conservation Area Red Hills	S2MC 201	Artefact Scatter	765437	6426087	360	None	T40
Conservation Area Red Hills	S2MC 202	Artefact Scatter	765350	6426120	2	None	T40
Conservation Area Red Hills	S2MC 203	Artefact Scatter	765338	6426156	20	None	T40
Conservation Area Red Hills	S2MC 204	Artefact Scatter	765258	6426088	3	None	T40
Conservation Area Red Hills	S2MC 205	Artefact Scatter	765286	6426122	2	None	T40
Conservation Area Red Hills	S2MC 206	Artefact Scatter	765649	6426311	53	None	T40
Conservation Area Red Hills	S2MC 207	Artefact Scatter and PAD	765640	6426268	112	None	T40
Conservation Area Red Hills	S2MC 208	Artefact Scatter and PAD	765734	6426259	53	None	T40
Conservation Area Red Hills	S2MC 209	Artefact Scatter and PAD	765734	6426275	89	None	T40
Conservation Area Red Hills	S2MC 210	Artefact Scatter	766010	6426378	8	None	T40
Conservation Area Red Hills	S2MC 211	Isolated Find	766060	6426400	1	None	T40
Conservation Area Red Hills	S2MC 212	Artefact Scatter	766126	6426347	2	None	T40
Conservation Area Red Hills	S2MC 213	Isolated Find	766172	6426383	1	None	T40
Conservation Area Red Hills	S2MC 214	Isolated Find	766231	6426410	1	None	T40
Conservation Area Red Hills	S2MC 215	Artefact Scatter	766288	6426452	5	None	T40
Conservation Area Red Hills	S2MC 216	Artefact Scatter	766453	6426402	91	None	T40
Conservation Area Red Hills	S2MC 217	Artefact Scatter	766466	6426437	9	None	T40
Conservation Area Red Hills	S2MC 218	Artefact Scatter	766651	6426460	50	None	T40
Conservation Area Red Hills	S2MC 219	Artefact Scatter	766710	6426536	7	None	T40
Conservation Area Red Hills	S2MC 220	Artefact Scatter	766624	6426572	15	None	T40

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MOOLARBEN COAL PROJECT: STAGE 2

MCP Survey Area Stage 2	Site Name	Site Type	Eastings	Northings	Artefact Density	Impact Status	MCP Stage 2 Transect
Conservation Area Red Hills	S2MC 221	Isolated Find	766489	6426599	1	None	T40
Conservation Area Red Hills	S2MC 222	Artefact Scatter	766305	6426512	72	None	T40
Conservation Area Red Hills	S2MC 223	Isolated Find	766267	6426551	1	None	T40
Conservation Area Red Hills	S2MC 224	Isolated Find	766260	6426518	1	None	T40
Conservation Area Red Hills	S2MC 225	Artefact Scatter	766125	6426484	45	None	T40
Conservation Area Red Hills	S2MC 226	Artefact Scatter and PAD	765466	6426346	109	None	T40
Conservation Area Red Hills	S2MC 227	Artefact Scatter and PAD	765387	6426462	62	None	T40
Open Cut 4	S2MC 228	Artefact Scatter	766893	6420332	2	None	T41
Underground No. 1	S2MC 229	Rock-shelter	763056	6423750	14	Low	T42
Underground No. 1	S2MC 230	Isolated Find	762763	6423698	1	Low	T42
Underground No. 1	S2MC 231	Artefact Scatter/Sandstone Overhang	762203	6423681	31	Low	T42
Munghorn Gap Nature Reserve	S2MC 232	Isolated Find/RockShelter	764831	6419682	1	None	T43
Munghorn Gap Nature Reserve	S2MC 233	Artefact Scatter/Rock Shelter	764334	6420256	3	None	T43
Munghorn Gap Nature Reserve	S2MC 234	Artefact Scatter	763698	6421496	2	None	T43
Underground No. 2	S2MC 236	Shelter/Artefacts/Rock Paintings	761393	6421336	5	Low	T44
Underground No. 2	S2MC 237	Isolated Find	761301	6421217	1	Low	T44
Underground No. 2	S2MC 238	Artefact Scatter and PAD	761752	6420984	104	Low	T44
Underground No. 2	S2MC 239	Artefact Scatter	761953	6421041	3	Low	T44
Infrastructure	S2MC 240	Artefact Scatter	765318	6426505	7	None	T45
Infrastructure	S2MC 241	Artefact Scatter	765247	6426510	4	None	T45
Infrastructure	S2MC 242	Isolated Find	765212	6426530	1	None	T45
Infrastructure	S2MC 243	Isolated Find	765196	6426508	1	None	T45
Infrastructure	S2MC 244	Isolated Find	765096	6426564	1	None	T45
Infrastructure	S2MC 245	Isolated Find	765084	6426524	1	None	T45
Infrastructure	S2MC 246	Isolated Find	764807	6426681	1	None	T46
Infrastructure	S2MC 247	Artefact Scatter	764525	6426421	3	High	T46
Infrastructure	S2MC 248	Artefact Scatter	764492	6426391	2	High	T46
Infrastructure	S2MC 249	Artefact Scatter	764401	6426311	7	High	T46
Infrastructure	S2MC 250	Artefact Scatter and PAD	764346	6426273	2	None	T46
Infrastructure	S2MC 251	Artefact Scatter and PAD	764275	6426197	12	High	T46
Infrastructure	S2MC 252	Isolated Find	763900	6425946	1	High	T46

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MCP Survey Area Stage 2	Site Name	Site Type	Eastings	Northings	Artefact Density	Impact Status	MCP Stage 2 Transect
Infrastructure	S2MC 253	Isolated Find	764544	6426676	1	None	T 47
Infrastructure	S2MC 254	Isolated Find	764371	6426751	1	None	T 47
Infrastructure	S2MC 255	Isolated Find	764148	6426815	1	High	T 47
Infrastructure	S2MC 256	Artefact Scatter	763698	6426910	2	High	T 47
Infrastructure	S2MC 257	Isolated Find	763567	6426991	1	None	T 47
Infrastructure	S2MC 258	Artefact Scatter	763414	6427000	9	None	T 47
Infrastructure	S2MC 259	Isolated Find	763374	6427039	1	None	T 47
Infrastructure	S2MC 260	Isolated Find	765318	6426505	1	High	T 49

Table 9 above and Figure 12: Appendix 2 show that Aboriginal occupation recorded for MCP Stage 2 is principally concentrated within the Murragamba Creek Valley and surrounding low ridges above historic flood levels.

10.1 Open Cut 4

A total of 175 Aboriginal Sites has been recorded for the OC4 area (see Table 10 below). As Table 10 below shows, the dominant site type is artefact scatters. Single isolated artefact finds are distributed principally within the Murragamba Creek Valley.

Table 10: Site types recorded in association with Open Cut 4 area

Site Type	Number
Isolated Finds	73
Artefact Scatters	102
PADs (Potential Archaeological Deposits)	20

Generally, the area is dominated by narrow drainage channels (i.e. Murragamba and 'Eastern Creek') running through cleared open woodland and pasture improved cultivated land, ground visibility is variable, however a good section of this area has been cleared for open grazing. There are two environmental features located either within or near OC4 area which may have influenced local Aboriginal occupation patterns, these being:

- Murragamba Creek Valley.
- Freshwater springs which appear along sections of the Murragamba catchment.

10.1.1 Spatial Distribution

The greatest evidence for Aboriginal occupation within OC4 is concentrated within a 1.75km linear section of Murragamba Creek opposite the Munghorn Nature Reserve. This section of creek contains open sites of artefact scatters and potential archaeological deposits such as S2MC: 43, 45–46, 51, 54, 56, 62–64 comprising a

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total of approximately 1000 stone artefacts (see Figures 11 & 12: Appendix 2). Occupation evidence is concentrated on both sides of the creek in places. In this section of Murragamba Creek, there is a strong correlation of site density and degree of ponding present within the creek channel itself (see Dr Peter Mitchell's report Appendix 8). Several previously recorded Aboriginal sites also occur in this area of Murragamba Creek Valley and these are: 36-3-0237, 36-3-241.

All archaeological material recorded is eroded or lying in scalded patches of bare soil with exposed artefactual material. Most sites were recorded associated with flat ground adjacent to creek margins with some minor ridge crest occupation evidence. None of the material was recorded in situ. Recent ploughing has disturbed much of the A horizon. These sites show a pattern of intensive short term occupation with overlapping discard events dominated by quartz stone tool technology with some tuff and silcrete.

The second area is a narrow linear section of 'Eastern Creek' approximately 1km in distance. This section of creek contains open sites of artefact scatters and potential archaeological deposits such as S2MC: 122–140 comprising a total of over 580 stone artefacts (see Figure 11: Appendix 2). All archaeological material recorded is eroded or lying in scalded patches of bare soil with exposed artefactual material.

Like the first area along Murragamba Creek, most sites in the 'Eastern Creek' area were recorded associated with flat ground adjacent to creek margins (within 100m) with some minor ridge-crest occupation evidence. None of the material was recorded in situ. There are no identifiable stone hearth materials or charcoal type features on the sites surfaces. These sites show a pattern of intensive short-term occupation with overlapping discard events dominated by quartz stone tool technology with some tuff and silcrete present.

A majority of the artefacts recorded in both these areas are unmodified complete flakes or broken flakes made from a high quality quartz material. However there are also a high number of exhausted bipolar cores and retouched implements (i.e. backed items) made principally from good quality quartz found within the larger surface assemblages as well as axes and grindstones.

10.2 Underground No. 1

A total of 8 Aboriginal sites have been recorded for the UG1 area (see Table 11). As Table 11 shows, the dominant site type is low density sites either as single isolated artefact finds randomly distributed across a number of land unit associations or rock-shelters located on lower slopes above Murragamba Creek Valley. The area principally consists of elevated sandstone ridge crests or mid slopes with steep gullies. No Potential Archaeological Deposits were recorded for Underground No. 1 area.

Table 11: Site types recorded in association with Underground No. 1

Site Type	Number
Isolated Finds	5
Artefact Scatters	1
Rock-shelter/Overhang with artefacts	2

Generally, the area is dominated by open woodland and forest, ground visibility is poor, however a good section of this area has been cleared for open grazing. Where sheet erosion has occurred on top of the ridge crest, sites can be more easily detected. Despite the area having good gully potential there were little shelter formations encountered when these ridges were surveyed.

All archaeological material recorded is eroded or scalded patches of bare soil with exposed artefactual material. Most sites were recorded associated with flat ground with some minor ridge crest occupation evidence. None of the material was recorded in-situ. These sites show a pattern of short term occupation with overlapping discard events dominated by quartz stone tool technology with some tuff material present.

A majority of the artefacts recorded are unmodified broken and complete flakes followed by flaked pieces made from quartz material. There are virtually no finished tools associated with these open and rock-shelter sites.

10.3 Underground No. 2

A total of 4 Aboriginal Sites have been recorded for the Underground No. 2 area (see Table 12 below). As the table below shows, the site types are artefact scatters or rock-shelter with single isolated artefact find.

Table 12: Site types recorded in association with Underground No. 2

Site Type	Number
Isolated Finds	1
PADs(Potential Archaeological Deposits)	1
Artefact Scatters	2
Rock-shelter with Art	1

Generally, the area is dominated by a single sandstone ridgeline and associated gullies which form part of the Moolarben ridge system. Open woodland and steep mid-sloping ground are common. There are some pasture improved lower slopes used for sheep grazing and ploughed land for cropping. Ground visibility is poor, however on the upper footslopes at the break of slope sheet erosion provides good surface visibility. The dominant environmental features of UG2 area which may have influenced local Aboriginal occupation patterns, are:

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- Moolarben Ridge south of Carr's Gap Trig Station.
- A series 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 facing east.

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. The greatest evidence for occupation is represented by two sites, S2MC 236 and 238.

Site S2MC 236 contains a single large sandstone Tor feature which contains registered DECC rock art 36-3-0134. This site sits on a ridge crest and over looks a large gully. The site is an elongate sandstone shelter facing east containing painted rock art images and European graffiti dating back to the early 1900s. The art work is regionally significant and the site is strategically located between Moolarben Creek Valley and Murragamba Creek Valley.

Approximately 500m to the south of S2MC 236 is the Site S2MC 238. This site is an artefact scatter site with a Potential Archaeological Deposit. The site lies at the head of a gully and overlooks an expanse of sandstone escarpment. The site is predominantly made up of quartz artefacts but there is also backed material and retouched pieces. There is likely to be sub surface evidence for occupation at this site.

All other archaeological material recorded is eroded or scalded patches of bare soil with exposed artefactual material. Some material was exposed due to deep ploughing along the margins of Murragamba 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. None of the material was recorded in situ.

10.4 Infrastructure Area

A total of 28 Aboriginal Sites have been recorded for the Infrastructure area (see Figure 11: Appendix 2 and Table 13). As Table 13 shows, the dominant site type is single isolated artefact finds which are randomly distributed across a number of land unit associations.

Table 13: Site types recorded in association with Infrastructure areas

Site Type	Number
Isolated Finds	16

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PADs(Potential Archaeological Deposits)	4
Artefact Scatters	12

Generally, the area is dominated by revegetated shrub and tree areas with open pasture used for minor sheep grazing. Ground visibility is poor, however on the upper footslopes at the break of slope sheet erosion provides good surface visibility. The dominant environmental features of the Infrastructure area which may have influenced local Aboriginal occupation patterns are:

- ephemeral drainage associated with the Wilpinjong North Creek catchment which flows in an east- west direction
- sandy ridges located to the north of Bora Creek catchment which provide dry soft campsite locations.

A majority of the artefacts recorded are unmodified broken and complete flakes followed by flaked pieces made from quartz material. There is a low density of utilised implements and cores associated with some of these open sites.

10.5 Conservation Areas: Red Hills Property 14, Munghorn Nature Reserve and Powers Property No. 44

A total of 43 Aboriginal Sites have been recorded for the proposed Red Hills Property 14 , Munghorn Nature Reserve and Powers Property No. 44 Conservation areas. As Table 14 below shows, the dominant site type is artefact scatters followed by single isolated artefact finds distributed principally within the Wilpinjong North Creek, Murragamba Creek and Eastern Creek Valleys.

Table 14: Site types recorded in association with conservation areas

Site Type	Number
Isolated Finds	7
Artefact Scatters	33
PADs (Potential Archaeological Deposits)	8
Grinding Grooves/Artefact Scatter	1
Rockshelter with artefacts	2

Generally, the area is dominated by narrow drainage channels (i.e. Murragamba Creek, Eastern Creek and Wilpinjong Creek) running through cleared open woodland and pasture improved cultivated land, ground visibility is variable, however a good section of this area has been cleared for open grazing. There are two environmental features located either within or near the proposed Conservation areas which may have influenced local Aboriginal occupation patterns, these being:

- Wilpinjong Creek Valley.

- Freshwater Seepages which appear along sections of the Upper catchment of 'Eastern Creek'.

10.5.1 Spatial Distribution

The greatest evidence for Aboriginal occupation within the Conservation areas is within the Wilpinjong Creek Valley located on the property known as Red Hills. This section of drainage line contains a cluster of 33 open sites with 4 sites (see Figure 11: Appendix 2 S2MC 200, S2MC 201, S2MC 207 and S2MC 226) containing over a 100 artefacts and 7 sites (see Figure 11: Appendix 2 S2MC 197, S2MC 200, S2MC 207-209, S2MC 226-227) containing Potential Archaeological Deposits. Sites are distributed over a 1.5km linear section of Wilpinjong Creek within a 100m corridor.

On the Red Hills Property 14 all archaeological material recorded is eroded or lying in scalded patches of bare soil with exposed artefactual material. Most sites were recorded associated with flat ground adjacent to creek margins with some minor ridge crest occupation evidence. None of the material was recorded in situ. Recent ploughing has disturbed much of the A soil horizon. These sites show a pattern of intensive short term occupation with overlapping discard events dominated by quartz stone tool technology with some tuff and silcrete.

The second area is a broad open valley within the upper catchment of 'Eastern Creek' located on the Powers Property No. 44. Here a cluster of open sites and grinding grooves (S2MC 148-154) are located principally around a zone of seepage on an elevated ridge. This zone of seepage has been modified by early settlers and now contains a series of historic water troughs surrounded by mature eucalypt trees. Approximately 206 stone artefacts and 30 grinding grooves have been recorded within a 100m x 50m area (see Figure 11: Appendix 2).

On the Powers Property 44 all archaeological material recorded is eroded or lying in scalded patches of bare soil with exposed artefactual material on a series of small ridges and sandstone benches/outcrops. None of the artefactual material was recorded in situ; however several clusters of grinding grooves are still intact on a sandstone bench. There are no identifiable stone hearth materials or charcoal type features on the sites surfaces. These sites show a pattern of intensive short term occupation with overlapping discard events dominated by quartz stone tool technology with some tuff and silcrete present.

The third area is located on the western margin of the Munghorn Nature Reserve. This area contains an L shaped sandstone ridge-line with a series of gullies running east-west into the sandstone ridge. There are two rockshelter sites with low density artefact numbers and no deposit and an open artefact scatter located on the western margin of Munghorn Nature Reserve. All these sites face west overlooking the Murrumbidgee Creek Valley.

A majority of the artefacts recorded in these areas are unmodified complete flakes or broken flakes made from a high quality quartz material. However there are also a

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high number of exhausted bipolar cores and retouched implements (i.e. backed items) made principally from good quality quartz found within the larger surface assemblages as well as grindstones.

10.6 Potential Archaeological Deposits (PADs)

A total of 33 PADs have been recorded as a result of the assessment. This site category is recognised by DECC as a temporary site category and therefore should be recorded for registration purposes. It is the aim of this assessment to develop a site management strategy that will help determine the cultural integrity of this site category. A majority of PADs recorded in Stage 2 assessment are associated with alluvial deposits located adjacent to either Murragamba Creek, Wilpinjong Creek or 'Eastern Creek'. There are no rock-shelter sites in the MCP Stage 2 assessment area that contain PADs (see Figure 13: Appendix 2).

10.7 Site Condition

Of the 258 sites recorded: four open artefact scatter sites (two along Murragamba Creek and two along Wilpinjong Creek) and one grinding groove site within Power Property No. 44 are considered to be in fair condition. The remaining 254 sites (Rock-shelter, Isolated Finds and Artefact Scatter sites) are considered to be in poor condition. This state of preservation will ultimately have a bearing on how much information can be recorded from the site. Parts of Registered DECC site 36-3-0134 are in fair condition but weathering, wasp nests and dust has damaged a high proportion of art located on vertical walls.

11 Analysis

11.1 Site Distribution, Terrain Landform Type and Land Elements

As discussed previously, approximately (85%) of sites and isolated finds are located within a valley floor, alluvial floodplain or drainage channel context in the MCP Stage 2 area (see Figure 11: Appendix 2 and Table 15 below). Approximately (15%) of recorded sites and isolated finds are located on elevated features such as ridge crests, knolls, saddles or on spurs away from valley floors. The most rarely occupied land unit are upper slopes. A majority of open space occupation is found on land units that are flat and located near water sources.

Within the ridge systems, a majority of occupied shelters are located within 500m of water sources and access corridors. The most commonly occupied land unit are spurs followed by the alluvial flats (see Table 15 below).

Table 15 describes the distribution of sites against land-unit types.

Table 15: Sites and land-unit association

Landform Unit	Isolated Finds	Artefact Scatter	Grinding Grooves	Rock-shelters	PADs	Total
Ridge crest	4	7	1	2		14
Alluvial flat	23	64	0	0	30	87
Drainage channel	0	0	0	0	3	0
Hillock (knoll)	0	1	0	0		1
Flat	12	12	0	0		24
Ridge slope	14	18	0	2		34
Saddle	3	1	0	0		4
Spur	46	47	0	1		94
TOTALS	102	150	1	5		258

Table 16: Site distribution across soil landscape units

Soil Landscape Unit	Transects	Site numbers
Ulan Soil Landscape	40	245
Lees Pinch Soil Landscape	6	10
Munghorn Soil Landscape	3	3
Bald Hill Soil Landscape	0	0

Table 16 above shows that Ulan soil landscape contains the highest concentration of sites, but it also was the most surveyed soil landscape.

11.2 Slope, Distance to Water, Access to Resources (Food and Stone Materials)

Sites located within the Ulan Soil Landscape have slopes of between 2–5 degrees. Sites located within Lees Pinch Soil Landscape have slopes of between 5–10 degrees. Three main creek systems (Murragamba, Eastern and Wilpinjong North (see Figure 14: Appendix 2) found across the study area have varying proportions of sites located near them.

Murragamba Creek is the most surveyed drainage line and has the highest concentration of recorded sites. It contains sites with the richest and most diverse surface stone artefact assemblages. It is also the most disturbed natural feature located within the study area. Wilpinjong Creek North has also a high concentration of sites associated with its drainage length.

A majority of sites recorded (80%) are located within 50–100m of a watercourse, soak or spring. From work carried out by Aquaterra, Murragamba Creek contains the highest concentration of natural springs and soaks compared to other local catchments (i.e. in comparison with Moolarben, Lagoon and Spring Creeks: See Figure 14: Appendix 2).

There are no reported quarried outcrops of flaked stone material within the survey area. Quartz pebbles and cobbles are found eroding from Narrabeen and Conglomerate sandstones. Some local cherts are also found eroding in gravel layers of local lithosols. Local gravel deposits are however generally of poor quality for flaked stone tool raw material. Two distinct local tuffs (yellow and black) have been identified from archaeological sites further west and south of the study area.

11.3 Site Contents, Stone Artefact Assemblages, Site Age, Sub surface potential, Cultural Landscape Variability

11.3.1 Site Contents

Open Sites

Of the 253 open sites recorded, 27 sites (S2MC:30, 43, 50, 54, 56-58, 61-62, 64, 76, 81, 89, 123, 124, 151, 153, 200, 201, 206, 207–209, 216, 222, 226 and 227 (see Figure 11: Appendix 2) have a density of more than 50 artefacts. Table 17 below describes the main features of these sites

Rock Shelter Site

Rock shelter sites and descriptions are contained in Table 18 below.

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Table 17: Main features of significant open sites recorded in MCP Stage 2 area

Site Name	Site Location	Site Description
S2MC 30 OC4:T11	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising 58 artefacts distributed over a 180m x 185m area within a open paddock cleared for grazing. Artefacts are exposed by sheet erosion. The site is located close to an ephemeral creek area connected to Murragamba Creek. No in situ deposits have been observed. The site is in poor condition.
S2MC 43 OC4 T13	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 152 artefacts distributed over an 91m x 82m area. East of Murragamba Creek. Part of the site (60%) has been disturbed by ploughing and cropping. Potential archaeological deposits however are associated with this site. The site is in poor condition.
S2MC 50 OC4 T14	Open paddock Creek Flat Murragamba Valley	Open artefact scatter comprising of 68 artefacts distributed over a 219m x 66m area. This site is located above a drainage channel within a plough field. No in situ deposits have been observed. The site is in poor condition.
S2MC 54 OC4 T15	Open paddock Creek Flat Murragamba Valley	Open artefact scatter comprising of 85 artefacts distributed over a 117m x 63m area. This site is located on an elevated terrace above creek flats. Potential archaeological deposits however are associated with this site. The site is in poor condition due to ploughing.
S2MC 56 OC4 T15	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 110 artefacts distributed over a 112m x 91m area. This site is located on creek flats on a spur on the eastern margin of Murragamba Creek. There is a possibility that sub-surface remains may be located near this site. Part of the site (50%) has been impacted by ploughing. The site is in poor condition.
S2MC 57 OC4 T15	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 57 artefacts distributed over a 106m x 94m area. This site is located on creek flats on the eastern margin of Murragamba Creek. No in situ deposits have been observed. The site is in poor condition. Part of the site (80%) has been impacted by ploughing. The site is in poor condition.
S2MC 61 OC4 T16	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 51 artefacts distributed over a 57m x 65m area. This site is located on a spur above a creek flat close to Murragamba Creek along a vehicle track. There are no sub-surface deposits associated with this site. The site is in poor condition.
S2MC 62 OC4 T16	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 67 artefacts distributed over a 43m x 74m area. This site is located on a spur above Murragamba Creek on a vehicle track. Potential archaeological deposits however are associated with this site. The site is in poor condition.

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Site Name	Site Location	Site Description
S2MC 64 OC4 T17	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 627 artefacts distributed over a 37m x 82m area. This site is located on spur and creek flats on the western side of Murragamba Creek on a ploughed surface. Although the site has been ploughed, Potential archaeological deposits however are associated with this site. The site is in poor condition.
S2MC 76 OC4 T19	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 60 artefacts distributed over a 173.5m x 78.5m area. This site is located on spur near creek flats on the western side of Murragamba Creek on a ploughed surface. There are no sub-surface deposits associated with this site. The site is in poor condition.
S2MC 81 OC4 T19	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 52 artefacts distributed over a 184m x 86m area. This site is located on spur near creek flats on the western side of Murragamba Creek on a ploughed surface. There are no sub-surface deposits associated with this site. The site is in poor condition.
S2MC 89 OC4 T21	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 93 artefacts distributed over a 116.5m x 41m area. This site is located on spur near creek flats on the western side of Murragamba Creek on a ploughed surface. There are no sub-surface deposits associated with this site. The site is in poor condition.
S2MC 123 OC4 T30	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 225 artefacts distributed over a 103m x 82.5m area. This site is located on creek flats on the eastern side of Murragamba Creek on a ploughed surface. Although the site has been ploughed, Potential archaeological deposits however are associated with this site. The site is in poor condition.
S2MC 124 OC4 T30	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 171 artefacts distributed over a 134m x 52.5m area. This site is located on creek/terrace flats on the western side of Murragamba Creek on a ploughed surface. Although the site has been ploughed, Potential archaeological deposits however are associated with this site. The site is in poor condition.
S2MC 150 OC4 T33	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 64 artefacts distributed over a 124m x 51.1m area. This site is located on a spur on the south-western side of Murragamba Creek on a ploughed surface. There are no sub-surface deposits associated with this site. The site is in poor condition.
S2MC 153 OC4 T33	Open paddock Creek Flats Murragamba Valley	Open artefact scatter comprising of 67 artefacts distributed over a 73.5m x 68.5m area. This site is located on creek flats on the south-western side of Murragamba Creek on a ploughed surface. There are no sub-surface deposits associated with this site. The site is in poor condition.
S2MC 200 OC4 T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 260 artefacts distributed over a 76m x 325m area. This site is located on creek flats on the northern side of Wilpinjong Creek on a ploughed surface. Although the site has been ploughed, Potential archaeological deposits however are associated with this site. The site is in fair condition.

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Site Name	Site Location	Site Description
S2MC 201 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 360 artefacts distributed over a 71m x 408m area. This site is located on creek flats on the northern side of Wilpinjong Creek on a ploughed surface. Although the site has been ploughed, Potential archaeological deposits however are associated with this site. The site is in poor condition.
S2MC 206 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 53 artefacts distributed over a 81m x 30m area. This site is located on creek flats on the eastern side of Wilpinjong Creek on an alluvial terrace. Potential archaeological deposits are associated with this site. The site is in poor condition.
S2MC 207 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 112 artefacts distributed over a 124m x 55.5m area. This site is located on creek flats on the northern side of Wilpinjong Creek on an alluvial terrace. Potential archaeological deposits are associated with this site. The site is in fair condition.
S2MC 208 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 53 artefacts distributed over a 28m x 83.5m area. This site is located on creek flats on the northern side of Wilpinjong Creek on an alluvial terrace. Potential archaeological deposits are associated with this site. The site is in poor condition.
S2MC 209 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 89 artefacts distributed over a 260m x 102m area. This site is located on creek flats on the northern side of Wilpinjong Creek on an alluvial terrace. Potential archaeological deposits are associated with this site. The site is in poor condition.
S2MC 216 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 91 artefacts distributed over a 48m x 114m area. This site is located on creek flats on the southern side of Wilpinjong Creek on an alluvial terrace. Potential archaeological deposits are associated with this site. The site is in poor condition.
S2MC 222 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 72 artefacts distributed over a 75m x 264m area. This site is located on creek flats on the northern side of Wilpinjong Creek on an alluvial terrace. Potential archaeological deposits are associated with this site. The site is in poor condition.
S2MC 226 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 109 artefacts distributed over a 80m x 98m area. This site is located on creek flats on the northern side of Wilpinjong Creek on an alluvial terrace. Potential archaeological deposits are associated with this site. The site is in poor condition.
S2MC 227 Conservation T40	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 62 artefacts distributed over a 155m x 36m area. This site is located on creek flats on the northern side of Wilpinjong Creek on an alluvial terrace. Potential archaeological deposits are associated with this site. The site is in poor condition.

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Site Name	Site Location	Site Description
S2MC 238 Underground No. 2 T44	Open paddock Creek Flats Wilpinjong North Valley	Open artefact scatter comprising of 104 artefacts distributed over a 38.2m x 18m area. This site is located on ridge slope/ridge crest on escarpment above steep gully. Potential archaeological deposits are associated with this site. The site is in poor condition.

Rock-shelter Sites

Table 18: Main features of significant rock-shelter sites recorded

Site Name	Site Location	Site Description
S2MC 236 UG No. 2: T44 36-3-0134	Ridge Crest Munghorn Plateau	Large sized rock-shelter facing east. Dimensions: 2.5m H x 22.5m W x 5.4m D. Thin sandy shallow deposit with rock floor. Good condition. Scatter of 5 artefacts located in front of shelter's drip-line at the northern end of the site. This site contains rock art depicting star motif, hand prints, hand stencils made in red (10) and (2) white ochre and a snake like figure and goanna figure drawn in red ochre. A large sandstone slab is lying within the shelter and contains European graffiti engraved on its surface. There could be more hand stencils located within shelter's roof or walls. Extensive European graffiti dating back to 1901 overlays Aboriginal art. More intensive recording is required.
S2MC 236 UG No. 2: T44 36-3-0134	Ridge Crest Munghorn Plateau	Small size rock-shelter facing east located approximately 50m north of main rock-shelter. Dimensions: 2.0m H x 16.5m W x 3.5m D. Rock floor. The site contains hand prints and hand stencils in red ochre. No artefacts were observed on the shelter's floor. Good condition. Extensive European graffiti overlays Aboriginal art. More intensive recording is required.

Grinding Groove Site

Only one grinding groove site was recorded within the study area. Table 19 below describes the main features of the site:

Table 19: Main features of significant grinding groove site recorded

Site Name	Site Location	Site Description
S2MC 151 T33 Powers Property Conservation.	Ridge Crest above soakage Ulan Soil Landscape	Sandstone boulder outcrops broken and disturbed on edge of ridge crest located above natural soakage. The sandstone blocks contain 30 grinding grooves, some complete some partially broken. The site also includes an artefact scatter made up of 17 artefacts and covers an area of 81m x 50m. Grooves measure on average 24.4cm x 5.6cm x 3.2 cm. The site is in poor condition. Grooves are assumed to have been made as a result of stone axe grinding activities.

11.3.2 Stone Artefact Assemblage Characteristics

A total of 4825 stone artefacts have been recorded as a result of this assessment. Figure 15 (see Appendix 2) provides the break down of the main stone raw materials used to manufacture flaked stone tools. As can be seen, quartz raw material dominates all assemblage components, accounting for 76% of the total raw material count. The next most commonly used raw material is tuff, accounting for 19% of the total assemblage count. Chert, silcrete and quartzite are also used, but in much lower proportions. The origin of the tuff raw material is in conjecture with the possibility of local sources being present, however given the low levels of tuff artefacts showing primary cortex it is unlikely that a large quarry source is nearby.

A range of quartz pebbles were observed in several localities in the study area and it is likely to have been sourced from outcrops of conglomerate pebbly sandstone. It is argued that higher quality quartz was procured from local colluvial gravels in select locations which people kept coming back to over many years. The range and variability of quartz pebble sizes shows there is distinct selection process being undertaken when deciding on how backed technology is being used within the study area.

Figure 16 (see Appendix 2) shows that at least 50% of recorded surface assemblage is made up of Broken Flakes, followed by Complete Flakes (22%) and Flaked Pieces (18%). Retouched items only account for 1.2% of the total assemblage contents. Cores (Bipolar, Single Platform and Multi-Platform) make up approximately 5% of the total assemblage content. A majority of cores are multi-platform type made from high quality quartz raw materials. A total of 28 backed pieces (i.e. geometrics or bondis) were identified with a majority being either recorded in the Murrumbidgee Creek Valley or Wilpinjong Creek North Valley. Of these, 25 backed pieces were made from high quality quartz.

Grindstones recorded are small and circular in shape made from local quartzite pebbles and show anvil type usewear likely to have been caused by hard seed and nut processing. Axes are typical for the Sydney Basin region are acid volcanic in origin and are likely to have been used for heavy duty work on trees and branches. Volcanic source material for axes is likely to have come from the Moore Creek area near Tamworth. Hammerstones and Manuports are also made from local quartzite pebbles

A majority of flakes with striking platforms (Complete and Broken Proximal) contain approximately 64% broad platforms with 36% containing focal platforms. Cortex is found on approximately 12.6% of all stone artefact items. A comparison was made of the size of Complete Flakes and Bipolar Cores (quartz) and Single Platform and Multi-Platform Cores. The plot of complete flake size distribution (see Figure 17: Appendix 2) shows that a majority of complete flakes are between 10–30mm in length and 10–25mm wide. The average flake width is 21mm, flake length is 25mm and thickness is 7.3mm. When plotted for size distribution, Bipolar Cores (see Figure 18: Appendix 2) show a uniform size distribution which is directly related to pebble size and reduction technique. More generally for Single Platform and Multi-Platform Cores there is a broader size distribution indicating greater variability for the production of larger heavier flakes especially in raw materials other than quartz (see Figure 19: Appendix 2). There is a narrower size distribution for the production of complete flakes using either quartz or chert raw materials. Volcanic source material for axes is likely to have come from the Moore Creek area near Tamworth.

11.3.3 Inter-site Comparability

If we examine assemblage size between the sites recorded, we see a higher proportion of larger sites are located near permanent watercourses such as Murrumbidgee Creek, Eastern Creek and Wilpinjong North Creek than sites found along ridgelines or escarpments. The distribution of both natural springs and soaks within the main creek catchments are likely to have allowed Aboriginal occupation to become almost permanent even in times of drought. Figure 20 (see Appendix 2) clearly shows there is a major concentration of natural springs and soaks especially in Murrumbidgee Valley which would have made spring flow almost constant prior to European settlement. This is one of the most likely site location factors that is consistent in the study area. Sites with 10 or less artefacts are more likely to be found on ridge crests, whilst sites with 10 or more artefacts, are likely to be found close to permanent or semi permanent water on flatter ground. Sites with densities greater than 100 show a wider range of artefact and raw material types.

There is clear pattern of assemblage composition between different catchments with richer sites showing a higher degree of assemblage variability than sites located away from drainage features. Sites located between catchments on ridges or escarpment features show the lowest level of assemblage composition. There is no clear distribution pattern of the types of artefacts recorded between sites except a high degree of broken quartz material. This breakage pattern could very well be a result of a higher impact due to ploughing on alluvial flats and animal treadage along

watercourses and vehicle mechanical damage within the ridgeline systems. The most interesting sites from an open site assemblage composition comparison are: S2MC: 43, 54, 56, 63, 64, 89, 123, 124, 200, 201, 207, 226 and 238.

Rock-shelter occupation shows that out of a total of 62 potential shelter sites investigated, only four sites contained evidence of diverse human occupation activities (ie. making art, grinding tools and discarding artefacts) S2MC: 229-233, 236 (36-3-0134). Only two other shelter sites: 229 and 231 showed artefact densities of greater than 10 artefacts on their floor surface.

Given the low numbers of rock-shelter sites, aspect does not appear to be an important indicator of rock-shelter occupation within the study area. The most important rock-shelter site in the study area faces east (S2MC 236: 36-3-0134). Floor space and slope may be a better indicator of human habitation potential with most of the shelters with occupation evidence having floor areas greater than 2m x 1m x 1.2m. Dryness is also another likely site selection factor that could influence occupation potential with no shelters recorded with occupation evidence having wet floors.

11.3.4 Site Age and Subsurface Potential

Without evidence of buried hearths (i.e. ancient fireplaces) rock-shelter deposits containing dateable carbon material are the only evidence that could be dated directly, none of the open sites recorded in the study area can be directly dated. This obviously means that true age cannot be known. Another technique of indirect dating is seriation (see Section 7.2.1). The general surface assemblage recorded in MCP Stage 2 is regarded as being associated with a backed technology sequence principally designed for geometric and bondi point production. It is likely that the surface assemblages recorded in MCP Stage 2 area can be generally described as part of the Eastern Regional Sequence of backed technology, first proposed by Fred McCarthy in the 1940s (Hiscock & Attenbrow 2002). Current research is looking (Eastern Sequence Project) to identify the nature and directionality of technological changes in stone artefact assemblages in Aboriginal sites within the Sydney Basin. It is also looking to compare temporal trends between and within sub-regions of the Basin.

In terms of direct dating the surface evidence is likely to be only a few hundred or thousand years old. One can only speculate, given the extent of erosion and likely disturbance along the Murragamba Creek, Wilpinjong Creek and Eastern Creek Tributaries and surrounding landforms, that most sites are probably not more than 1000–2000 years old.

Although a majority of the soils are shallow over much of the study area and likely to have been heavily bioturbated, within the immediate Murragamba, Eastern and Wilpinjong Creek catchments there is some alluvial soil development. This, coupled with the fact that human occupation is likely to be concentrated within a certain distance from creek margins, shows there is some potential for buried open deposits.

11.3.5 Limitations of the Data

The most significant limitation of the survey data is the lack of ground visibility on larger areas of flat land (open paddocks adjacent to Murragamba, Eastern and Wilpinjong Creeks). Due to the above, more archaeological evidence was expected in areas within 100m along most of Murragamba Creeks catchment. Of the 20% of the study area assessed on foot, the remaining 80% has relatively low potential for further assessment (i.e. steep slopes and heavy vegetation cover). Land that may hold greater promise is likely to be within 50–100m of watercourses further east of the study area, especially within the Murragamba Creek catchments.

Although ploughing has no doubt removed potential sub-surface deposits in some alluvial land units; where occupation material has accumulated over a long period of time, it is likely that more buried evidence would be expected to be found.

11.4 Comparisons with Other Survey and Excavation Results

Comparisons with the work of Haglund (1981, 1987, 1997), Kuskie and Clarke (2001, 2005, 2007), Hamm (2006), Attenbrow (2004), Vinnicombe (1980), Pearson (1981), Navin Officer (2005) Moore (1970), Hiscock and Attenbrow (2002) and MacDonald (1992) show that sites recorded within the study area are well represented in the existing archaeological record. Dated sites are few and dated sites within an open space context are rare. Across different landscape units recorded sites found within the study area fall within two main categories:

- *Short-term occupation or single activity sites.* These are usually represented by a single site or several discard events where hunters may be preparing their weapons ready for use near a hunting ground (i.e. Isolated Find discarded after use) removing bark to make dishes or canoes or tool preparation areas such as grinding axes and thus creating groove sites. The location of these sites is likely to be more random in the landscape depending on historical land-use strategies.
- *Specific long-term seasonal nodal sites.* These display a range of human activities, including tool preparation and manufacture, rock art displays, ceremonial activity where stone arrangements are created or trees are carved, shelter or open space occupation centred around a number of key seasonal resources (i.e. protected raised valleys overlooking hunting sites, creek margins, springs, soakages, wetlands, etc). The location of these sites is likely to be more predictable even with varying historical land-use patterns.

As discussed by Vinnicombe (1981) and Attenbrow (2004) the above site types can be further described using a site catchment model:

- Hunter-gatherers used a catchment area by having a number of short term base camps where a family group size varied according to seasons and locality.

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- Hunter-gatherers also used transit-like camps which acted as a stopover point for procurement of raw materials, or exchange of trade items or preparation of food.
- Specific activity locations (i.e. rock art sites, grinding grooves etc) which may have represented a prime place of choice to undertake specific local activities (i.e. high quality sandstone area at the head of a gully to grind axe material, high quality sandstone to engrave, paint or undertake stencil art, area close to a high quality source of ochre which had ceremonial significance, stone source quarry site).

In contrasting the location and content of sites within the study area, a majority of sites recorded are already commonly represented in the existing archaeological record. Haglund (1997) has recorded many examples of artefact scatters and isolated finds within the adjacent Ulan lease. Open sites (principally artefact scatters, isolated finds made from quartz and tuff) have been commonly recorded on alluvial flats, valley bottoms and ridge crests. Many of these sites are found as a result of natural or man-made soil disturbance processes and are missing key finished tool items or evidence of campsite structures. Rock-shelter sites are less common, especially those with art and grinding grooves present. The work of Kuskie and Clarke (2001, 2005, 2007) reveals patterns of occupation within the Ulan Mine lease based on the following observations:

- *“Aboriginal people used and occupied the entire study area, but at a very low intensity and possibly at different times of the year and different periods within the overall time-span of occupation.*
- *Focused occupation was more likely to have occurred in rock-shelters or overhangs and in association with higher order watercourses in the locality, which are general absent from the study area, but even this may have been very sporadic or of low intensity. Use of the SMP area may largely have involved occasional and short-duration visits by small parties of hunters and/or gatherers for food procurement or transitory movement through the landscape. Within the SMP area, larger rock-shelters near drainage depressions (e.g. site MC1) may have served as temporary encampments.*
- *More intensive occupation may have occurred in the surrounding locality outside of the current study area, where higher order watercourses and more substantial rock-shelters are present. These contexts are more likely to have been favoured for camping and resource exploitation.*
- *The stone material quartz was favoured for stone-working activities and may have been procured from local colluvial and alluvial gravels. Tuff was also commonly used and was probably obtained from local terrestrial sources at Ulan;*
- *Manufacturing stone tools, particularly flaked implements for use in making or maintaining wooden tools or butchering or processing foods, was generally a*

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casual or opportunistic activity, meeting requirements on an 'as needed' basis; and

- *While non-specific stone flaking was a common activity, exposed sandstone bedrock in the study area was used for the shaping and/or maintenance of ground-edge hatchets. This activity may have been occasional and incidental to transitory movement or short-term occupation within the study area during the course of the normal daily hunting/gathering round, rather than a result of special purpose visits.” (Kuskie & Clarke 2007: 22)*

Within the Wilpinjong Mine Lease, Navin/Officer (2005) argue the following patterns of occupation:

“Just under half of the recorded Aboriginal sites occur within valley floor contexts, a third within basal valley slope contexts, 19% occur on mid valley slope contexts and 4% in upper valley contexts.” (Navin Officer 2005)

and ... *“Most of the archaeological sites recorded within the Project disturbance area occur on relatively shallow, texture contrast soils with distinct clay subsoils. These sites are unlikely to contain undisturbed or in situ archaeological deposits. A limited number of deposits occur which include potential for in situ archaeological material and which warrant some form of archaeological subsurface investigation as the Project is developed. These consist of aggrading landforms such as alluvial flats, fans, and terrace deposits, locally elevated spurlines adjacent to watercourses, and three sand and gravel deposits.” (Navin Officer 19: 2005)*

Pearson (1984) writing about the historical land-use patterns of Wiradjuri people in the Upper Macquarie Valley and surrounding Mudgee districts concludes that:

“Groups of up to 20 Aborigines were met by early explorers and settlers on the area around Bathurst and gatherings of 100 and 150 people were recorded on special occasions. The observation of James Gunther, the C.M.S missionary at Wellington Valley from 1837 to 1843 give a good picture of the nature of Aboriginal group movements and their frequency. Gunther paints a picture of a highly mobile population and flexible group size. ...The ethnohistorical evidence from the Upper Macquarie suggests that recognisably distinct local communities existed, which were larger than the groups which were observed hunting and gathering at normal times... There seem to have been no over-riding seasonal factors affecting Aboriginal movements in well watered upper Macquarie.” (Pearson 64:1984)

Given the above comparative conclusions, it is worth considering what type of research could be carried out on sites recorded in MCP Stage 2 area.

Research issues to contrast with other studies

Research questions that are of major interest concern the following issues:

- Can we tell if any of these sites have a long history of Aboriginal occupation or are they likely to be considered short term or site specific?
- Do undisturbed open sites which may demonstrate discrete human activities and that can be linked to a specific Aboriginal resource use exist within the study area (i.e. spring or soak)?
- How do these sites in the Murrumbidgee Creek Valley compare to elsewhere in the local area (i.e. Wilpinjong and Moolarben Valleys)?
- Why are the sites so rich? Is this controlled by local geographic factors or resource specific?
- Are there any sites that can tell us about tool manufacturing, raw material selection and local reduction processes (i.e. identifying knapping floors of one particular type of raw material). How important is quartz and why it is selected in the production of stone tools in the study area?
- How unique is the rock art site 36-3-0134? What are its main cultural features and the variability of its painting styles? What can it tell us about ceremonial or social interaction of local Wiradjuri Aboriginal people? Why has the site been heavily graffiti by European settlers?
- Undertaking in-depth rock art analysis of motif assemblages, application techniques and their rarity will help answer the above questions. This research may tell us something about local social and ceremonial activity (i.e. wet pigment paintings which are rare versus dry pigment paintings which are common).
- Will testing a range of Potential Archaeological Deposits within discrete catchment areas and land-units tell us something about the intensity and variability of Aboriginal land-use patterns overtime?
- How will subsidence monitoring be undertaken to provide local data on subsidence impacts on rock-shelters, grinding groove and open sites with participation of all Aboriginal groups over the life of the UG1 and UG2?
- What is the impact of graffiti on local rock art sites and how is it to be effectively monitored?
- What number of discard items recorded as Isolated Finds are actually used as tools as opposed to the discard of unmodified flakes or broken flakes (Usewear and Residue analysis)?

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

Individually the majority of the sites recorded within the study are not unique or rare, but commonly represented. However, the intensity of occupation is far greater for the Murragamba Valley than for other areas such as the Moolarben Creek Valley. It is argued that settlement within the Murragamba Valley offered a strategic access to long term resources and places to undertake ceremony and make art. The valley is so shaped that it naturally concentrates water resources and creates highly habitable nodes in the broader landscape compared to Moolarben Creek Valley. Parts of Wilpinjong Valley have a similar geographic importance but lack the level of occupational concentration that occurs in Murragamba Valley. This therefore makes the Murragamba Valley a more significant site complex or cultural landscape, than other areas assessed within the MCP Stage 2 study area or adjacent. These sites do represent more evidence of a wider more diverse pattern of prehistoric land-use and may provide evidence of linking transport routes (corridors) or patterns of seasonal movement across a broader region. A lack of clearly dateable material remains on these kind of sites and remains a problem in constructing local or regional chronologies. Sites may be considered common or representative because they are only identified within a small area (i.e. development area).

11.5 Aboriginal Views of Sites and Cultural Landscape Value

As part of the assessment process, each Aboriginal group participating in the survey or who identified as an Aboriginal stakeholder was asked what cultural landscape values the project area may contain. A number of issues were raised:

- Aleisha Lonsdale and Warranha Ngumbaay were concerned about sites located within the Munghorn Gap Nature Reserve. These sites are associated with rock art and contemporary ceremonial practice. Will mining affect these sites?
- Warranha and Aleishia raised concerns about having access to sites and cultural landscape without any restrictions in place for Cultural Practises and Teachings as they feel that companies may put restrictions on area which makes it hard to keep cultural awareness ongoing in some areas. They would like to see something in place for all Aboriginal people in the community to have access to these areas of concern. They also have concerns about the removal of cultural objects and identification of Aboriginal Burials. They believe the mine should consider a Keeping Place for Aboriginal people in the community within close vicinity or on mine land.
- They did not identify any places of cultural significance within the MCP Stage 2 development area but were concerned about the broader impact of mining on Aboriginal heritage within the Ulan/Moolarben area. Additional comments about the results and cultural values of the MCP Stage 2 Aboriginal Cultural Heritage Assessment have been raised by other Aboriginal Stakeholder groups and these are provided in Appendix 4 of this report.

12 Significance Assessment

The Consultant has based his Significance Assessment of the Moolarben cultural resource on the following criteria:

- NSW Department of Environment and Conservation Guidelines.
- Australian Heritage Commission National Estate criteria.
- Archaeological significance assessment.
- Aboriginal social significance.
- Educational significance.

It is important to state that not all cultural heritage sites or places are equally significant or important and consequently worthy of long term preservation. A detailed discussion of significance criterion and how it has changed over time has recently been undertaken by Byrne et al (2001). The most important criteria for the assessment of the Moolarben Aboriginal cultural resource are the Aboriginal social significance, scientific archaeological significance and educational significance. Excluding Aboriginal social significance, these specific criteria will be defined.

12.1 Aboriginal Social Significance

MCM has undertaken to consult directly with all Aboriginal community groups affected by the mining proposal.

Scientific significance is defined as: *“The scientific or research value of a place. This will depend upon the importance of the data involved, on its rarity, quality or representativeness and on the degree to which the place may contribute further substantive information.”* (Byrne et al 146:2002)

In the Moolarben project context, the Consultant has used the following archaeological assessment criteria concerning Aboriginal history and past land-use, which are represented by the following headings:

- Information Potential/Research Value.
- Regional Research Priorities.
- Representativeness.
- Rarity.
- Educational.

- Cultural Landscape Values.

12.2 Information and Research Potential

This criterion is relevant to assessing an area's research potential in understanding of Australia's cultural history or human occupation of Australia. An area's cultural resource may have the potential to provide information that will contribute to understanding past human behaviour. Three factors are considered important in assessing a site, suite of sites or cultural object as having research potential:

- A place or site's intactness or integrity (this may include the state of preservation of a site or cultural remains). An intact site or place may reveal a greater amount of cultural evidence for past human behaviour. Sites in poor condition may be limited in what they can contribute to further research.
- Whether a site or cultural object (relic) may demonstrate connectedness to other sites within a landscape or within a regional context.
- The chronological potential of a site or suite of sites to provide dates of human history for that particular evidence of occupation. Whether the site or place has potential for dateable deposits or strata.

12.3 Regional Research Priorities

This research criterion is important for assessing significance when information will contribute on a regional level and assist other researchers in the understanding of past human behaviour. It is usually understood in the context of regional research priorities. Some priorities may be focussed on chronology, others on technological variability, while others may be looking at site function.

12.4 Representativeness

This archaeological assessment criterion is based on a conservation objective. It is relevant when assessing what a site or place may contribute if it was preserved for future generations. The concept has to be assessed in a regional and local context. If very little of this type of site or suite of sites has been conserved, then it becomes a conservation priority. The aim for cultural resource managers is to conserve a representative sample of sites or places for future generations and research.

The main problem of this criterion is that much of the comparative data for site conservation, especially on a regional scale has not been systematically gathered by many conservation agencies. Defining variability may be an aim for cultural resource managers, but if nothing is known about what has been destroyed or lost due to natural or human development processes then comparisons concerning representativeness are meaningless.

Without the above information, archaeologists are encouraged to assess representativeness based on their field experience and on their reading of the representative literature.

12.5 Rarity

This concept of significance criteria concerns the issue of how distinct a site or cultural object may be compared to other similar sites or objects. 'Rare' implies that sites or objects of this nature have not been readily reported or assessed in a local or regional context before. The criterion of rarity may be assessed at a range of levels including; local regional, national, state or international.

12.6 Educational Potential

Sites or places that help educate the broader public about Aboriginal history are valuable resources. It is usually the level of information retrieved from sites or objects that can really assist in enlightening the public about what happened at a particular place in the past. This educational potential comes from the work of the archaeologist in translating their finds or research results into everyday language that people can understand.

The educational outcomes may be newspaper articles, books, video presentations, lectures, radio broadcasts and information brochures. The information may be displayed as part of a local or regional museum. A mining company may use the research results to inform their employees about Aboriginal cultural history and occupation of a local area. The Aboriginal community may take the information and use it in local schools to teach and educate children about Wiradjuri Aboriginal history and culture.

12.7 Cultural Landscape Value

This value combines the concept of aesthetic and social significance to a broader context of how living Aboriginal people perceived the local landscape and their sites or cultural objects within it. This Aboriginal concept may be connected to the understanding of religious and scenic values where places and natural features may contain inherent Wiradjuri cultural landscape values.

Sites or cultural objects found within a landscape, which is 'untouched' or has natural scenic beauty, may be important when assessing cumulative impact or broader landscape disturbance. Aboriginal people will place a value on an entire landscape (with all its natural features) and how that may be affected by development impact.

12.8 Significance Results

12.8.1 Information and Research Potential

The following sites are considered to have some research potential based on their contents and condition: S2MC 43, S2MC 54, S2MC 62-64, S2MC 123-124, S2MC 151, S2MC 200, S2MC 207, S2MC 236 (36-3-0134) and S2MC 238.

12.8.2 Regional Research Values and Representativeness

The following sites are considered to have some regional research value: S2MC 43, S2MC 54, S2MC 62-64, S2MC 123-124, S2MC 151, S2MC 200, S2MC 207, S2MC 236 (36-3-0134) and S2MC 238.

12.8.3 Rarity

The following sites were considered rare based on their content, landscape aspect and research potential: S2MC151, S2MC 236 and S2MC 238.

12.8.4 Educational Potential

The following sites are considered to have some educational potential: S2MC151, S2MC 236.

12.8.5 Cultural Landscape Values

The following local features and places are considered to have some Aboriginal cultural landscape value:

- Murragamba Valley.
- Moolarben Ridge: South of Carr's Gap.
- Wilpinjong Creek North Valley.

Much of the cultural knowledge of these places comes from both oral and written historical sources.

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12.9 Significance Rating

Based on the above significance criteria, Table 20 below summarises the main significance rating for each site. It shows level of scientific significance assessed for Aboriginal sites/objects located within the project area.

Table 20: Level of scientific significance assessed for Aboriginal sites / objects located within the project area

S2MC = Stage 2 Moolarben Coal Project area

Low: 209 (includes 10 DECC sites)	Medium: 37 sites (includes 7 DECC sites)	High: 12 sites (includes 1 DECC site)
S2MC:1-5, 7-13, 16-17, 19-29, 31-42, 44, 47-49, 52-53, 55, 59-60, 65-75, 78-80, 82-88, 90-122, 126-149, 152-153, 155-199, 202-206, 210-215, 217, 219-221, 223-225, 228-234, 237, 239-249, 252-257, 259-260, 36-3-0690-36-3-0699.	S2MC:6, 14-15, 18, 30, 45-46, 50-51, 56-58, 61, 76, 81, 89, 125, 150, 154, 201, 208-209, 216, 218, 222, 226-227, 250, 251, 258, 36-3-0237, 36-3-0238, 36-3-0239, 36-3-0240, 36-3-0241, 36-3-0287, 36-3-0337	S2MC: 43, 54, 62-64, 123-124, 151, 200, 207, 236 (36-3-0134) and 238.

13 Conclusions

Of a total of 258 sites recorded for the Stage 2 project area, including 18 existing DECC registered sites, 12 sites (i.e. S2MC: 43, 54, 62-64, 123-124, 151, 200, 207, 236 [36-3-0134] and 238: see Figures 11 and 12: Appendix 2) are considered to be of high archaeological or scientific significance. The remaining 246 sites are considered of medium or low archaeological significance and depending on the nature of the development impacts may not require further archaeological investigation. If the remaining sites are to be impacted, then specific management recommendations would have to be evaluated following discussions with relevant Aboriginal community stakeholder groups.

From an Aboriginal cultural assessment point of view, the most sensitive Aboriginal cultural landscape is located within the Murrumbidgee Valley and Moolarben Ridgeline south of Carr's Gap. However, general Aboriginal community consultation advice has stated that all sites (archaeological or cultural) are of value, but none of the community members interviewed objected to the mining proposal going ahead.

13.1 Development Impacts

13.1.1 Open Cut Coal Mining and Infrastructure Impacts

The most significant development impact from the MCP Stage 2 development will be the effect of open cut coal mining on Aboriginal heritage. The main open cut extraction area is called OC4 (see Figure 2: Appendix 2). Impacts to Aboriginal heritage will also occur as a result of the MCP Stage 2 infrastructure, road and powerline realignment and creek realignment works. The total ground surface impact area from OC4 is approximately 1270ha (12.7km²).

13.1.2 Drainage-line Impacts and Surface Impacts

Full resource recovery from OC4 will require the relocation and reinstatement of two drainage systems, the Murrumbidgee Creek and an unnamed tributary to the east of Murrumbidgee Creek. The design and scheduling of OC4 will be considerate to the effective relocation and reinstatement of these drainage systems.

This development process will be cumulative and carried out on a progressive basis. During the development of Stage 2 it will involve:

- Top soil stripping.
- Excavation and placement of overburden material in out of pit emplacements, and then in pit.
- Upgrading and construction of roads and tracks to and from the open cut pit area.
- Building of storage dams.

- Development of a ROM Hopper and associated infrastructure.
- Excavation and haulage of coal.

It is estimated that a total of 173 sites will be impacted by this cumulative surface impact. This impact assessment is based on a worst case scenario (see Figure 21: Appendix 2 and Table 9).

13.1.3 Noise and Vibration from Blasting Impacts

The assessment of noise and vibration impacts from the Open Cut 4 development on the surrounding landscape including ridgeline sites (i.e. Site S2MC 236: 36-3-0134 and open archaeological deposits located along Murragamba and Eastern Creek has been assessed to be negligible by noise and vibration consultants Spectrum Acoustics. Pennington (2008) has assessed the above vibration impacts from blasting and concludes:

“The Aboriginal Heritage site is 350m west of the nearest point of OC4 and 550m east of OC/2. For a reasonably large overburden blast, the predicted ground vibration levels are 10mm/s from Pit 2 and 15mm/s from Pit 4. DECC has conservatively set a criterion of 40mm/s at the site but 80mm/s has previously been used on other projects. Vibration impacts need to get well above 20mm/s to cause superficial cracking in plasterboard joints. These levels are well below the DECC conservative criterion and should result in no damage to the Aboriginal heritage sites.” (Pennington 2008)

13.1.4 Mine Subsidence Impact

There will be two Underground Coal Mines associated with MCP Stage 2, these are described as UG1 and UG2 (see Figure 21: Appendix 2). Mine subsidence can be generally described as:

“Subsidence usually refers to vertical displacement of a point, but subsidence of the ground actually includes both vertical and horizontal displacements. These horizontal displacements can in many cases be greater than the vertical subsidence, where the subsidence is small. The amplitude of subsidence is usually expressed in millimetres.” (Mine Subsidence Engineering 2008)

Subsidence can have an impact on cliff-lines, boulder outcrops and sandstone overhangs which can bring about fracturing, cracking and faulting which may in some cases cause total collapse of rock-shelter or overhang sites. Additional impacts may be increase water seepage and runoff causing erosion of rock art work or displacement of artefacts and deposits. One of the most documented Aboriginal sites affected by mine subsidence in New South Wales is that of an Aboriginal rock art site near Bulli called Whale Cave. This was a large sandstone shelter in the Southern Coalfields region of Wollongong and underwent significant and permanent

damage as a result of underground mining (Lambert 1991). Subsidence impacts included cracks in the roof of the shelter, water seeping into the back of the cave and the need for 26 posts to support the cave roof from collapse.

13.1.5 Movement of sandstone structures

Tilting, Cracking and Troughing

Tilt is calculated as the change in subsidence between two points divided by the distance between those points. Tilt is, therefore, the first derivative of the subsidence profile. The sign of tilt is not important, but the convention usually adopted is for a positive tilt to indicate the ground increasing in subsidence in the direction of measurement. The maximum tilt, or the steepest portion of the subsidence profile, occurs at the point of inflection in the subsidence trough, where the subsidence is roughly equal to one half of the maximum subsidence. Tilt is usually expressed in millimetres per metre (Mine Subsidence Engineering 2008). For archaeological sites the above stress may cause fracturing or cracking such as shown in Figure 22 below (Mine Subsidence Engineering 2008).

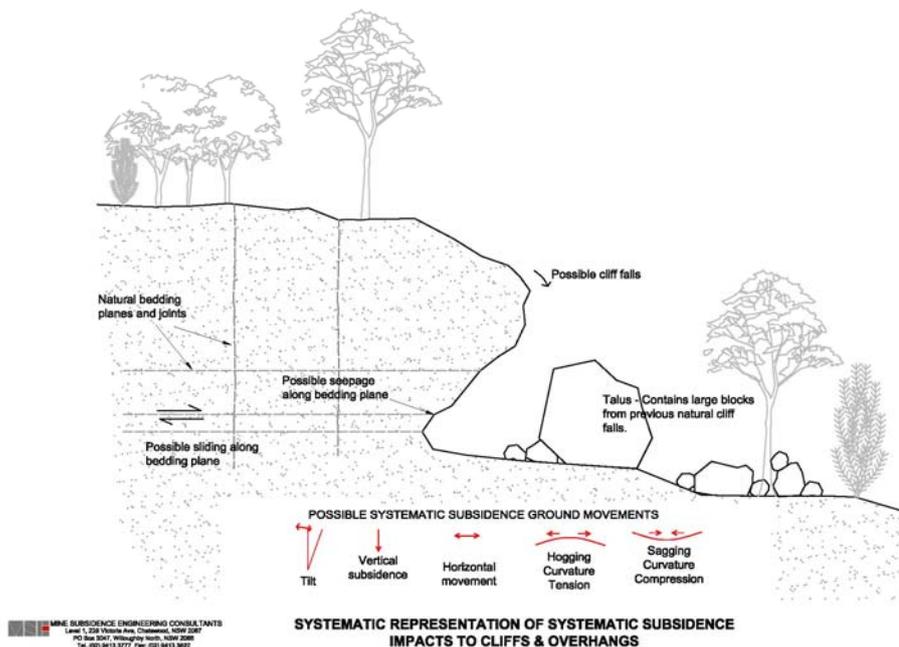


Figure 22: Systematic representation of systematic subsidence impacts to cliffs and overhangs.

For open sites and archaeological deposits the effect of subsidence impacts can be shown as movement of sandstone surfaces or benches causing cracking and bringing about the creation of troughs or depressions (see Figure 23 below from Mine Subsidence Engineering 2008.)

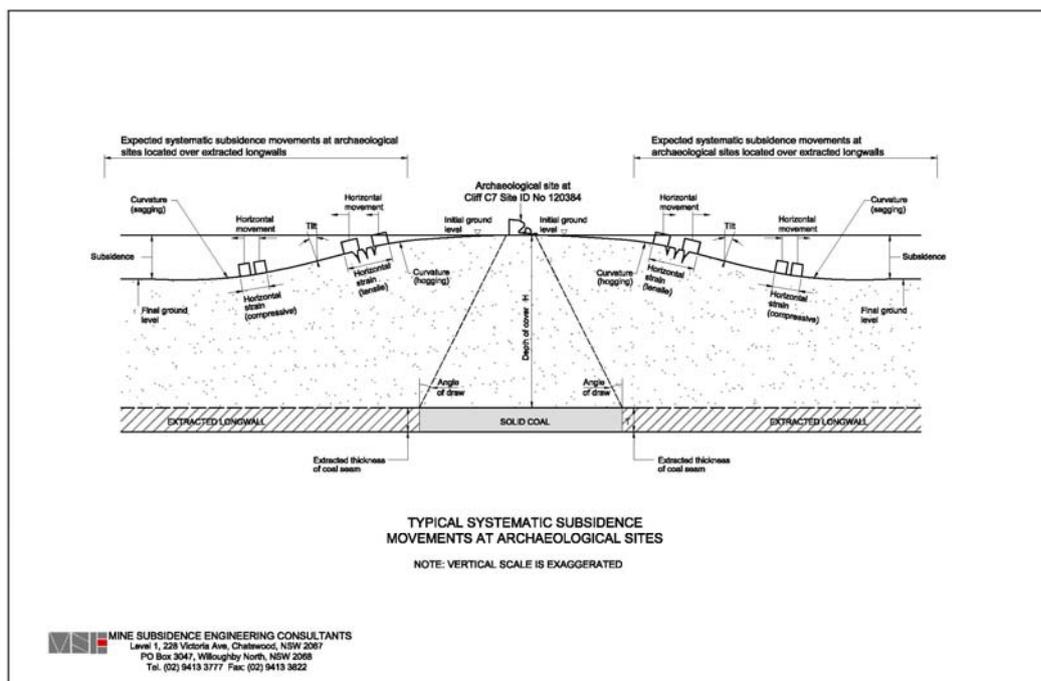


Figure 23: Typical systematic subsidence movements at archaeological sites.

These movements may also cause the increase in surface water run-off and bring about erosion and displacement of artefacts and potential archaeological deposits. Sites especially vulnerable would be located at the heads of gullies or on sandstone benches (i.e. grinding grooves or stone arrangements on ridge-crests).

13.1.6 Subsidence Impact Assessment: Underground No. 1 and No. 2

The assessment of subsidence impacts on Aboriginal heritage have been undertaken by Mine Subsidence Engineering Consultants (MSEC) subsidence specialists Mr Peter DeBono and Mr Don Kay (see Mine Subsidence Engineering Consultants 2008). Mr DeBono's report relates to Aboriginal sites and Objects located within Underground No. 1 and 2 area. His final report will be distributed to all Aboriginal community groups for comment. Assessment of long-term subsidence impacts is unknown for most sites, however an assessment of subsidence risk has been made and this is used as a guide to assess likely impacts.

Impacts on sandstone shelters, sandstone outcrops (tors, pinnacles, etc.) and associated drainage lines are likely to involve cracking, shearing and movement of

loose sandstone structures located within or near existing sites. The main findings of his report are described below:

Section 5.2.2 (Drainage Lines)

The drainage lines within the MCP Stage 2 Study Area contain predominantly alluvial and colluvial deposits and it is expected, therefore, that sections of beds downstream of the additional ponding areas, may erode during subsequent rain events, especially during times of high flow. It is expected over time, that the gradients along the drainage lines would approach grades similar to those which existed before mining. The extent of additional ponding along the drainage lines would, therefore, be expected to decrease with time.

The maximum predicted systematic tensile and compressive strains at the drainage lines, at any time during or after the extraction of the proposed longwalls, are 45mm/m and 40mm/m respectively. The minimum radii of curvatures associated with the maximum predicted systematic tensile and compressive strains are both less than 0.3km and 0.4km.

It is expected, at strains of these magnitudes, that fracturing and dilation of the bedrock would occur as a result of the extraction of the proposed longwalls. The drainage lines may have relatively thin deposits above the bedrock but it is expected that fracturing in the bedrock would be observed at the surface, especially around the locations of natural jointing in the bedrock and where the depths soil above the bedrock are the shallowest.

In times of heavy rainfall, the majority of the runoff would be expected to flow over surface cracking in the beds and would not be diverted into the fractured and dilated strata below. In times of low flow, however, some of the surface water could be diverted into the strata below the beds and this could affect the quality and quantity of the water flowing from the drainage lines.

It would be expected, however, to have very little impact on the overall quantity and quality of water flowing out of the drainage lines. It is also expected that with time the fracturing in the bedrock would be filled with alluvial materials during subsequent flow events, reducing the diversion of surface water flows into subsurface flows. It may be necessary, however, that some remediation of the beds of the drainage line would be required, such as the infilling of surface cracks with materials comprising a high clay content, or by locally regrading and recompacting the surface.

As described in Section 5.23, it is likely that the height of the fractured zones above the proposed longwalls could extend up from the Ulan Seam to the surface where the depths of cover are the shallowest. It is possible that this could result in increased conductivity between surface water, ground water resources and the mine workings and, hence, could potentially result in stream capture.

Section 5.3.3 (Cliffs)

It has been observed that cliff instabilities typically occur after the cliff has been directly mined beneath, and almost all of the rock falls occurred when the cliff was located above the goaf. Of the 10 cliffs that are identified within the Study Area, three of the cliffs, Cliffs C4, C7, and C10, are not located over the proposed longwalls. The edges of the nearest proposed longwall are approximately 95m from Cliffs C4 and C10. This represents approximately 0.9 times the depth of cover for Cliff C4 and 0.8 times the depth of cover for Cliff C10.

Cliff C7, which contains a significant rock art shelter, is to be protected by leaving a barrier of coal below the cliff. The barrier width has been designed based on distance of 0.5 times the depth of cover at the edge of the nearest panel to the delineated outcrop since cliff instabilities have not been observed for cliffs that are located outside approximately 0.5 times the depth of cover from the nearest longwall.

Of the remaining seven cliffs that are located over the proposed longwalls, five of the cliffs, Cliffs C1, C2, C3, C5 and C6, have lengths of approximately 20m and heights varying from approximately 10–15m. Cliffs C8 and C9 are considerably larger. Cliff C8 has a length of approximately 50m, height of approximately 20m and an overhang of approximately 5m. Cliff C9 has a length of approximately 100m, height of approximately 20m and overhang of approximately 7m.

Based on the above information, and in particular, the depth of cover and predicted subsidence for the cliffs, it is expected that cliff instabilities could occur on up to approximately 25% of the length of the cliffs that are located over the proposed longwalls. It is possible that, given the increased length, height and overhang of Cliffs C8 and C9, that these cliffs would be most susceptible to cliff falls.

A summary of the maximum predicted values of total systematic subsidence, tilt and strain at these 28 archaeological sites, after the extraction of the proposed longwalls, is provided in Table 21.

Table 21: Maximum predicted total systematic subsidence, tilt and strain at the archaeological sites within the study area after the extraction of Longwalls 1 to 13

Type	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total or Travelling Tilt (mm/m)	Maximum Predicted Total or Travelling Tensile Strain (mm/m)	Maximum Predicted Total or Travelling Compressive Strain (mm/m)
Open sites	1820	55	35	25
Overhang sites	1790	85	>50	>50

The values provided in the above tables are the maximum predicted parameters within a 20m radius of each site. The predicted tilts and strains are the maximum

values which occur during, or after the extraction of each proposed longwall, whichever is the greater.

13.1.7 Impact Assessments for the Archaeological Sites

Open sites containing artefact scatters and isolated finds can potentially be affected by cracking of the surface soils as a result of mine subsidence movements. It is unlikely that the scattered artefacts or isolated finds themselves would be impacted by surface cracking.

Whilst it is unlikely that the scattered artefacts or isolated finds themselves would be impacted by mine subsidence, it is possible that, if remediation works to the surface areas around the archaeological sites was required after mining, these works could potentially impact on the archaeological sites. It is recommended that MCM seek the required approvals from the appropriate authorities, prior to mining, for the potential remediation of the surface in the locations of the scattered artefacts and isolated finds. A discussion on surface cracking resulting from the extraction of the proposed longwalls is provided in Section 5.25.1.

Sites located within overhangs will be subject to similar impacts as described for the cliffs and overhangs in Section 5.3, and artefact scatters and isolated finds can potentially be affected by rock falls. Any artefacts that require protection from potential impacts would either need to be removed from the overhangs or would need to be protected by minimising the risk of rock falls at the relevant overhang.

One rock-shelter site, Site 36-3-0134: S2MC 236 (ID 120384) will be protected by the leaving by a barrier or block of unmined coal below the site. This site is located at Cliff C7 and predictions and impact assessments for this cliff are detailed in Section 5.3.

14 Cumulative Impact Assessment of MCP Stage 2 Development on Aboriginal Heritage Resources

Background

Cumulative Impact Assessment is defined by Thomas (2001) as being: “A series of separate insignificant decisions can lead to an overall significant effect, so this assessment process aims to take the longer broader view to identify the possible total effect of decisions about a number of seemingly isolated projects.” (Thomas 2001:246). It can also mean that impacts are cumulative or additive in overall effect and that they continue to increase without an understanding of the long term consequences. These impacts could also be far more serious if the range of risks is not assessed adequately over time.

The assessment is an analysis of all effects on an environmental issue such as Aboriginal heritage resources from a range of one or more activities as they occur over time and space. The effectiveness of the assessment is dependent on the quality of data used to predict cumulative impacts, the level or scale of assessment, the comparability of impacts across a range of issues (i.e. what has been effectively conserved and what has been destroyed or allowed to decay and disappear). In this discussion it is my intention to review the current level of scientific data for the cumulative impact on Aboriginal heritage resources within MCP Stage 2 area. This review will also take into account what other mining and agricultural impacts have occurred within the Murrumbidgee/Moolarben/Ulan broader landscape.

14.1 Scale of Assessment: How Aboriginal Heritage Resources are Defined

The cumulative loss of Aboriginal heritage resources across MCP Stage 2 study area can only be understood by considering it at two basic cultural heritage management levels: the Aboriginal site or Aboriginal object level and the cultural landscape level. Both these units of heritage management can cumulatively be assessed as significant or not, depending if they are assessed in isolation or as a group or collection of sites.

For example, an isolated find can only be assessed as significant if it is likely to be rare in the landscape or is an indication of other rare objects or sites. Taken as a common heritage item in the broad landscape along with larger denser sites, it may be recorded in a typically disturbed context and thus not be considered significant even at a local level. If however, 120 isolated finds were being destroyed as a result of a series of cumulative impacts within one or two landscape types this may well change our view of the collective value of isolated finds from a cultural landscape viewpoint. Aboriginal sites or objects may be connected to each other by landscape elements such as alluvial terraces making up a creek flat or a series of sites overlooking a spring site through a spur or ridge crest. An entire creek system may be defined as a cultural landscape with connected sites. Thus, to say that only one part of a creek is important may cause other undiscovered parts which may contain older buried archaeological materials to be overlooked.

14.2 MCP Stage 2: Impacts on Sites and Cultural Landscape

Site Types Affected

Of the 258 Aboriginal sites recorded in MCP Stage 2 a total of 150 open stone artefact scatter sites of varying densities, 103 individual stone artefact isolated finds, 4 rock-shelter sites, a grinding groove site and 33 Potential Archaeological Deposits (PADS) have been recorded.

14.3 Cultural Landscape Element

There are four main cultural landscape elements that contain Aboriginal cultural resources within the MCP Stage 2 project area, these are:

- Murragamba Creek and alluvial flats.
- Eastern Creek and alluvial flats.
- Moolarben Ridges (i.e. the ridge dividing Moolarben and Murragamba Valleys).
- Wilpinjong Creek and alluvial flats.

The highest concentration of Aboriginal sites and objects are located in sections of all three of the above creek systems. Several significant sites are located in an area south of Carr's Gap on Moolarben Ridgeline and these also appear to be culturally connected.

14.3.1 Murragamba Creek Impacts

Murragamba Creek contains 116 sites (2150 Aboriginal objects) which includes 16 registered DECC sites, with five sites assessed to be of high scientific significance. A total area of 5.2km² will be impacted by open cut coal mining development. A total of four sites will be conserved as a result of this development within a 4.4km section of creek conservation.

14.3.2 Eastern Creek Impacts

Eastern Creek contains a total of 20 recorded sites (580 Aboriginal objects) two of which are assessed to be of high scientific significance. A total area of 4km of alluvial terrace will be impacted and a total of 4 sites will be conserved as a result of this development.

14.3.3 Wilpinjong Creek Impacts: Red Hills

Wilpinjong Creek will be converted into a conservation area and as such over 100% of its length will be protected from any ongoing mining impacts. This section of drainage line contains a cluster of 33 open sites (1468 Aboriginal objects) with 4 sites (see Figure 11: Appendix 2 S2MC 200, S2MC 201, S2MC 207 and S2MC 226)

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containing over a 100 artefacts and 7 sites (see Figure 11: Appendix 2 S2MC 197, S2MC 200, S2MC 207–209, S2MC 226–227) containing Potential Archaeological Deposits. Sites are distributed over a 1.5km linear section of Wilpinjong Creek within a 100m wide corridor. There are also six isolated finds that will be protected as a result of this conservation outcome.

14.3.4 Moolarben Ridges

A total of seven sites (159 Aboriginal objects) have been recorded for this cultural landscape element. This area contains two sites (S2MC 236 and 238) that have been assessed to be of high scientific significance. The most likely impact from MCP Stage 2 development is subsidence from underground mining; however site S2MC 236 will be completely protected from any subsidence impacts through the area around it kept intact with a block of coal. The likely impact of subsidence on the other six sites has been assessed to be negligible by Mine Subsidence Engineering Consultants (2008).

14.4 Conservation Offsets

As has been discussed, MCP Stage 2 will conserve two important cultural landscapes. These are the Northern Wilpinjong Creek Valley (Red Hills) containing 33 sites (1468 Aboriginal objects) and a cluster of seven sites (206 Aboriginal objects) including a set of grinding grooves on a property known as Powers which is located around a soakage site.

14.5 Comparisons with Other Mining and Agricultural Impacts

14.5.1 Moolarben Coal Project Stage 1

The assessment located and recorded a total of 1598 Aboriginal Objects. This cultural record was made up of: 63 open stone artefact scatter sites of varying densities, 219 individual stone artefact isolated finds, 18 rock-shelter sites, a grinding groove site and a scarred tree site. A majority of this record (87%) is made up of exposed stone artefactual material eroding from areas of bare soil exposure with less than five artefacts in density.

14.5.1.1 Site Types

Out of total of 302 sites recorded, there are 63 open stone artefact scatter sites of varying densities, 219 individual stone artefact isolated finds, 18 rock-shelter sites, a grinding groove site and a scarred tree site.

14.5.1.2 Cultural Landscape Element

There are three main cultural landscape elements that contain Aboriginal cultural resources within the MCP Stage 1 project area, these are:

- Moolarben Creek Alluvial Flats especially Central and Southern sections.

- Northern Ridge Lines: Westwood Property.
- Bora Creek Alluvial Flats.

The highest concentration of Aboriginal sites and objects are located in sections of Moolarben and Bora Creeks and within a 2km radius of the central eastern side of Underground No. 4 on Westwoods property. Several significant sites are located within Underground No. 4 ridgeline system and include an existing rock art site 36-3-0042: S1MC 280 and a grinding groove site S1MC 26 which also appear to be culturally connected to occupation associated with the Goulburn River.

14.5.1.2.1 Moolarben Creek Impacts

Moolarben Creek contains 55 sites (471 Aboriginal objects) which includes two registered DECC sites, with one site (S1MC 103) assessed to be of high scientific significance. A total length of 100m will be impacted by open cut coal mining development. A total of 33 sites will be conserved as a result of this development within a 5km section of creek conservation.

14.5.1.2.2 Northern Ridgelines

Northern Ridgelines contains a total of 44 sites (381 Aboriginal objects) which include one registered DECC site 36-3-0043 (S1MC 280) with six sites: S1MC 264, 280 (36-3-0042), 282, 283, 286, 287 assessed to be of high scientific significance. Following a review of the final Underground No. 4 mine plan by DoP, the above sites including the remaining 38 will not be impacted as result of underground mining and will be subject to an intensive site recording and subsidence monitoring management programme.

14.5.1.2.3 Bora Creek Impacts

Bora Creek contains 34 sites (150 Aboriginal objects) all of these sites were assessed to be of low scientific significance. A total length of 1km will be impacted by infrastructure mining development (i.e. building of dams, offices, car parking and a rail loop). A total of six sites will be conserved as a result of this development within a 500m section of riparian creek conservation.

14.5.1.3 Conservation Offsets

There are approximately 78 sites (440 Aboriginal Objects) that will be protected as of the MCP Stage 1 development project. These contain areas within the Northern Ridgelines, a majority Moolarben Creek and a small portion of Bora Creek.

14.5.2 Wilpinjong Coal Mine Development

Approximately 2510ha of the Wilpinjong Mine Lease (approximately 25km²) including comprehensive survey of the Project disturbance area and sample survey or other areas adjacent to the Project disturbance area was carried out. A total of 235 Aboriginal sites and objects were recorded as a result of the assessment (see Figure 5: Appendix 2, Navin Officer 2005).

14.5.2.1 Site Types

Out of total of 235 sites recorded, there are 70 open stone artefact scatter sites of varying densities (23 sites have over 50 estimated artefacts, with five sites having over 500 artefacts estimated), 64 individual stone artefact isolated finds, 43 rock-shelter sites, a procurement site, 49 scarred trees (some debatable in origin) two sites of cultural significance, three natural spring sites, four sites of debateable origin and two potential archaeological deposits in an open context (Navin Officer 2005).

14.5.2.2 Cultural Landscape Element

There are five main cultural landscape elements that contain Aboriginal cultural resources within the Wilpinjong project area, these are:

- Cumbo Creek Alluvial Flats especially Central and Southern sections.
- Bens Creek.
- Narrow Creek Alluvial Flats.
- Spring Creek and surrounding ridgelines.
- Wilpinjong Creek and surrounding ridgelines.

The highest concentration of Aboriginal sites and objects are located in sections of Wilpinjong Creeks, Spring Creek and Cumbo Creek. There are several significant sites are located within these creek systems and adjacent ridgelines and include two open sites with over 500 artefacts WCP 134 and WCP 174 located along Wilpinjong Creek and three rock-shelters with art WCP 72 located north of Cumbo Creek (300m), WCP 152 located south-west of Spring Creek (1.5km) and WCP 153 located just north of WCP 152, approximately 500m. There are 68 sites of moderate to high significance ratings and the remaining 161 sites are assessed to be either moderate, low to moderate, low or nil significance rating (Navin Officer 2005).

14.5.2.2.1 Valley Floor Impacts and Creek Impacts

A total of 162 sites (approximately 68%) of all sites are likely to be impacted by the Wilpinjong mine development. This direct impact accounts for approximately 2376 Aboriginal objects. The exact figure cannot be known as the original survey did not list the total number of artefacts recorded for sites with over 50 artefacts. A majority

of these sites however are low density artefact scatters with less than 20 artefacts (53) or Isolated Finds (51). Much of this evidence is scattered randomly across the valley floor with richer sites (i.e. containing over 50 artefacts and some archaeological deposit located within 100–200m of an existing drainage line. The most significant open site affected by the Wilpinjong development is WCP 134 located near Wilpinjong creek. This site contains an additional stone artefact procurement site WCP 88 that may have been the result of Aboriginal people using local gravels for stone tool manufacture.

The most significant impact within landscape terms is the destruction of portions of creek systems flowing across the Wilpinjong development with impacts on Narrow Creek (10 sites), Bens Creek (5 sites), Cumbo Creek (6 sites), Planters Creek (5 sites) and Spring Creek (6 sites).

14.5.2.2.2 Ridgeline Impacts

There is significantly less impact on surrounding ridgelines landscape elements as a result of the Wilpinjong mine development. There are three significant rock art sites (WCP 72, 152, 153,) and one culturally significant site (WCP 58) protected within conservation zones. Blasting and vibration impacts will not affect these sites.

14.5.2.3 Conservation Offsets

There are approximately 73 sites that will be protected as of the Wilpinjong mine development. The company established three conservation zones ECA A–C to protect various environmental values including Aboriginal heritage values within the Wilpinjong mine lease. Twenty one sites will be permanently protected within these conservation zones including significant rock art sites WCP 72, 152 and 153. More importantly a significant portion of Wilpinjong Creek will also be protected along with a smaller portion of Cumbo Creek alluvial deposits. According to Navin Officer the conservation areas show that:

“These survey results clearly indicate that the landforms within the proposed ECAs have high archaeological value and contain a significant proportion of high significance sites, and/or the potential for such sites. These areas contain similar sites to those in the disturbance areas as well as a more diverse range of site types. Many of these sites have scientific and cultural significance.” (Navin Officer 2005:114)

14.5.3 Ulan Coal Mine Development

Ulan Coal Mine lease covers an area of approximately 17.876ha (178km²) and is located in the headwaters of the Goulburn and Talbragar Rivers catchments. Over 440 Aboriginal sites have been recorded on the UCML mining leases during the various studies conducted since 1980. These sites include:

- Rock-shelters with Aboriginal art, particularly hand stencils, and/or artefact deposits.

- Grinding grooves.
- Artefact scatters.
- Isolated finds.
- Scarred trees.
- Quarries.

14.5.3.1 Site Types

Out of total of 440 sites recorded within the UCML, there are records for 130 open stone artefact scatter sites of varying densities, 43 individual stone artefact isolated finds, 107 rock-shelter sites with either art, grinding grooves, deposits and/or artefacts, a red ochre quarry, two grinding groove sites and one possible stone arrangement. There are also numerous scarred trees, some of which have been noted but not registered.

14.5.3.2 Cultural Landscape Element

The main cultural landscape elements that contain Aboriginal cultural resources within the UCML project area, these are:

- Mona Creek catchment and Alluvial Flats.
- Curra Creek catchment and surrounding ridgelines.
- Broken Back escarpment.
- Cockabutta Creek and surrounding ridgelines.
- Bobadeen Creek and surrounding ridgelines.
- Ulan Creek alluvial flats.

The highest concentration of Aboriginal sites and objects are located in sections of Mona Creek Valley and Ulan Creek Valley. No information is available about the level of scientific significance of sites and objects from the work of Haglund. There are several significant sites are located within these creek systems and adjacent ridgelines and include two rock-shelter sites with grinding grooves MC 1 and MC 2 located within the Mona Creek valley. From the work of Kuskie and Clarke (2007), it is reported that there are 22 sites of low significance rating, three sites low-moderate, one site moderate, one site moderate to high and one high significance ratings.

14.5.3.3 Impact assessment

Since 1980, a number of mine developments have occurred within the Ulan Mine lease; however up until 2002 there has been no data available on the total number of Aboriginal sites or objects impacted. Unsubstantiated data puts the level of site impacts at about 10–20% with a majority of sites being open artefact scatters and isolated finds associated with development of the main open cut mine and its impact on the Goulburn River and parts of southern Ulan Creek catchment. There is little comparative data on the ongoing indirect impacts. However, it is also likely that a much higher percentage of rock-shelter sites within the UCML have been conserved but there is a lack qualitative data on the condition of these shelter sites due to natural erosion and potential subsidence impacts.

14.5.3.4 Conservation Offsets

Little comparative data is available on the total number of sites and objects conserved within the Ulan Coal Mine lease. However as a result of its subsidence management plan review Ulan Coal Mines have set aside several conservation areas described as: the ML1468 Development Approval, with three Conservation Areas have been established at Ulan to protect a sample of Aboriginal rock-shelter sites. The Mona Creek Conservation Area encompasses sites MC23 to MC30, the Brokenback Conservation Area sites BB4 to BB11, and the Cockabutta Creek Conservation Area sites CC18 to CC20. The conservation area boundaries are a minimum distance of 150m from each site. These sites include rock-shelters with artefacts, art and potential deposits, but the presence of any grinding grooves is uncertain (Kuskie & Clarke 2007).

14.5.4 Goulburn River National Park and Munghorn Gap Nature Reserve Conservation Offset

In order to evaluate the effects of cumulative impacts surrounding Moolarben Coal Project it also necessary to discuss briefly what Aboriginal cultural resources have been protected permanently through national estate conservation. Two conservation areas have relevance in this discussion and they are Goulburn River National Park and Munghorn Gap Nature Reserve.

14.5.4.1 Goulburn River National Park

Goulburn River National Park is located approximately 42km north-east of Mudgee within the Great Dividing Range on the Upper Hunter River catchment.

The park encompasses 70,161ha of a large area of dissected rugged sandstone country on sandstone plateau with a series of creeks flowing into the Goulburn River which form the main cultural artery for Aboriginal occupation. Goulburn River National Park extends along about a 90km section of the Goulburn River within an area which is roughly bounded by Sandy Hollow, Merriwa, Bylong, Wollar and Ulan.

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A portion of the Goulburn River National Park was originally proposed to be flooded in the early 1980s as part of the proposed Kerrabee Dam proposal. This dam was to be constructed on the Goulburn River at the junction with the Merriwa River to supply water to the Hunter Valley. However, following extensive environmental assessment, it was determined that the area's significant natural and cultural values precluded construction of the dam. The area was reserved as Goulburn River National Park in 1983 (NPWS POM 2003).

There are over 400 registered Aboriginal sites within the park and a significant portion of those sites were recorded through the work of Haglund in her original EIS study for the Kerrabee Dam proposal (Haglund 1981). She documented a total of 347 sites comprising 232 rock-shelter sites and 103 open sites with archaeological deposits. She also recorded 15 sets of axe grinding grooves (six of these are parts of other sites) six rock art sites (five of which have archaeological deposits), one basalt axe quarry (located in the bed of the Goulburn River) and two possible scarred trees.

A large portion of these sites are clustered at the junction of two streams or are located along a meander. She argues that:

“These locations generally provide one or more permanent water-holes, good visibility in several directions, areas of gently sloping or flat colluviums or alluvial flats and behind these stretches of vertical cliff face honey combed with rock-shelters. There are often also areas of horizontal rock platform overlooking the stream, and stretches of river bed with pebbles suitable as raw material for tools.” (Haglund 1981: 26)

In summing up the regional significance of archaeological sites recorded in the Goulburn River NP, Haglund says:

“The study area offers one of the few, perhaps the only possibility in eastern NSW of studying a system of Aboriginal land use in a sample that is balanced or complete, i.e. retaining example of most aspects of what could leave physical evidence. A whole series of sites and groups of sites which are clearly used differently and to different extents, but which appear to belong together are being distinguished... A study of the site clusters at the focal point is necessary to understanding of the complex. There is also hints of differences between some of these complexes which would need further study to be elucidated. On present evidence it does not seem possible to take a few small samples areas as representative of the whole study area.” (Haglund 1981:42)

In her comparison of site density with other rich research areas such as Mangrove Creek Dam, Haglund says that:

“The density of sites appears to be unusually high. This is shown by the survey of sample areas and by comparison with other areas surveyed in detail such as Mangrove Creek Dam, within the latter there are 2.8. sites per km²,

within the Kerrabee Dam area the density is 11.6 sites per km². It should be noted that not only are open sites undisturbed to unusual extent but also other sites (i.e. rock-shelters) are unusually free from evidence of disturbance or vandalism” (Haglund 1981: 43).

14.5.4.2 Munghorn Gap Nature Reserve

Munghorn Gap Nature Reserve lies approximately 34km north-east of Mudgee and covers an area of approximately 5,935ha of sandstone pagoda formation country. It is adjacent to Goulburn River National Park on both the south and north sides of the Mudgee-Wollar road. The nature reserve was originally dedicated under the *Fauna Protection Act 1948* on 12 April 1961 “for the purpose of protection and care of fauna, the propagation of fauna and the promotion of the study of fauna”. In 1967 the reserve was extended and reclassified as Munghorn Gap Nature Reserve (NPWS POM 2003).

Munghorn Gap Nature Reserve is located in the headwaters of Cumbo, Murragamba/Wilpinjong and Moolarben Creeks, which are three tributaries of the Upper Goulburn River. Its southern boundary is drained by Cooyal Creek which flows into the Talbragar River, part of the Murray–Darling Basin of inland Eastern Australia. Thus Munghorn Gap straddles the watershed between the coastal eastward-flowing streams and the inland westward-flowing streams (NPWS POM 2003).

The nature of the Aboriginal cultural heritage sites in the Munghorn Gap Nature Reserve is relatively unknown, however several rock art sites have been recorded within the area known Honey Eater Flats (see Appendix 1). No systematic archaeological surveys have been carried out within the Nature Reserve.

14.5.5 Agricultural Land-Use and Related Impacts

Pastoral occupation began in the Ulan/Moolarben area during the 1830s when small pastoral holdings were established along the flats of the major rivers. The marginal nature of farming ensured that much of the landscape remained relatively undisturbed. Several descendant families of the original landholders still reside in the Merriwa and Wollar areas. According to Tickle (2005), settlement was very slow with isolated settlers occurring in the 1850s. By the 1880s and 1890s, there was an increased numbers of small selections which have been amalgamated into larger holdings. Early land use consisted of timber cutting and subsistence farming. Sheep and cattle breeding and grazing with some crops for fodder are the main land uses now. Mining for coal has taken place near Ulan since the 1930s and there has been mining for Ulan stone and slate in isolated pockets.

The biggest impact of agricultural land-use on the archaeological record was the ploughing of alluvial creek and river flats and the removal of native vegetation. A broad area, the open valleys of Moolarben, Murragamba and Wilpinjong have had close to 150 years of soil disturbance with either ploughing for pasture improvement or cropping activities. Areas within the Murragamba Creek Valley clearly show an

increase in top soil loss (especially A1–A2 soil horizon) and a resultant loss of in situ cultural evidence especially structural information such as hearths and stone structures. There are small pockets of protected alluvial terrace areas but these are relatively rare. The protection of these intact pockets of alluvial plains is rare and continues to be under constant threat both from mining and agricultural impacts.

14.5.6 Discussion and Conclusions

From this broad cumulative impact review, a number of observations and conclusions can be drawn. These will be summarised at the site and cultural landscape level.

14.5.7 Impacts on Site Types

The greatest loss of site types within the Ulan/Moolarben areas is clearly isolated finds of surface artefacts and low density artefact scatter sites (i.e. less than five artefacts), followed by scarred and carved trees. The number of sites per mining development that are removed through surface impacts (particularly open cut mining) is high across all three mine developments, although more evidence is required from within the Ulan mine lease. There is also a perception that isolated find sites do actually represent a single discard event within the prehistoric Aboriginal landscape, but more investigation needs to be undertaken to tell if the find is connected to other sites or is part of buried archaeological remains.

It is argued that even with the effects of subsidence from underground mining, rock-shelter sites are still the best protected site type and least threatened across a broad range of landscapes in the Ulan/Moolarben area. Rarer sites such as grinding grooves and stone arrangements are more vulnerable especially if they are susceptible to subsidence or vibration impacts.

The impact from mining development, although great and continuing to accumulate, must be put into historical context with other land-uses. Early agricultural development would have removed rare carved tree sites and wild fires would have also had an effect. Scarred trees would have been removed by timber extraction and farmers making fence posts from native vegetation. The likelihood of finding intact scarred trees within the broad landscape is considered rare; however more research needs to be undertaken in identifying how scarred trees were created in the local landscape.

The building of surface water dams on farms at the head of creeks, springs and soaks would have also impacted many smaller Aboriginal sites and objects. The impacts of town development (Ulan village), road building through local government activity and the construction of power-lines also need to be considered. The assessment of these impacts did not occur until the late 1970s and already some alluvial landscapes (i.e. Moolarben Creek catchment) had been severely affected.

14.5.8 Impacts on Cultural Landscapes

The greatest loss of cultural landscapes is associated with the impacts on creek and river alluvial landforms. Comparatively the greatest impacts from agricultural land-use again have come about through systematic pasture improvement and ploughing alluvial flats. Moolarben, Wilpinjong, Lagoon, Spring and Murragamba Creeks have all been disturbed by ongoing clearing and ploughing for agriculture. Ulan Coal Mine's impact on Aboriginal sites and objects has principally come about from the construction of its main open cut mine and the diversion of the Goulburn River. Parts of Ulan Creek have also been altered but the scale of impact is less evident and there is little comparative data on what sites and objects have been destroyed from the 1980s.

Moolarben Coal project will impact on a section of the Bora Creek cultural landscape (1km), Murragamba Creek cultural landscape (4.4km) as well as the Eastern Creek (4km) cultural landscape. Wilpinjong Mine has impacted on parts of Cumbo Creek (1.4km), Spring Creek (300m), Narrow Creek (2km) and Wilpinjong Creek cultural landscapes but has mainly disturbed portions of the valley floor adjacent to these areas.

14.5.9 Conservation Offsets and Reserves

As well as the negative impacts from mining there are also positive outcomes concerning the conservation of Aboriginal sites and objects. Moolarben Coal Project Stage 1 and 2 will protect a total of 171 sites as well Moolarben Creek alluvials, North Wilpinjong Creek cultural landscape, and cluster of important sites on Powers Property. Wilpinjong Mine has conserved a total of 73 sites and created three conservation areas (ECA A-C) which conserve portions of Cumbo Creek cultural landscape and Wilpinjong Creek cultural landscape. Ulan Mine has also set aside three conservation areas called Mona Creek, Broken Back and Cockabutta Creek which aim to protect a total of 16 significant rock-shelter sites.

Within the Goulburn River National Park, there are at least 400 registered Aboriginal sites which are protected permanently and have the potential to provide much more information about the way Aboriginal people used the landscape over time. From the work of Haglund (1981), it appears that the quality and quantity of sites within the Goulburn River National Park have been significantly undervalued as a source of conservation offset in comparison to Aboriginal sites and objects found on private land used for mining and agriculture purposes.

14.5.10 Conclusion

This cumulative review of the impact of mining and agriculture on Aboriginal sites and objects in the Ulan/Moolarben area has raised a number of important issues. These issues concern the future conservation and management of Aboriginal cultural resources and can be summarised in the following way:

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- There is a significant loss of small surface Aboriginal artefact sites and objects across a range of landscape types in the Ulan/Moolarben area both through mining and agricultural development. Of special concern are the on-going impacts on alluvial plain landforms for all major open site type categories. This cumulative loss will continue unless these sites are better understood in their regional landscape setting.
- As mining, agriculture, residential, road, power, etc. development increases in the Moolarben/Ulan area a higher portion of Aboriginal sites and objects will be completely lost from their local environmental setting and it will be harder for government agencies and consultants to properly assess local and regional significance without any base-line research information.
- The conservation of specific cultural landscapes should be made a priority when governments are making a judgement about what type of impact should be allowed in the Ulan/Moolarben – Wilpinjong area.
- A regional base-line research study should be implemented to look at the regional heritage significance of Aboriginal heritage resources in the Goulburn River National Park. This will allow a better assessment of cultural and scientific significance of Aboriginal sites across the whole region and remove pressure from dealing with a site by site impact assessment approach;
- This study should be funded by government, local mining and agricultural companies by each making an equal contribution to a trust fund to be run jointly with the local Aboriginal community. The study should also look at setting up more locally based conservation programmes for Aboriginal community participation to monitor and protect sites.
- Better site data information should be provided to local Aboriginal communities on the scale of cumulative impacts effecting Aboriginal heritage resources in the Ulan/Moolarben area. There is also a need for local Aboriginal stakeholder groups to run their own heritage databases so that they can be better able to make judgement about levels of cumulative impact.

15 Mine Impacts and Conservation Offsets MCP Stage 2

15.1 Impacts on Aboriginal Sites and Objects

As a result of the MCP Stage 2 development a total of 173 Aboriginal sites and objects will be impacted (see Table 9 and Figure 21: Appendix 2). This impact is a result of the following mine operation development:

- Open Cut 4.
- Underground No. 1 and 2.
- Infrastructure development including water pipe-line route.
- Out of pit dumps.
- Storage dams.
- Access roads.

15.2 Conservation of Aboriginal Sites and Objects

As a result of the MCP Stage 2 development a total of 85 Aboriginal sites and objects will be conserved (see Table 9 and Figure 21, and Table 22 below: Appendix 2). This conservation strategy will come about due to the protection of the following landscapes:

- Wilpinjong Creek North Red Hills Property: Wilpinjong Creek cultural landscape
- Powers' Property: sites and objects connected to existing soakage site.

Table 22: Aboriginal sites and objects which will be impacted and conserved by the Moolarben Stage 2 mine development proposal

Type of mining impact	Sites to be impacted	Sites likely to be preserved as a result of the proposal
Open Cut 4	139	36
Underground No. 1	6	2
Underground No. 2	3	1
Infrastructure impacts	25	2
Conservation offsets		44
TOTAL	173	85

16 Management Recommendations

16.1 Site Management Strategies and Conservation Options

Subject to final approval of the Stage 2 Moolarben Coal Project from the NSW Department of Planning, 173 sites are likely to be impacted by the mine development and will require Part 3A planning approval. A total of 85 sites will be conserved as a result of the Stage 2 MCP development. (See Table 22 above and Figure 21: Appendix 2.)

The following general management recommendations are made for Aboriginal sites and objects likely to be effected by the Moolarben Stage 2 mine development proposal.

These general management recommendations include:

- Conservation and preservation of sites outside the disturbance area from likely mine construction impacts.
- Archaeological salvage and test excavations.
- Surface collection of Aboriginal objects.
- Intensive *in situ* recording.
- Ongoing monitoring and assessment of subsidence impacts.
- That Moolarben Coal Mines provide expert subsidence advice to the Aboriginal community via a presentation to discuss the MCP Stage 2 subsidence assessment.

16.2 Specific Management Recommendations

From a total of 173 sites likely to be impacted by the MCP Stage 2 development it is recommended that the following specific archaeological salvage management methods be applied (see Appendix 9):

- Controlled gridded surface collection of Isolated Finds and low density Artefact Scatters: 133 sites.
- Test excavation and salvage by means of mechanical (grader scrapes, back hoe trenching), shovel testing and hand excavations: 34 sites; in conjunction with;
- Intensive surface recording including fine scale mapping and photography: 6 sites including Rock Art Site 36-3-0134.

16.2.1 Murragamba Creek

This significant cultural landscape is subject to the highest mining impact within the MCP Stage 2 project and it is recommended that MCM try and preserve as much as of this landscape feature as is practically possible.

16.2.2 Keeping Place

It is recommended that MCM set aside a Keeping Place for the purpose of housing and curating all salvaged Aboriginal objects and archaeological material during the life of the project. This Keeping Place will be managed jointly by MCM and Aboriginal community stakeholder groups. Its location, curatorial purpose, educational function and design should be subject to consultation with all Aboriginal community stakeholder groups and the DECC. The location and management of the Keeping Place should ensure open access for all interested Aboriginal people as well as relevant scientific researchers.

16.2.3 Regional Aboriginal Cultural Heritage Assessment Study: Goulburn River National Park

To better understand and manage the scale of future cumulative impacts from mining within the Ulan/Mudgee area on Aboriginal heritage, it is recommended that MCM provide research funding into a study of sensitive Aboriginal cultural landscape types within the Goulburn River National Park. This study would build upon the research work of Dr Laila Haglund in providing a better understanding of regionally significant Aboriginal cultural landscape types within the Mudgee/Ulan region. The project should be jointly managed between MCM and DECC and have Aboriginal community stakeholder input into its design and execution.

16.3 Aboriginal Community Stakeholder Consultation and Management Input to the Final Report's Recommendations and Aboriginal Heritage Planning

It is recommended that all Aboriginal stakeholders be sent copies of this report and be given the opportunity to comment on its contents and provide management advice as to the acceptability of impacts on existing Aboriginal cultural resources identified in the MCP Stage 2 Approval area. This would involve all four Aboriginal stakeholder groups – Mudgee LALC, Murong Gialinga, Warrabinga Native Title Aboriginal Corporation and the North-East Wiradjuri Pty Ltd – being invited to attend onsite field inspections to discuss these management issues with MCM.

16.4 Conservation Management Option

This option will either involve leaving an identified Aboriginal site or Aboriginal object in place and therefore undisturbed within the landscape. It may also require protection using fencing or the appropriate construction barriers to prevent accidental damage.

16.5 Aboriginal Cultural Heritage Management Plan

It is recommended, that Moolarben Coal Mines Pty Ltd prepare an Aboriginal Cultural Heritage Management Plan in order to assist it in managing likely cultural resources found within their mine lease area. This plan will be developed using an Aboriginal Heritage planning workshop with input and advice from the local Aboriginal community stakeholders and qualified experts.

17 Acknowledgements

The Consultant would like to thank the following people for their support and positive attitude in preparing this document: Mr Ian Callow, Mr Jonathan Berry, Mr Alan Wells, Miss Jodie Mitchell, Mr Glen Miller, Miss Christine Maynard, Mr David Maynard, Mrs Wendy Lewis, Mrs Robyn Williams, Miss Emma Syme, Mr Kevin Williams, Mrs Lyn Syme, Miss Rosie Pye, Mrs Aleisha Lonsdale, Mrs Lola McConnell, Mrs Gail McConnell, Mr Larry Flick, Mr Robert Maynard, Mr Nathan Flick, Mr Steven Flick, Dr Peter Mitchell, Mr Neil Pennington, Mr Peter De Bono, Mr Don Kay, Mr Geoff Murray, Mrs Narelle McMahon, Mr Calvin Sciani, Mr John Furner, Mrs Sandra Turner.

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APPENDICES

APPENDIX 1: DECC AHMIS Site Register Search Results

WOLCAR 1:25,000

APPENDIX 1



Department of
**Environment
& Conservation**

List of Sites (Partial)

Grid Reference Type = AGD (Australian Geodetic Datum), Map Sheet like 541%, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	Location				
✓ <u>36-3-0454</u>	<u>WCP 177</u>	GDA	55	770132	6417479	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0455</u>	<u>WCP 178</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0456</u>	<u>WCP 179</u>	GDA	55	769042	6418083	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ <u>36-3-0457</u>	<u>WCP 180</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0458</u>	<u>WCP 181</u>	GDA	55	767683	6421370	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0459</u>	<u>WCP 182</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0460</u>	<u>WCP 183</u>	GDA	55	768077	6417927	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0461</u>	<u>WCP 184</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0462</u>	<u>WCP 185</u>	GDA	55	767620	6415880	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0463</u>	<u>WCP 186</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0464</u>	<u>WCP 187</u>	GDA	55	767560	6418332	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0465</u>	<u>WCP 188</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0466</u>	<u>WCP 189</u>	GDA	55	769758	6419369	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0467</u>	<u>WCP 190</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0468</u>	<u>WCP 191</u>	GDA	55	769914	6419951	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0469</u>	<u>WCP 192</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0470</u>	<u>WCP 193</u>	GDA	55	771497	6417049	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0471</u>	<u>WCP 194</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0472</u>	<u>WCP 195</u>	GDA	55	773708	6417456	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0473</u>	<u>WCP 196</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			
✓ <u>36-3-0474</u>	<u>WCP 197</u>	GDA	55	771101	6416606	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ <u>36-3-0475</u>	<u>WCP 198</u>	Status	Valid			None	<input type="checkbox"/>	Artefact			

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List of Sites (Partial)
Grid Reference Type = AGD (Australian Geodetic Datum), Map Sheet like 541%, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Eastings	Northings	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
✓ 36-3-0553	WCP117	GDA	55	767046	6417986	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid								
✓ 36-3-0554	WCP118	GDA	55	767012	6417958	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid					Artefact			
✓ 36-3-0555	WCP119	GDA	55	767012	6417958	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid					Potential Archaeological Deposit (PAC)			
✓ 36-3-0556	WCP120	GDA	55	767018	6417924	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid					Potential Archaeological Deposit (PAC)			
✓ 36-3-0557	WCP121	GDA	55	767260	6418550	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid					Potential Archaeological Deposit (PAC)			
✓ 36-3-0558	WCP122	GDA	55	767483	6418950	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid					Artefact			
✓ 36-3-0559	WCP123	GDA	55	767528	6418870	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid					Modified Tree (Carved or Scarred)			
✓ 36-3-0560	WCP124	GDA	55	767322	6418870	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid					Artefact			
✓ 36-3-0561	WCP125	GDA	55	767551	6418682	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid					Artefact			
✓ 36-3-0562	WCP126	GDA	55	767359	6418476	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid					Artefact			
✓ 36-3-0563	WCP127	GDA	55	772442	6416074	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid					Artefact			

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	Location				
✓ 36-3-0531	WCP95	GDA	55	773968	6417817	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0532	WCP96	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0533	WCP97	AGD	55	773970	6418008	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0534	WCP98	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0535	WCP99	GDA	55	774018	6418065	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0536	WCP100	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0537	WCP101	GDA	55	773986	6418077	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0538	WCP102	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0539	WCP103	GDA	55	773802	6418148	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0540	WCP104	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0541	WCP105	GDA	55	773853	6418099	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0542	WCP106	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0543	WCP107	GDA	55	773848	6418091	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0544	WCP108	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0545	WCP109	GDA	55	768724	6420426	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0546	WCP110	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0547	WCP111	GDA	55	768862	6420231	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0548	WCP112	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0549	WCP113	GDA	55	768609	6420249	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0550	WCP114	Status	Valid				<input type="checkbox"/>				
✓ 36-3-0551	WCP115	GDA	55	768901	6419830	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0552	WCP116	Status	Valid				<input type="checkbox"/>				

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List of Sites (Partial)

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
✓ 36-3-0641	WCP67	GDA	55	772720	6419067	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0642	WCP68	Status	Valid			None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0643	WCP69	GDA	55	772369	6418807	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0644	WCP70	Status	Valid			None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0645	WCP71	GDA	55	771715	6417414	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0646	WCP72	Status	Valid			None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0647	WCP73	GDA	55	771626	6417830	None	<input type="checkbox"/>	Art (Pigment or Engraved)		Permit(s)	
✓ 36-3-0648	WCP74	Status	Valid			None	<input type="checkbox"/>	Potential Archaeological Deposit (PAL)		Permit(s)	
✓ 36-3-0649	WCP75	GDA	55	771578	6417365	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0650	WCP76	Status	Valid			None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 36-3-0651	WCP77	GDA	55	770872	6417192	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 36-3-0652	WCP78	Status	Valid			None	<input type="checkbox"/>	Artefact		Permit(s)	
✗ 36-3-0653	WCP79	GDA	55	770887	6416900	None	<input type="checkbox"/>	Artefact		Permit(s)	
✗ 36-3-0654	WCP80	Status	Valid			None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
36-3-0608	WCP34	GDA	55	768414	6418593	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
36-3-0609	WCP35	GDA	55	768253	6418543	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
36-3-0610	WCP36	GDA	55	768465	6418489	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)			
		Status	Valid					Artefact			
36-3-0611	WCP37	GDA	55	768465	6418489	None	<input type="checkbox"/>	Art (Pigment or Engraved)			
		Status	Valid					Potential Archaeological Deposit (PAC)			
36-3-0612	WCP38	GDA	55	768665	6418489	None	<input type="checkbox"/>	Artefact			
		Status	Valid					Potential Archaeological Deposit (PAC)			
36-3-0613	WCP39	GDA	55	768532	6418680	None	<input type="checkbox"/>	Artefact			
		Status	Valid					Potential Archaeological Deposit (PAC)			
36-3-0614	WCP40	GDA	55	768145	6417921	None	<input type="checkbox"/>	Artefact			
		Status	Valid					Potential Archaeological Deposit (PAC)			
36-3-0615	WCP41	GDA	55	768083	6417772	None	<input type="checkbox"/>	Artefact			
		Status	Valid					Potential Archaeological Deposit (PAC)			
36-3-0616	WCP42	GDA	55	768013	6418339	None	<input type="checkbox"/>	Artefact			
		Status	Valid					Potential Archaeological Deposit (PAC)			
36-3-0617	WCP43	GDA	55	767922	6417818	None	<input type="checkbox"/>	Artefact			
		Status	Valid					Potential Archaeological Deposit (PAC)			
36-3-0618	WCP44	GDA	55	767641	6416465	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)			
		Status	Valid					Potential Archaeological Deposit (PAC)			

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List of Sites (Partial)

Grid Reference Type = AMG Map Sheet = NARR4S Feature Search Type = AHIMS Features

Site Id	Site Name	Grid Ref. Type	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
<u>36-3-0162</u>	<u>Cockabulite (site 4);</u>	AMG	55	749050	6441050	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		1333
		Status	Valid								
<u>36-3-0164</u>	<u>Ulan 103;</u>	AMG	55	757560	6433660	None	<input type="checkbox"/>	Artefact	Axe Grinding Groove		2423
		Status	Valid					Grinding Groove	Shelter with Deposit		
<u>36-3-0165</u>	<u>Ulan 104;</u>	AMG	55	757600	6432660	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								
<u>36-3-0167</u>	<u>Ulan 106;</u>	AMG	55	766440	6434560	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								
<u>36-3-0168</u>	<u>Ulan 107;</u>	AMG	55	757250	6434770	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								
<u>36-3-0169</u>	<u>Ulan 108;</u>	AMG	55	757000	6435000	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								
<u>36-3-0170</u>	<u>Ulan 109;</u>	AMG	55	755770	6435400	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								
<u>36-3-0171</u>	<u>Ulan 110;</u>	AMG	55	756790	6435400	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								
<u>36-3-0172</u>	<u>Ulan 111;</u>	AMG	55	756810	6435410	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								
<u>36-3-0173</u>	<u>Ulan 112;</u>	AMG	55	755770	6434030	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								
<u>36-3-0174</u>	<u>Ulan 113;</u>	AMG	55	755730	6434050	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid								



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List of Sites (Partial)

Grid Reference Type = AMG Map Sheet = NARR4S Feature Search Type = AHIMS Features

Site Id	Site Name	Grid Ref. Type	Zone	Eastings	Northings	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						General	Location				
<u>36-3-0175</u>	<u>Ulan 114;</u>	AMG	55	755730	6434050	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0176</u>	<u>Ulan 115;</u>	AMG	55	755860	6434360	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0177</u>	<u>Ulan 116;</u>	AMG	55	758950	6432530	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0178</u>	<u>Ulan 118;</u>	AMG	55	757550	6433690	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0187</u>	<u>Identifier 110;Site 32;</u>	AMG	55	756790	6435400	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0188</u>	<u>Identifier 111;Site 33;</u>	AMG	55	756810	6435410	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		2423
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0205</u>	<u>Ulan SG25</u>	AMG	55	759000	6434700	None	<input type="checkbox"/>	Stone Quarry Artefact	Quarry		
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0206</u>	<u>Ulan SG24</u>	AMG	55	759030	6434640	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0207</u>	<u>Ulan SG23</u>	AMG	55	758900	6435930	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0208</u>	<u>Ulan SG22</u>	AMG	55	758700	6434587	None	<input type="checkbox"/>	Artefact	Shelter with Deposit		
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0225</u>	<u>L 1 (Loughville 1)</u>	AMG	55	757400	6429400	None	<input type="checkbox"/>	Water Hole Artefact	Shelter with Deposit Water Hole/Well Open Camp Site		
		Status	Valid				<input type="checkbox"/>				



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List of Sites (Partial)

Grid Reference Type = AMG Map Sheet = NARRAS Feature Search Type = AHIMS Features

Site Id	Site Name	Grid Ref. Type	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
<u>36-3-0234</u>	<u>MC1</u>	AMG	55	754090	6440410	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0248</u>	<u>BO27</u>	AMG	55	758980	6435740	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0249</u>	<u>BO26</u>	AMG	55	758880	6435680	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0250</u>	<u>BO25</u>	AMG	55	759040	6435610	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0251</u>	<u>BO24</u>	AMG	55	759080	6435950	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0253</u>	<u>BO22</u>	AMG	55	759170	6434910	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0254</u>	<u>BO20</u>	AMG	55	758810	6434740	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0255</u>	<u>BO19</u>	AMG	55	759210	6435070	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0258</u>	<u>BO18</u>	AMG	55	759250	6435670	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				
<u>36-3-0292</u>	<u>BO3 (Basalt Quarry 3)</u>	AMG	55	756510	6436950	None	<input type="checkbox"/>	Artifact			
		Status	Valid				<input type="checkbox"/>				

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List of Sites (Partial)

Grid Reference Type = AMG Map Sheet = GUL63N Feature Search Type = AHIMS Features

Site Id	Site Name	Grid Ref. Zone		Northing	Eastings	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Record
		Type	Status			General	Location				
<u>38-3-0004</u>	<u>Ulan-Dexter Mountain</u>	AMG	Valid	55	756787	6420002	None	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art	
<u>38-3-0041</u>	<u>Ulan-Creek Site 3:</u>	AMG	Valid	55	757104	6426502	None	<input type="checkbox"/>	Artefact	Open Camp Site	361
<u>38-3-0047</u>	<u>Stubbo Creek 3:</u>	AMG	Valid	55	739276	6424042	None	<input type="checkbox"/>	Artefact	Open Camp Site	
<u>38-3-0049</u>	<u>Slapdash Creek 1:</u>	AMG	Valid	55	737542	6421727	None	<input type="checkbox"/>	Artefact	Open Camp Site	
<u>38-3-0155</u>	<u>JDS DAVIS BRIDGE:</u>	AMG	Valid	55	741590	6419720	None	<input type="checkbox"/>	Modified Tree (Carved or Scarrd)	Scarrd Tree	1333
<u>38-3-0159</u>	<u>X 29:</u>	AMG	Valid	55	759410	6426580	None	<input type="checkbox"/>	Artefact	Open Camp Site	361
<u>38-3-0163</u>	<u>Ulan 102:</u>	AMG	Valid	55	755830	6426800	None	<input type="checkbox"/>	Artefact	Open Camp Site	2423
<u>38-3-0226</u>	<u>EF1 Ulan</u>	AMG	Valid	55	757150	6428300	None	<input type="checkbox"/>	Artefact	Isolated Find	
<u>38-3-0235</u>	<u>CC1 COOYAL CREEK</u>	AMG	Valid	55	742960	6418990	None	<input type="checkbox"/>	Artefact		
<u>38-3-0236</u>	<u>MC3</u>	AMG	Valid	55	758430	6424550	None	<input type="checkbox"/>	Artefact		

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
✓	<u>36-3-0487 WCP211</u>	GDA	55	766953	6418347	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0488 WCP212</u>	GDA	55	767340	6418935	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0489 WCP213</u>	GDA	55	767250	6418768	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0490 WCP214</u>	GDA	55	767380	6418668	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0491 WCP215</u>	GDA	55	766857	6418302	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0492 WCP216</u>	GDA	55	767084	6418194	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0493 WCP217</u>	GDA	55	772380	6416589	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0494 WCP218</u>	GDA	55	772393	6416642	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0495 WCP219</u>	GDA	55	772467	6416920	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0496 WCP220</u>	GDA	55	772530	6417256	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	<u>36-3-0497 WCP221</u>	GDA	55	772612	6417691	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				

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st of Sites (Partial)

id Reference Type = AGD (Australian Geodetic Datum), Map Sheet like 541%, Feature Search Type = AHIMS Features

ite ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
✓	-3-0443 WCP 166	GDA	55	774210	6417972	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0444 WCP 167	GDA	55	774175	6417960	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0445 WCP 168	GDA	55	774376	6417608	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0446 WCP 169	GDA	55	774143	6417777	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0447 WCP 170	GDA	55	774274	6417965	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0448 WCP 171	GDA	55	774247	6417965	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0449 WCP 172	GDA	55	771678	6420157	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0450 WCP 173	GDA	55	771907	6420224	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>	Potential Archaeological Deposit (PAC)			
✓	-3-0451 WCP 174	GDA	55	771399	6419731	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0452 WCP 175	GDA	55	771542	6418199	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				
✓	-3-0453 WCP 176	GDA	55	770194	6417886	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid				<input type="checkbox"/>				

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features		Further Info.	Report ID
						Gender	General	Location	(recorded prior to June 2001)		
36-3-0652	WCP78	GDA	55	770824	6416689	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	
		Status	Valid								
36-3-0653	WC OS 16 with PAD	AGD	55	767367	6422761	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	
		Status	Valid								
36-3-0657	WC OS 18	AGD	55	765865	6423952	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Colley, Sarah (1168)
		Status	Valid								
36-3-0658	WC OS 17 with PAD	AGD	55	766479	6423495	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Warrabinga Native
		Status	Valid								
36-3-0659	WC IF 5	AGD	55	767284	6422874	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Warrabinga Native
		Status	Valid								
36-3-0660	WC OS 15 with PAD	AGD	55	769001	6421142	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Warrabinga Native
		Status	Valid								
36-3-0661	WC IF 4	AGD	55	769272	6420809	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Warrabinga Native
		Status	Valid								
36-3-0662	WC OS 14	AGD	55	769878	6420402	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Warrabinga Native
		Status	Valid								
36-3-0663	WC OS 13 with PAD	AGD	55	769987	6420251	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Warrabinga Native
		Status	Valid								
36-3-0664	WC PAD 1	AGD	55	771196	6419721	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Warrabinga Native
		Status	Valid								
36-3-0665	WC IF 3	AGD	55	771371	6419748	None	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Permit(s)	Warrabinga Native
		Status	Valid								

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ite ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	Location				
✓ 6-3-0509	<u>WCP233</u>	GDA	55	774209	6418644	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0510	<u>WCP234</u>	Status	Valid	55	774422	6418360	None	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 6-3-0511	<u>WCP235</u>	GDA	55	773914	6418734	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0512	<u>WCP236</u>	Status	Valid	55	774178	6418994	None	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 6-3-0513	<u>WCP237</u>	GDA	55	772878	6419301	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0514	<u>WCP238</u>	Status	Valid	55	770576	6416748	None	Artefact		Permit(s)	
✓ 6-3-0515	<u>WCP79</u>	GDA	55	770786	6416510	None	<input type="checkbox"/>	Water Hole		Permit(s)	
✓ 6-3-0516	<u>WCP80</u>	Status	Valid	55	770756	6416595	None	Artefact		Permit(s)	
✓ 6-3-0517	<u>WCP81</u>	GDA	55	770562	6416585	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0518	<u>WCP82</u>	Status	Valid	55	770722	6416428	None	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0519	<u>WCP83</u>	GDA	55	770508	6416343	None	<input type="checkbox"/>	Artefact		Permit(s)	

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						General	Location				
✓ 6-3-0498	WCP222	GDA	55	772556	6417780	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0499	WCP223	Status	Valid			None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0500	WCP224	GDA	55	771435	6419138	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0501	WCP225	Status	Valid			None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0502	WCP226	GDA	55	770066	6417096	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0503	WCP227	Status	Valid			None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0504	WCP228	GDA	55	769110	6416961	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0505	WCP229	Status	Valid			None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0506	WCP230	GDA	55	770356	6420383	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0507	WCP231	Status	Valid			None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0508	WCP232	GDA	55	770563	6420668	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0509	WCP233	Status	Valid			None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0510	WCP234	GDA	55	770584	6416001	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0511	WCP235	Status	Valid			None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0512	WCP236	GDA	55	770555	6416059	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0513	WCP237	Status	Valid			None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0514	WCP238	GDA	55	774062	6418634	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
✓ 6-3-0515	WCP239	Status	Valid			None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						General	Location				
✓	-3-0476 WCP200	GDA	55	768811	6419935	None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0477 WCP201	Status	Valid			None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0478 WCP202	GDA	55	769046	6419655	None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0479 WCP203	Status	Valid			None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0480 WCP204	GDA	55	768512	6419768	None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0481 WCP205	Status	Valid			None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0482 WCP206	GDA	55	768129	6418868	None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0483 WCP207	Status	Valid			None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓	-3-0484 WCP208	GDA	55	768747	6418814	None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0485 WCP209	Status	Valid			None	<input type="checkbox"/>	Artifact		Permit(s)	
✓	-3-0486 WCP210	GDA	55	766789	6417930	None	<input type="checkbox"/>	Artifact		Permit(s)	
		Status	Valid			None	<input type="checkbox"/>	Artifact		Permit(s)	

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
✓ 6-3-0465	WCP 188	GDA	55	770194	6416729	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0466	WCP 189	Status	Valid				<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0467	WCP 190	GDA	55	770091	6420022	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0468	WCP 191	Status	Valid				<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0469	WCP192	GDA	55	771158	6420301	None	<input type="checkbox"/>	Artefact	Potential Archaeological Deposit (PAC)	Permit(s)	
✓ 6-3-0470	WCP193	Status	Valid				<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0471	WCP195	GDA	55	774308	6416524	None	<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0472	WCP196	Status	Valid				<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 6-3-0473	WCP197	GDA	55	773982	6418144	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
✓ 6-3-0474	WCP198	Status	Valid				<input type="checkbox"/>	Artefact		Permit(s)	
✓ 6-3-0475	WCP199	GDA	55	768760	6420674	None	<input type="checkbox"/>	Artefact		Permit(s)	

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						General	Location				
✓	<u>36-3-0432 WCP 155</u>	GDA	55	772228	6417918	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓	<u>36-3-0433 WCP 156</u>	GDA	55	772184	6417380	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓	<u>36-3-0434 WCP 157</u>	GDA	55	772217	6417143	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓	<u>36-3-0435 WCP 158</u>	GDA	55	771958	6416988	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓	<u>36-3-0436 WCP 159</u>	GDA	55	771982	6416730	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓	<u>36-3-0437 WCP 160</u>	GDA	55	771446	6416123	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid								
✓	<u>36-3-0438 WCP 161</u>	GDA	55	771855	6416725	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid								
✓	<u>36-3-0439 WCP 162</u>	GDA	55	771710	6416719	None	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓	<u>36-3-0440 WCP 163</u>	GDA	55	774066	6418110	None	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid								
✓	<u>36-3-0441 WCP 164</u>	GDA	55	774187	6418189	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid								
✓	<u>36-3-0442 WCP 165</u>	GDA	55	774281	6418028	None	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid								

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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info.	Report ID
						Gender	Location				
✓ <u>16-3-0421</u>	<u>WCP 144</u>	GDA	55	770589	6420596	<input type="checkbox"/>	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓ <u>16-3-0422</u>	<u>WCP 145</u>	GDA	55	770532	6420684	<input type="checkbox"/>	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid								
✓ <u>16-3-0423</u>	<u>WCP 146</u>	GDA	55	770366	6420979	<input type="checkbox"/>	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid								
✓ <u>16-3-0424</u>	<u>WCP 147</u>	GDA	55	770612	6415935	<input type="checkbox"/>	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid								
✓ <u>16-3-0425</u>	<u>WCP 148</u>	GDA	55	770596	6415935	<input type="checkbox"/>	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid								
✓ <u>16-3-0426</u>	<u>WCP 149</u>	GDA	55	770708	6416157	<input type="checkbox"/>	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid								
✓ <u>16-3-0427</u>	<u>WCP 150</u>	GDA	55	773285	6416741	<input type="checkbox"/>	<input type="checkbox"/>	Modified Tree (Carved or Scarred)		Permit(s)	
		Status	Valid								
✓ <u>16-3-0428</u>	<u>WCP 151</u>	GDA	55	772204	6419996	<input type="checkbox"/>	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓ <u>16-3-0429</u>	<u>WCP 152</u>	GDA	55	768375	6416723	<input type="checkbox"/>	<input type="checkbox"/>	Artefact		Permit(s)	
		Status	Valid								
✓ <u>16-3-0430</u>	<u>WCP 153</u>	GDA	55	768456	6417253	<input type="checkbox"/>	<input type="checkbox"/>	Potential Archaeological Deposit (PAC) Art (Pigment or Engraved)		Permit(s)	
		Status	Valid								
✓ <u>16-3-0431</u>	<u>WCP 154</u>	GDA	55	768503	6417372	<input type="checkbox"/>	<input type="checkbox"/>	Potential Archaeological Deposit (PAC)		Permit(s)	
		Status	Valid								

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Site ID	Site Name	Datum	Zone	Eastings	Northings	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						General	Location				
36-3-0074	Wollar-Gulgong:	AGD	55	781478	6414502	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Open Camp Site		
✓ 36-3-0098	Wattle Creek NO:2:	AGD	55	769880	6422760	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art		
36-3-0101	Yawanna NO:2:	AGD	55	774740	6421270	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art		
✓ 36-3-0103	Wilpinjong:	AGD	55	767950	6422190	<input type="checkbox"/>	<input type="checkbox"/>	Modified Tree (Carved or Scarred)	Scarred Tree		
36-3-0106	Yawanna No.1:	AGD	55	774780	6421260	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art		
36-3-0115	Yawanna No.3:	AGD	55	774800	6420900	<input type="checkbox"/>	<input type="checkbox"/>	Grinding Groove	Axe Grinding Groove		
36-3-0116	Yawanna No.4:	AGD	55	775200	6420600	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Open Camp Site		1333
36-3-0124	Deridgeree No.3:	AGD	55	777480	6427480	<input type="checkbox"/>	<input type="checkbox"/>	Grinding Groove	Axe Grinding Groove		
✓ 36-3-0133	Wattle Creek No.1:	AGD	55	769500	6422630	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art		
✓ 36-3-0134	Murragamba No.1:	AGD	55	761300	6421170	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art		
36-3-0222	Moolaben Creek MC1	AGD	55	760420	6420820	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Open Camp Site		



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Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	Location				
✓ <u>36-3-0223</u> MC2		AGD	55	760420	6420880	None	<input type="checkbox"/>	Artefact	Open Camp Site		
		Status	Valid								
✓ <u>36-3-0237</u> MC11		AGD	55	763384	6421070	None	<input type="checkbox"/>	Artefact			
		Status	Valid								
✓ <u>36-3-0238</u> MC10		AGD	55	763226	6422860	None	<input type="checkbox"/>	Artefact			
		Status	Valid								
✓ <u>36-3-0239</u> MC8		AGD	55	763193	6422680	None	<input type="checkbox"/>	Artefact			
		Status	Valid								
✓ <u>36-3-0240</u> MC6		AGD	55	763113	6421940	None	<input type="checkbox"/>	Artefact			
		Status	Valid								
✓ <u>36-3-0241</u> MC4		AGD	55	763161	6421650	None	<input type="checkbox"/>	Artefact			
		Status	Valid								
✓ <u>36-3-0287</u> WC/1		AGD	55	765680	6425480	None	<input type="checkbox"/>	Art (Pigment or Engraved)			
		Status	Valid								



List of Sites (Partial)

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 55 Map Sheet = WOLL2N Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions		Site Features	Site Types (recorded prior to June 2001)	Further Info. Contact	Report ID
						Gender	General Location				
36-3-0015	Cook Gap:	AGD	55	760387	6415931	<input type="checkbox"/>	<input type="checkbox"/>	Grinding Groove	Axe Grinding Groove		
36-3-0016	Ulan-Murrumbidgee:	AGD	55	760796	6421957	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art		
36-3-0020	Wollar: X	AGD	55	777958	6415823	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art		
36-3-0027	Cooks Gap:	AGD	55	760387	6415931	<input type="checkbox"/>	<input type="checkbox"/>	Grinding Groove	Axe Grinding Groove		
36-3-0039	Ulan:	AGD	55	760828	6427722	<input type="checkbox"/>	<input type="checkbox"/>	Modified Tree (Carved or Scarred)	Scarred Tree		361
36-3-0042	Ulan Creek:Site 2:	AGD	55	762944	6428010	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Axe Grinding Groove		361
36-3-0044	Ulan-Wilpinjong Creeks:	AGD	55	771442	6420278	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved) Grinding Groove	Shelter with Art Shelter with Deposit		
36-3-0060	Ulan Creek:Site 18:	AGD	55	760215	6426006	<input type="checkbox"/>	<input type="checkbox"/>	Ceremonial Ring (Stone or Earth) Modified Tree (Carved or Scarred)	Bora/Ceremonial Carved Tree		1299
36-3-0061	Ulan Creek:Site 19:	AGD	55	760878	6426622	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Open Camp Site		1299
36-3-0063	Ulan Creek:Site 21:	AGD	55	761207	6428074	<input type="checkbox"/>	<input type="checkbox"/>	Artefact	Open Camp Site		1299
36-3-0068	Bobadeeni:	AGD	55	761661	6427966	<input type="checkbox"/>	<input type="checkbox"/>	Art (Pigment or Engraved)	Shelter with Art		1299

Cont No 2 Address: in/ass station



National Parks and Wildlife Service

BOX N189, GROSVENOR STREET POST OFFICE, SYDNEY, NSW 2000. TEL (02) 237 6500

Site Recording Form — Art Sites

APPENDIX 1

MAP NAME	EDITION	SCALE	REFERENCE	HEAD OFFICE USE ONLY
Dubbo	metric	250K	7634211	NWPS Site No.: 36-3-134
Gulgong	1st	1:50000	6/30E 2117N	Site types: SHELTER & ART Date: 28-1-88
				Filed by: SW

Site name: Murrumbidgee No 1 Locality/Property Name: _____
 Owner/Manager: Mr M.J. Carlisle Address: Ulan (phone 063-734693)
 Local Post Office: Ulan NPWS District: Muswellbrook Region: Central

Reason for Investigation (Give R.O. Instruction No. where applicable):
private


36-3-0134

Portion No.: 97 Other Land Category: _____ Plan/Sketch/Section of Site attached? YES/NO
 Parish: Wilpinjong County: Phillip How many? 2

Air Photo Refs. (For stereo pair) _____ Photos Taken? YES/NO
 How many attached? 21

How to get to the site.
 (Refer to permanent features, give best approach to site eg. from above, below, along cliff. Draw diagram on separate sheet.)

Must have permission to enter

See Mr Carlisle for directions

to site

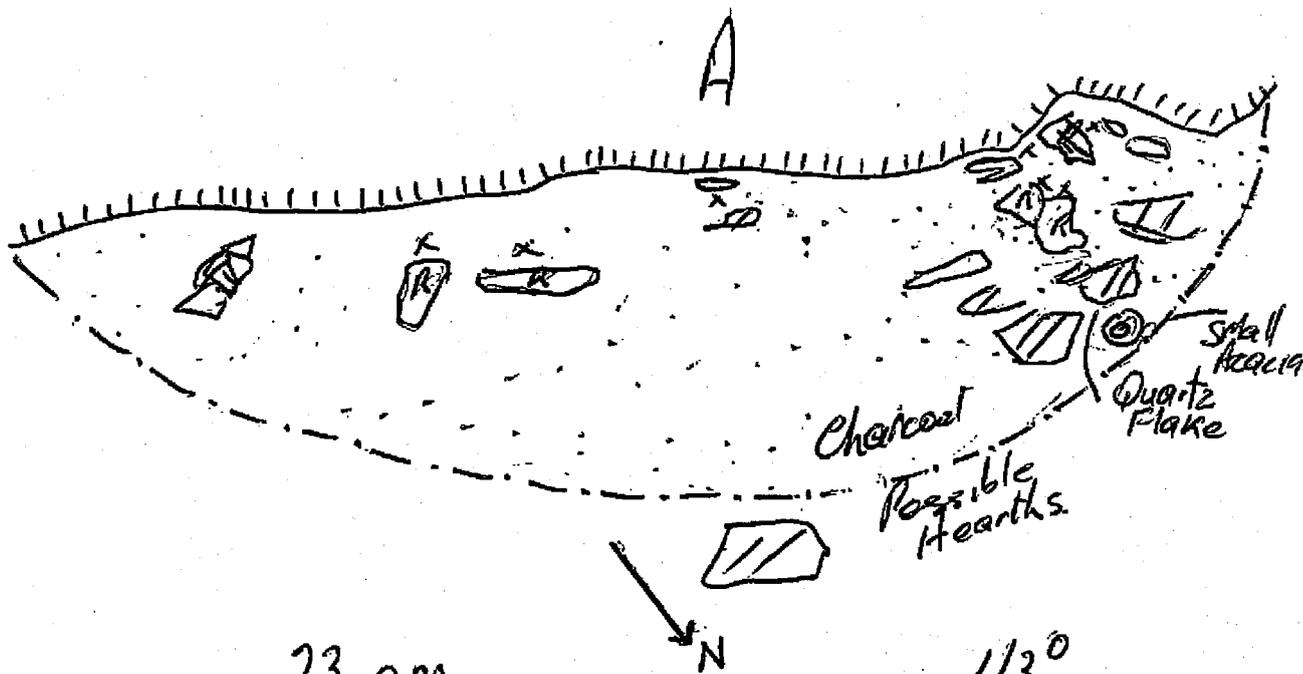
phone number Mr Kevin Carlisle

brother to Max.

Site Recorded by: W. T. Bluff Date: 7/87
 Address/Institution: Mortdale

SITE PLAN — SHOW SCALE + LOCATION OF ART

x Rubbed
Rock.



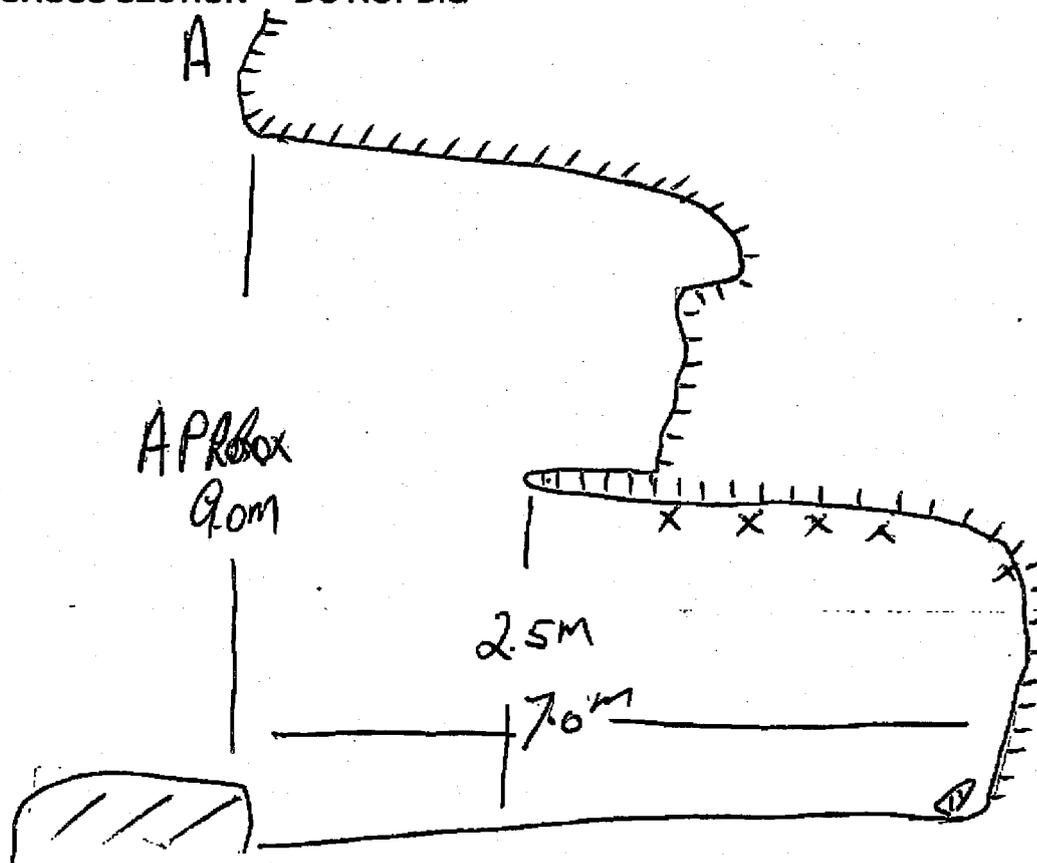
DIMENSIONS:

23.0m

ASPECT:

43°

SITE CROSS SECTION — DO NOT DIG



A P Box
9.0m

2.5m

7.0m

CONDITION OF SITE:

Causes of Art Damage:

- Vandalism
- Graffiti
- Foot Traffic
- Camping
- Pastoral
- Urban
- Mining
- Plant/Moss/Lichen
- Smoke
- None
- Other (Specify):

Erosion Damage:

- Exfoliation
- Water
- Fracturing
- Wind
- Rock Fall
- Salt
- None
- Other:

Animal Damage:

- Dust
- Rubbed Surfaces
- Disturbed Deposit
- Bird/Insect Nest
- None
- Other:

Description of Site Condition:

large shelter with pencil charcoal & paint over but names also scratched in rock lying on floor.

ACCOMPANYING DOCUMENTATION:

- | | |
|--|---|
| <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Photos Location <input type="checkbox"/> Tracings Location <input type="checkbox"/> Drawings Location <input type="checkbox"/> Aerial Photo Location <input type="checkbox"/> Charcoal Sample Location <input type="checkbox"/> Other (Specify) | <ul style="list-style-type: none"> <input type="checkbox"/> Slides <input type="checkbox"/> Published Ref. <input type="checkbox"/> Notes <input type="checkbox"/> Artifacts <input type="checkbox"/> Aboriginal Report |
|--|---|

Published References:

IMPORTANCE OF SITE TO ABORIGINES:

- Traditional
- Contact
- Contemporary
- Unknown

Informant/Land Council:

Address:

Details:

PURPOSE OF RECORDING:

- Research
- EIS
- Interest
- Other:

RECOMMENDATIONS FOR MANAGEMENT/PRESERVATION:

clean & fence.



SITE LOCATION AND ENVIRONMENT:

LOCAL GEOLOGY:

- Sandstone
- Granite
- Limestone
- Shale
- Other

Detail: *conglomerate*

TOPOGRAPHY:

- River Valley
- Creek Gully
- Estuary
- Beach
- Hill Slopes
- Cliffline
- Ridge
-
- Lake Edge
- Water Hole
- Swamp
-

SOILS:

- Rocky
- Clay
- Sandy
- Silt
- Gravel
- Humic
-
-

VEGETATION:

- Woodland
- Grassland
- Forrest
- Heath
- Swampy
- Desert
- Mallee
-

Local Specific Vegetation:

Ironbark, Stringybark, Black Pine, Geebung, Gracia, Casuarina, Leptospermum, Peppercorn, Murrayang, Sifted Bush

DESCRIPTION OF NATURAL ENVIRONMENT:

Mammals, Reptiles, Wombats

NEAREST DRINKING WATER:

- River
- Creek
- Lake
- Spring
- Well
- Rockhole
- Distance from Site: *600m*
- Other:
- Permanent
- Temporary
- Unknown

Detail: *bit near gamba ch*

PRESENT LAND USE:

Grazing

DESCRIPTION OF EUROPEAN IMPACT:

clearing fencing

NATURE OF SITE:

- Boulder
- Outcrop
- Cliffline
- Open Surface

Form of Erosion:

- Cavernous
- Honeycomb
- Exfoliation

Surface Condition:

- Stable
- Exfoliating
- Exposed/Weathered
- Has Accretion (Mineral/Insect)

Detail: *paper wasps*

PHYSICAL DESCRIPTION OF SITE:

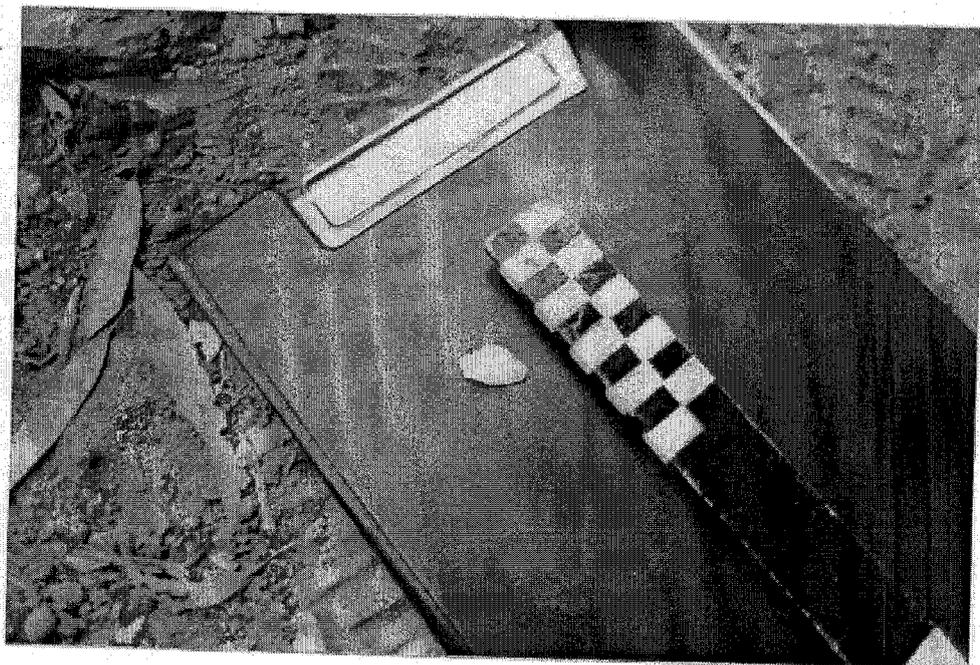
large shelter in cliffline with good deposit on North end

OTHER SITES/SITE TYPES IN VICINITY:

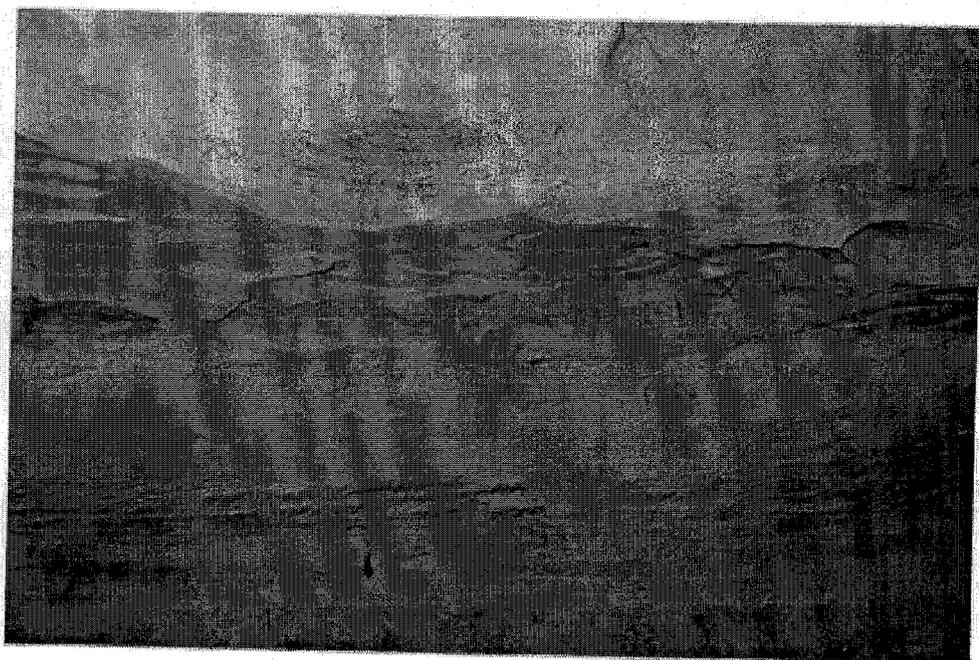
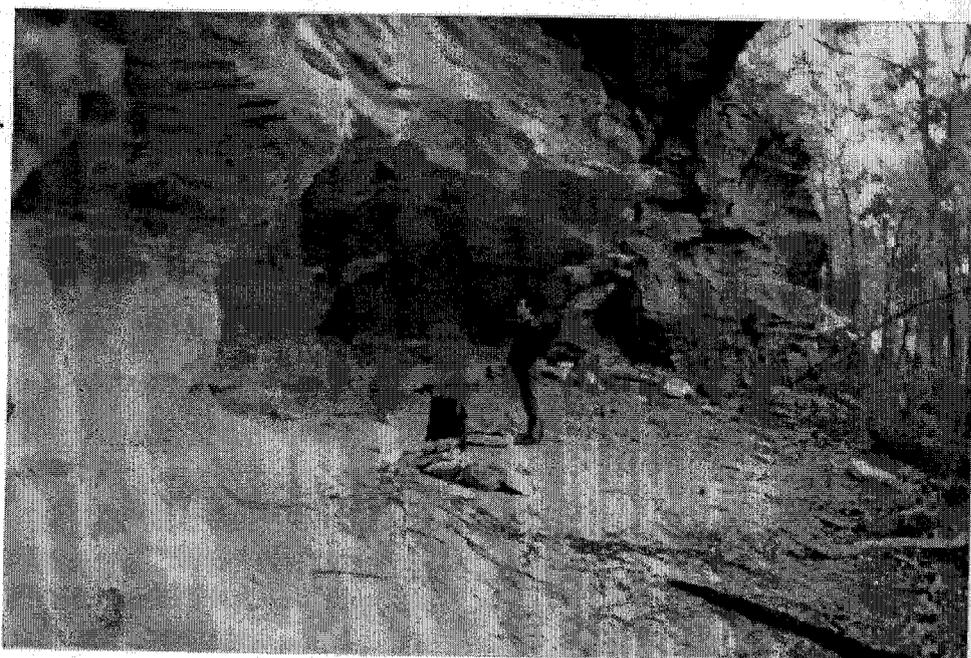
ant shelter

SITE ASSOCIATIONS:

possibly grind stones on floor, much charcoal on North end, 1 piece of glass quartz seen in cliffline



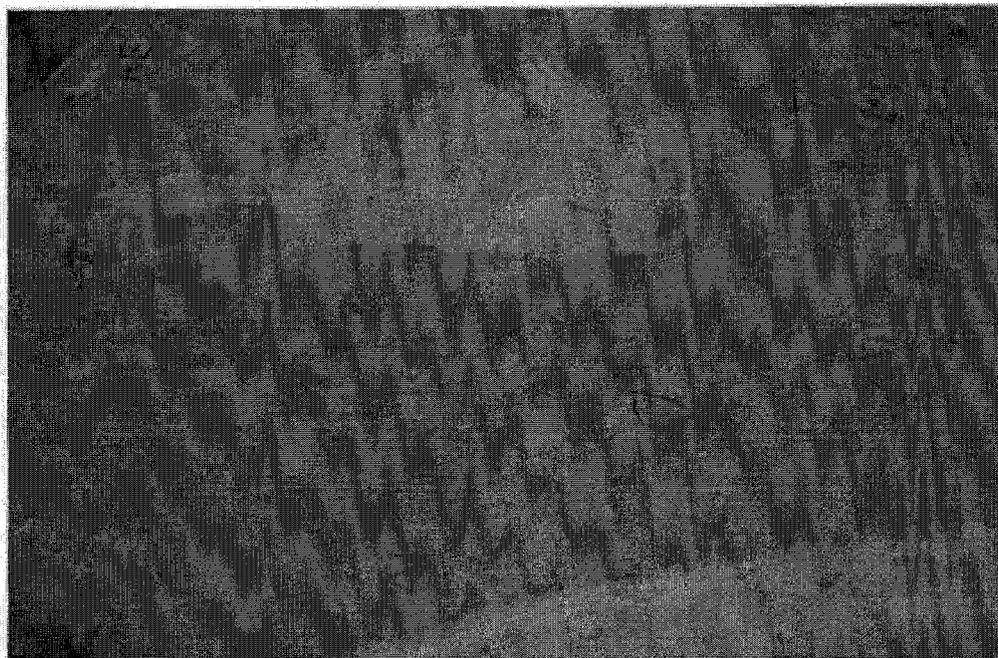
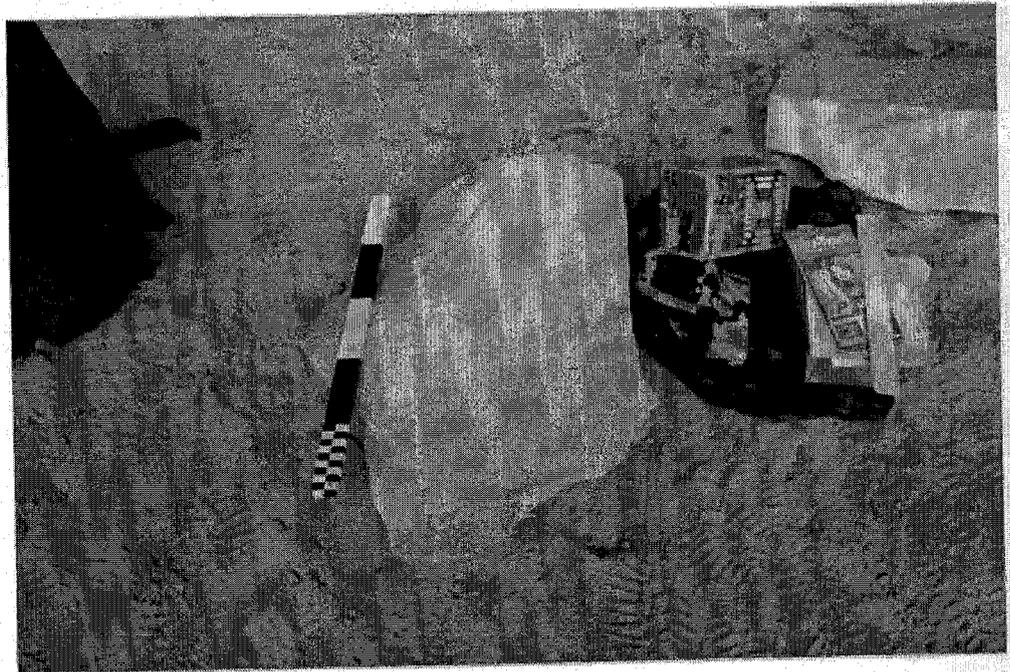
36-3-134
"Murragamba 1".



0

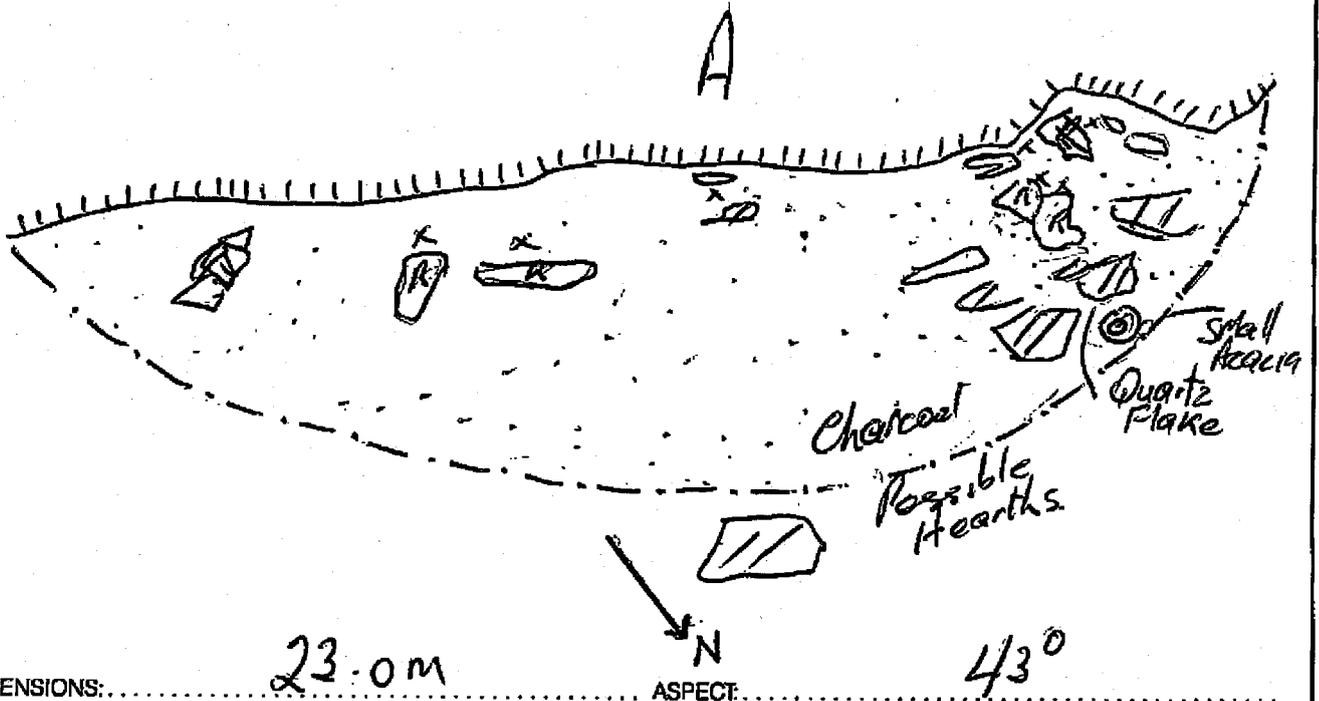


36-3-134
"Murragamba 1"



SITE PLAN — SHOW SCALE + LOCATION OF ART

x Rubber Rock.



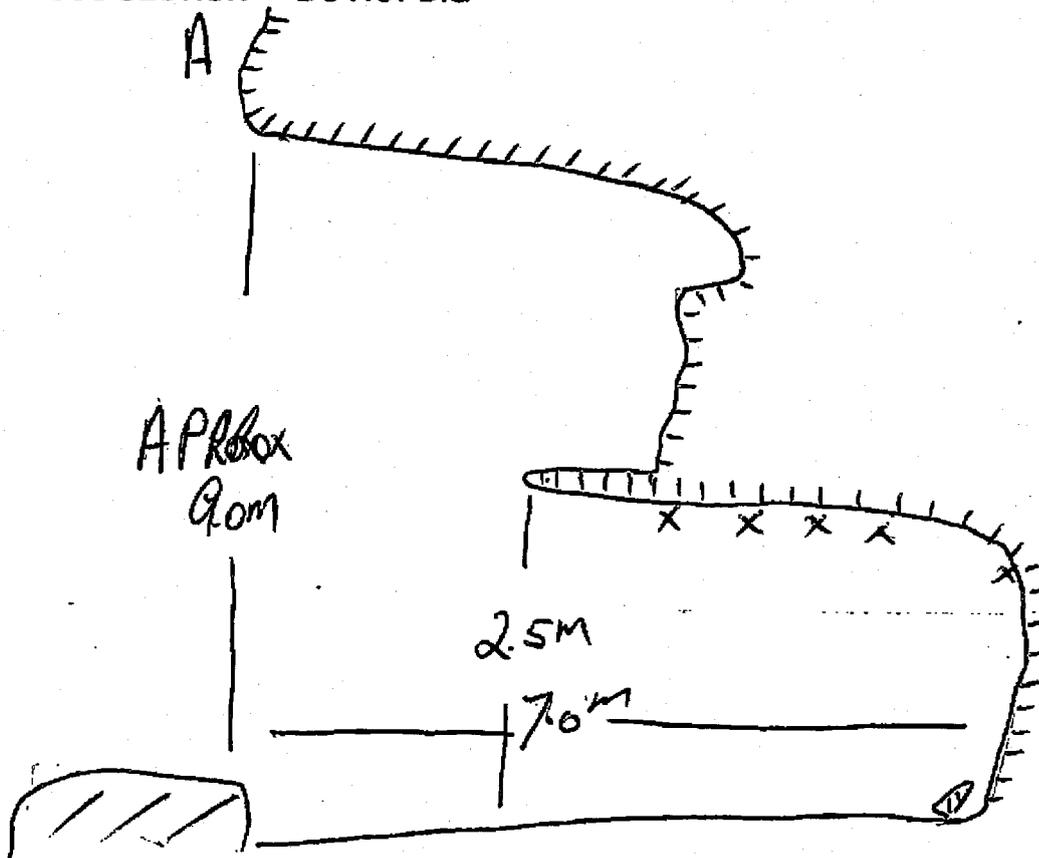
DIMENSIONS:

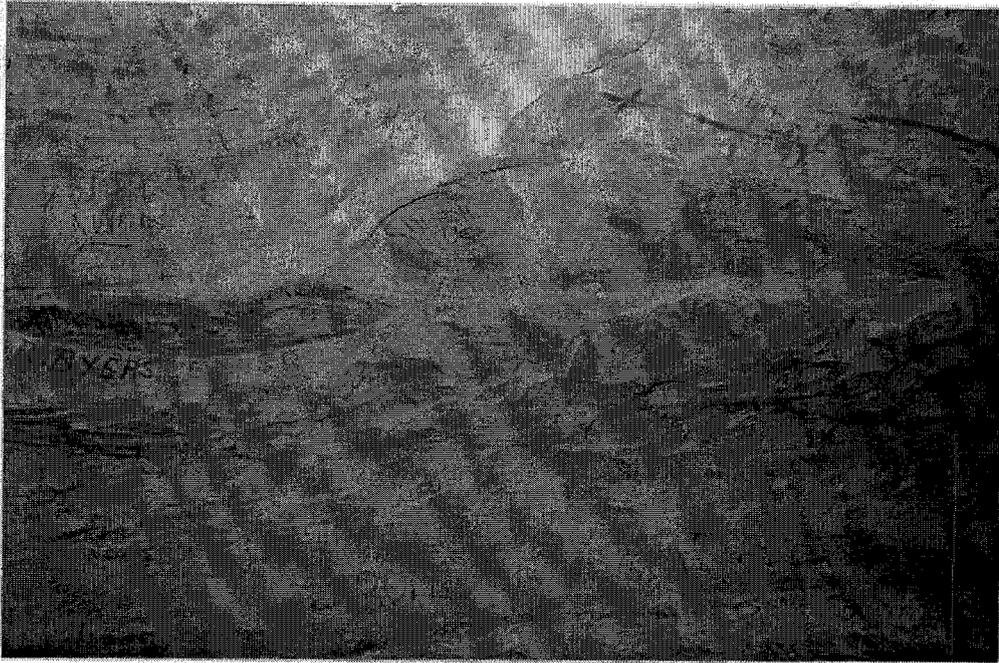
23.0m

ASPECT:

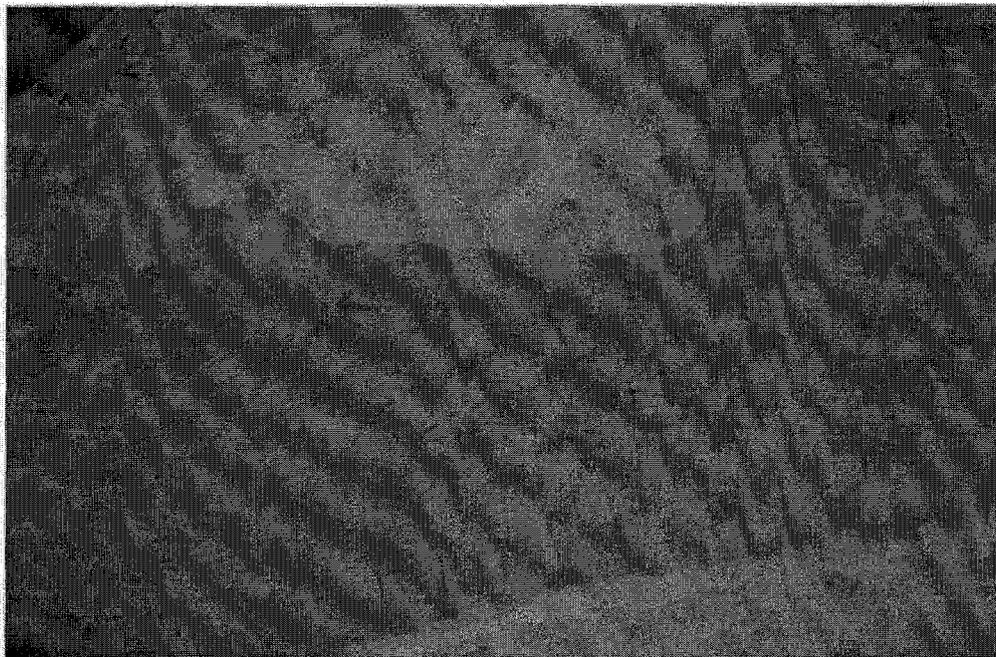
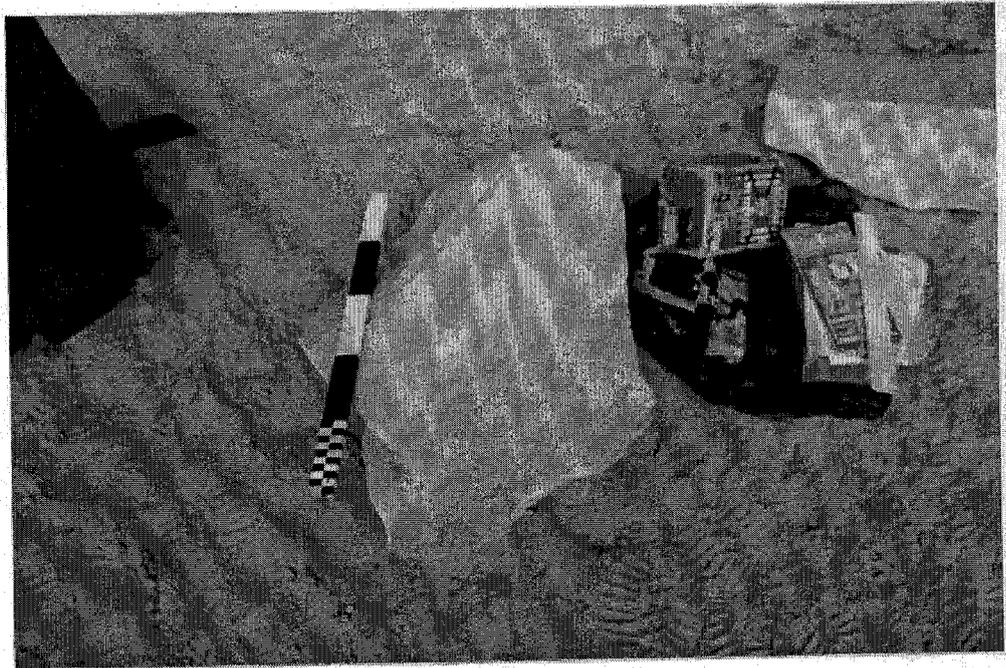
43°

SITE CROSS SECTION — DO NOT DIG



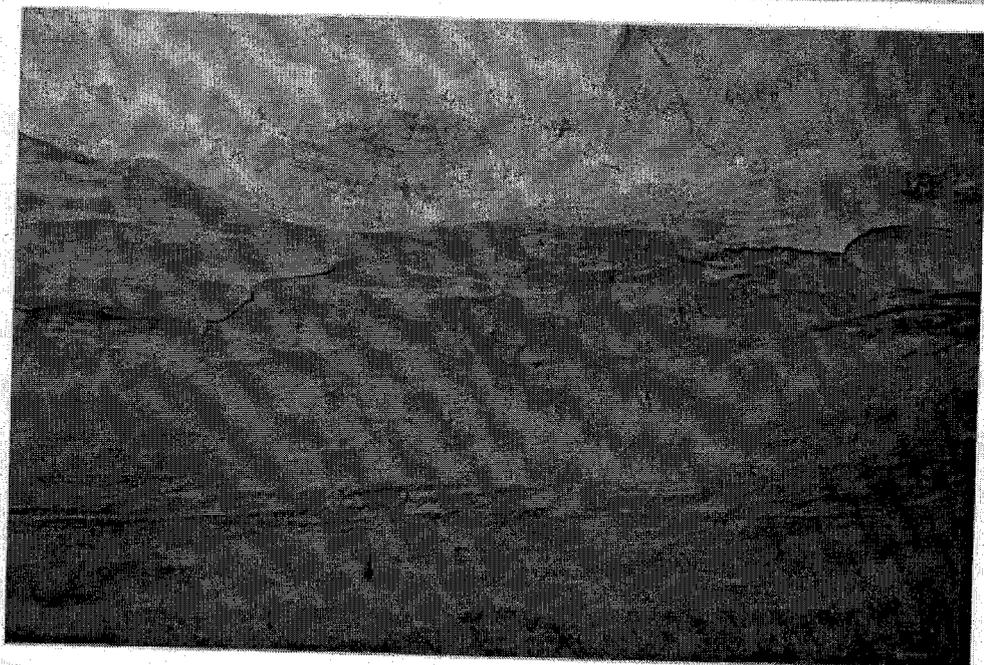
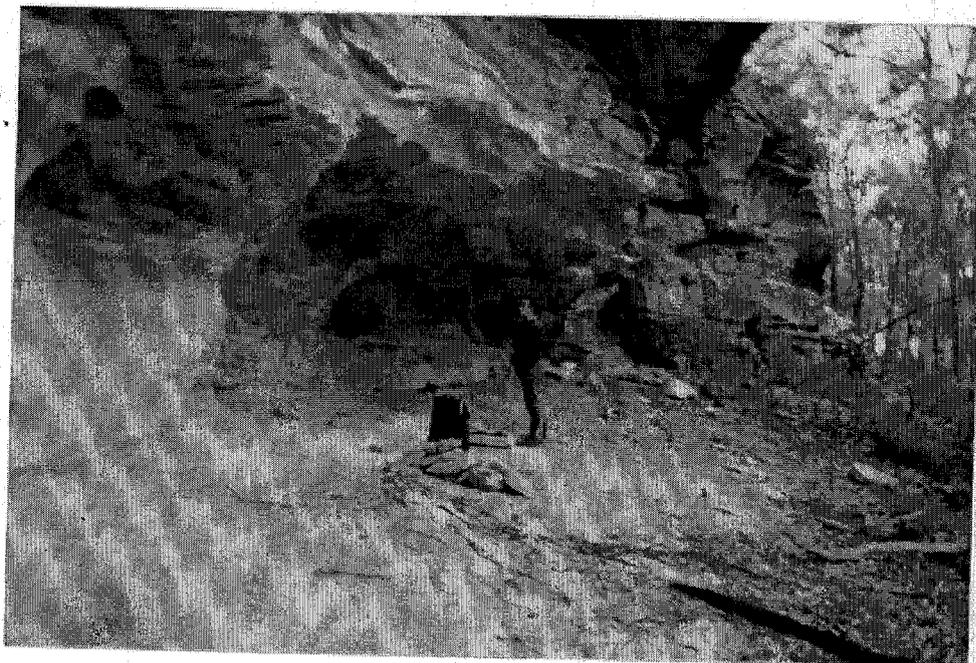


36-3-134
"Murragamba 1"





36-3-134
"Murragamba 1"



6

SITE LOCATION AND ENVIRONMENT:

LOCAL GEOLOGY:

- Sandstone
- Granite
- Limestone
- Shale
- Other

Detail: *conglomerate*

TOPOGRAPHY:

- River Valley
- Creek Gully
- Estuary
- Beach
- Hill Slopes
- Cliffline
- Ridge
- Lake Edge
- Water Hole
- Swamp

SOILS:

- Rocky
- Clay
- Sandy
- Silt
- Gravel
- Humic

VEGETATION:

- Woodland
- Grassland
- Forrest
- Heath
- Swampy
- Desert
- Mallee

Local Specific Vegetation:

Ironbark, Stringybark, Black Pine, Geebung, Araucaria, Casuarina, Leptospermum, Peperomia, Kunzea, Sifted Bush

DESCRIPTION OF NATURAL ENVIRONMENT:

Marsupials, Reptiles, Wombats

NEAREST DRINKING WATER:

- River
- Creek
- Lake
- Spring
- Well
- Rockhole
- Distance from Site: *600m*
- Permanent
- Temporary
- Unknown

Detail: *bit near gamba ch*

PRESENT LAND USE:

grazing

DESCRIPTION OF EUROPEAN IMPACT:

clearing, fencing

NATURE OF SITE:

- Boulder
- Outcrop
- Cliffline
- Open Surface

Form of Erosion:

- Cavernous
- Honeycomb
- Exfoliation

Surface Condition:

- Stable
- Exfoliating
- Exposed/Weathered
- Has Accretion (Mineral/Insect)

Detail: *paper wasps*

PHYSICAL DESCRIPTION OF SITE:

large shelter in cliff line with good deposit on North end

OTHER SITES/SITE TYPES IN VICINITY:

ant shelter

SITE ASSOCIATIONS:

9 possibl. grind stones on floor, much charcoal on North end, piece of glass quartz seen in cliff line

CONDITION OF SITE:

Causes of Art Damage:

- Vandalism
- Graffiti
- Foot Traffic
- Camping
- Pastoral
- Urban
- Mining
- Plant/Moss/Lichen
- Smoke
- None
- Other (Specify):

Erosion Damage:

- Exfoliation
- Water
- Fracturing
- Wind
- Rock Fall
- Salt
- None
- Other

Animal Damage:

- Dust
- Rubbed Surfaces
- Disturbed Deposit
- Bird/Insect Nest
- None
- Other

Description of Site Condition:

large shelter with pencil charcoal & paint over but names also scratched in rock lying on floor.

ACCOMPANYING DOCUMENTATION:

- | | |
|---|---|
| <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Photos <input type="checkbox"/> Tracings <input type="checkbox"/> Drawings <input type="checkbox"/> Aerial Photo <input type="checkbox"/> Charcoal Sample <input type="checkbox"/> Other (Specify) | <p style="text-align: center;">Location</p> <ul style="list-style-type: none"> <input type="checkbox"/> Slides <input type="checkbox"/> Published Ref. <input type="checkbox"/> Notes <input type="checkbox"/> Artifacts <input type="checkbox"/> Aboriginal Report <p style="text-align: center;">Location</p> |
|---|---|

Published References:

.....
.....
.....

IMPORTANCE OF SITE TO ABORIGINES:

- Traditional
- Contact
- Contemporary
- Unknown

Informant/Land Council:

Address:

Details:

.....
.....

PURPOSE OF RECORDING:

- Research
- EIS
- Interest
- Other:

RECOMMENDATIONS FOR MANAGEMENT/PRESERVATION:

clean & fence.

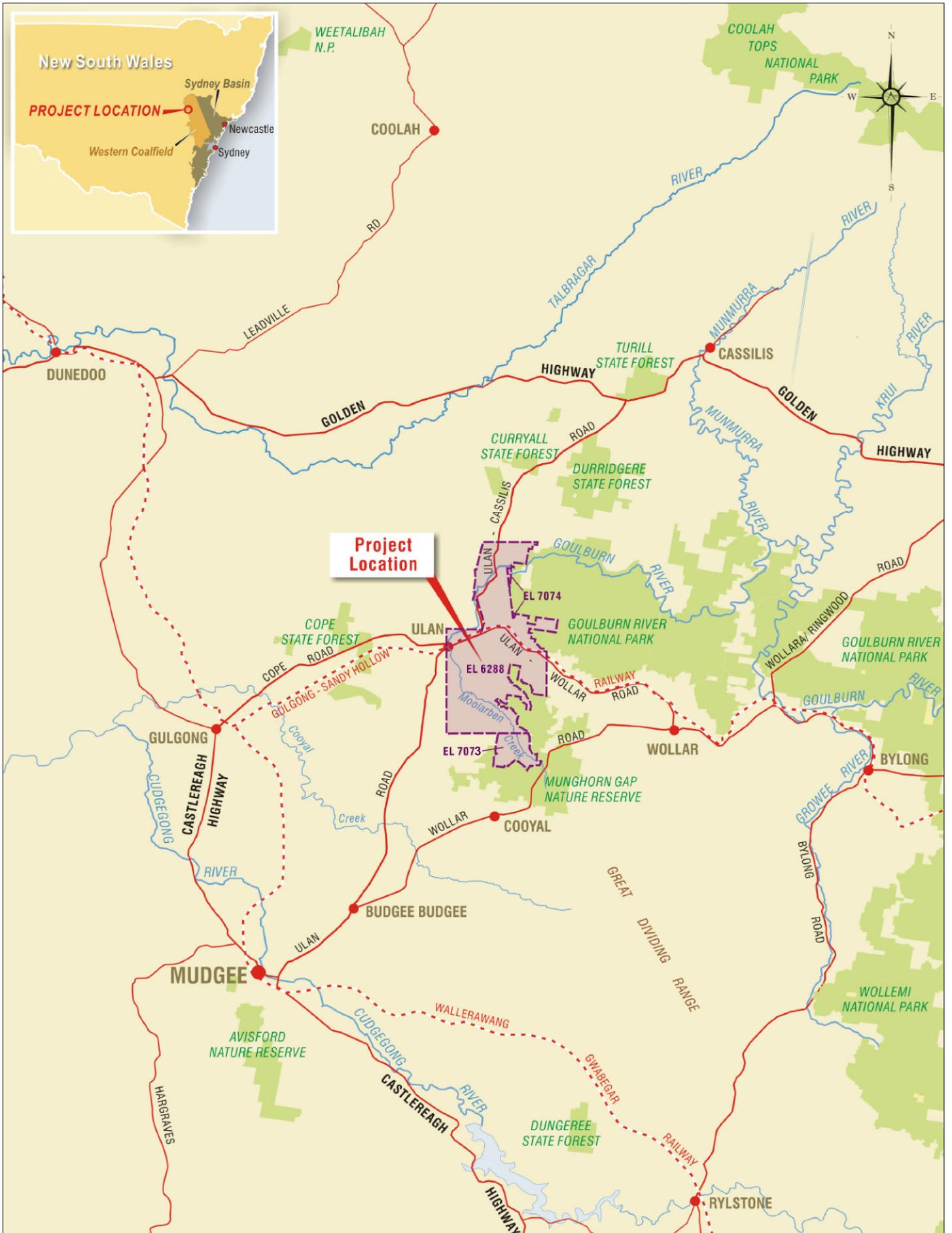
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ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL

APPENDIX 2: FIGURES

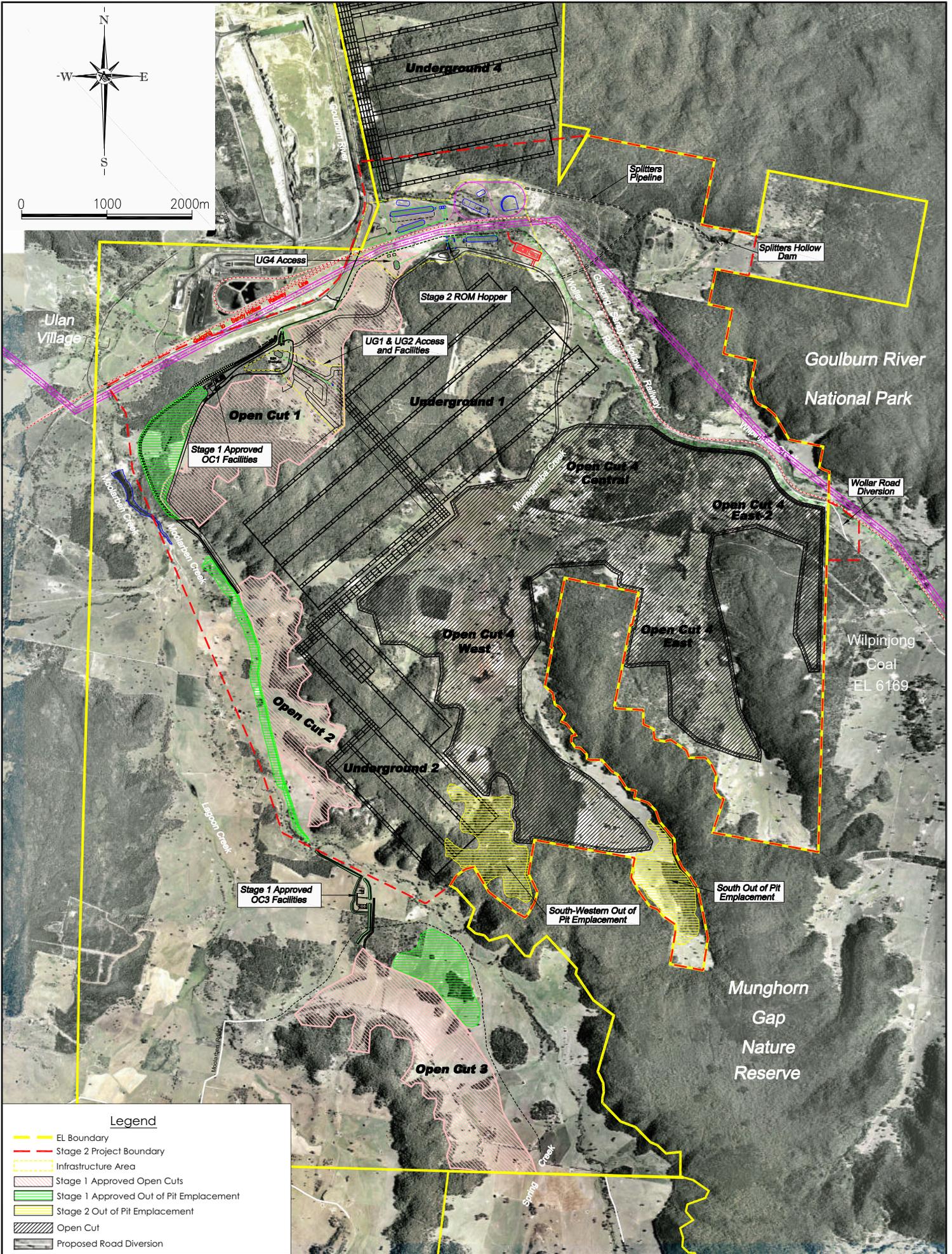




Rev.	Drawn	Description	Approved


Moolarben Coal Mines Pty Limited
 ABN 82 108 601 672
 Level 14 213 Miller Street Phone: 02 9922 3777
 North Sydney NSW 2060 Fax: 02 9923 2427
 Prepared by Pegasus Technical Ph: 02 65 718888

Moolarben Coal Project Regional Location Plan					Drawing No.
Figure 1					03030
					Revision No.
					B
					Sheet Size
					A0
Date	Scale:	Drawn	Checked	Approved	
18.07.08	NTS	CS	JF	JB	



Rev.	Drawn	Description	Approved


Moolarben Coal Mines Pty Limited
 ABN 62 106 601 672
 Level 14 213 Miller Street Phone: 02 9922 3777
 North Sydney NSW 2060 Fax: 02 9923 2427
 Prepared by Pegasus Technical Ph: 02 65 718688

MOOLARBEN COAL PROJECT					Drawing No.
Stage 2 General Arrangement					02947
Figure 2					Revision No.
Date	Scale	Drawn	Checked	Approved	Sheet Size
08.07.08	1:40,000	CS	JF	JB	A3



Legend

- Moolarben Coal Exploration Licence
- EL 6288
- EA2 Study Area
- Art
- Artefact
- Artefact Scatter
- Axe Grinding Groove
- Carved Tree
- Ceremonial
- Isolated Find
- Isolated Find & Artefact Scatter
- Open Campsite
- Rock Shelter with Art
- Rock Shelter with Art & Deposit
- Scared Tree

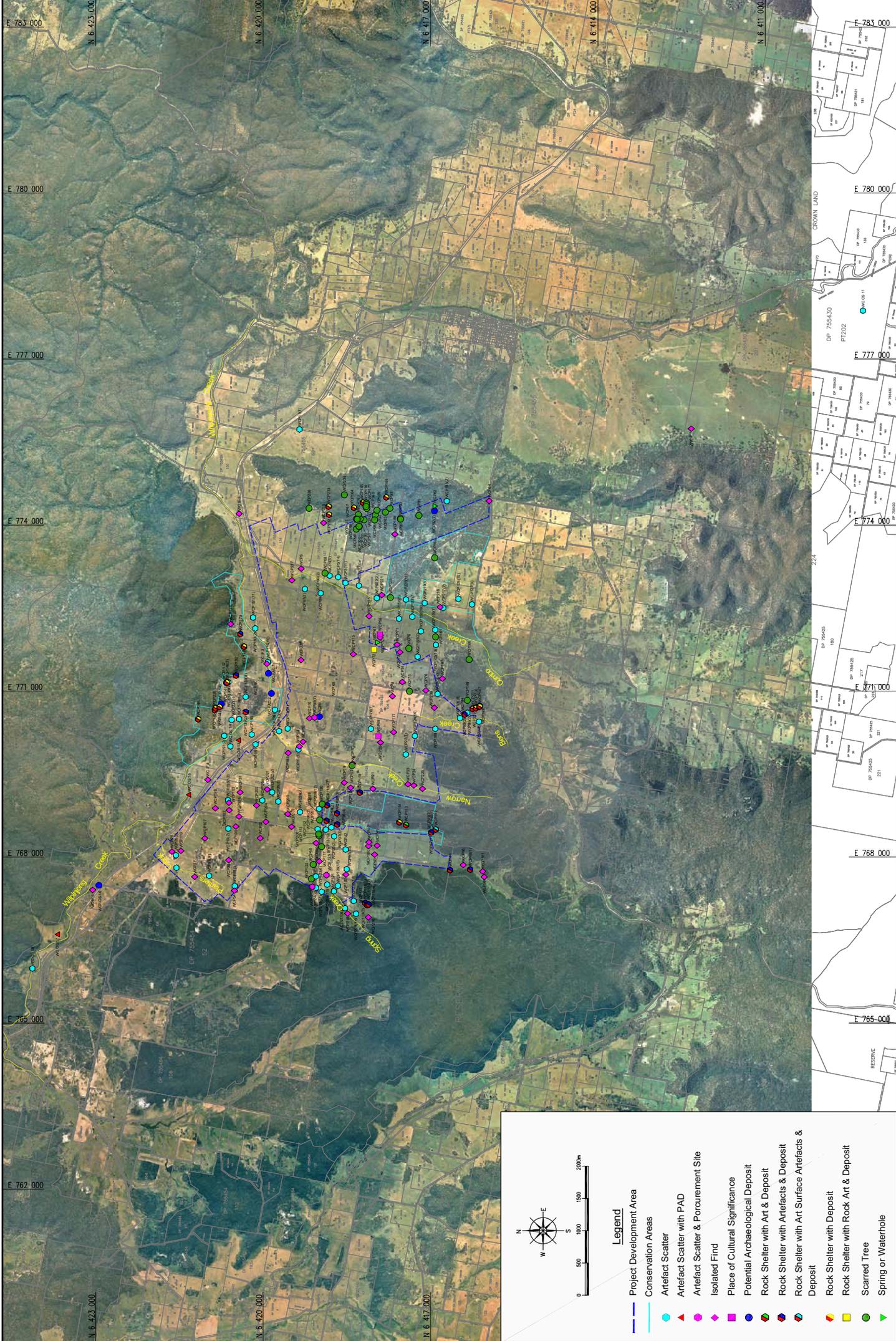
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Moolarben Coal Mines Pty Limited
 Level 14, 213 Miller Street
 North Sydney NSW 2060
 Phone: 02 9922 3777
 Fax: 02 9923 2427
 Prepared by Co-Resources Pty Ltd Ph: 02 95 718888

Figure 3: Moolarben Stage 2 DECC Site Registered Sites

Date: 05.06.2008
 Scale: 1:35,000
 Drawn: TB
 Checked: GH
 Approved: GH

Drawing No. XXXXX
 Revision No. A
 Sheet Size A1



Legend

- Project Development Area
- Conservation Areas
- Artefact Scatter
- ▲ Artefact Scatter with PAD
- ◆ Artefact Scatter & Porcurement Site
- ◆ Isolated Find
- Place of Cultural Significance
- Potential Archaeological Deposit
- Rock Shelter with Art & Deposit
- Rock Shelter with Artefacts & Deposit
- Rock Shelter with Art Surface Artefacts & Deposit
- Rock Shelter with Deposit
- Rock Shelter with Rock Art & Deposit
- Scattered Tree
- ▲ Spring or Waterhole

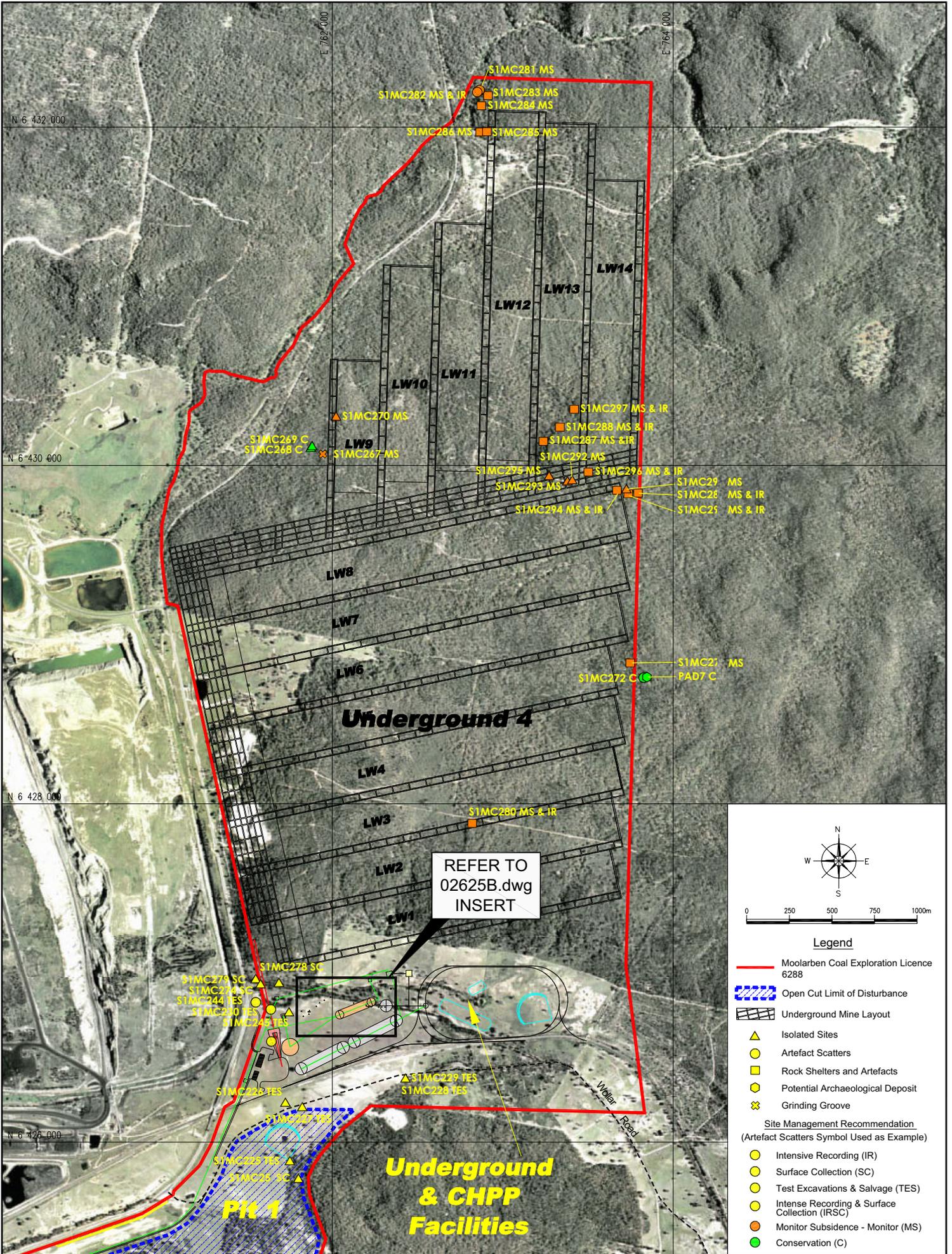
REV.	DATE	BY	CHK.	REV.	DATE	BY	CHK.	DESCRIPTION

Moolarben Coal Mines Pty Limited
 ADVANCE 108.61672
 Level 14, 213 Miller Street
 North Sydney NSW 2060
 Phone: 02 9922 3777
 Fax: 02 9923 2427
 Prepared by Pegasus Technical Ph: 02 65 71 8888

Wilpinjong Coal Project
Aboriginal Cultural Heritage
Site Recordings - Figure 5

Drawing No: 03171
 Revision No: A
 Sheet Size: A1

Date: 23.06.08
 Scale: 1:30,000
 Drawn: CP
 Checked: CS
 Approved: GH



Legend

- Moolarben Coal Exploration Licence 6288
- Open Cut Limit of Disturbance
- Underground Mine Layout
- ▲ Isolated Sites
- Artefact Scatters
- Rock Shelters and Artefacts
- ⬡ Potential Archaeological Deposit
- ⊗ Grinding Groove

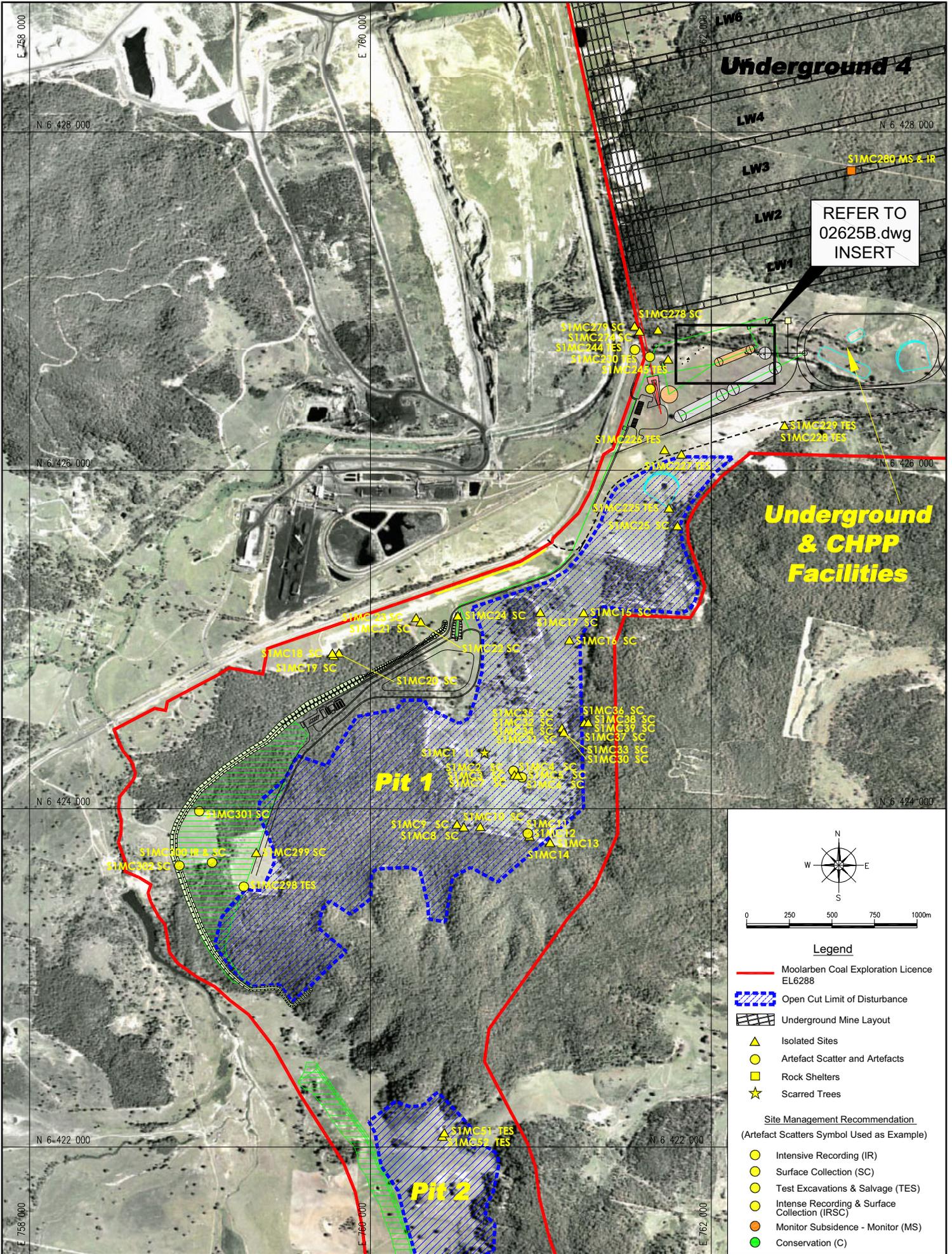
Site Management Recommendation
(Artefact Scatters Symbol Used as Example)

- Intensive Recording (IR)
- Surface Collection (SC)
- Test Excavations & Salvage (TES)
- Intense Recording & Surface Collection (IRSC)
- Monitor Subsidence - Monitor (MS)
- Conservation (C)

Rev.	Drawn	Description	Approved
B	NM	Issued Drawing	AW
A	CS	Preliminary Issue	AW

Moolarben Coal Mines Pty Limited
 ABN 62 108 601 672
 Level 14 213 Miller Street North Sydney NSW 2060 Phone: 02 9922 3777 Fax: 02 9923 2427
 Prepared by Pegasus Technical Ph: 02 65 718888

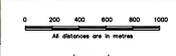
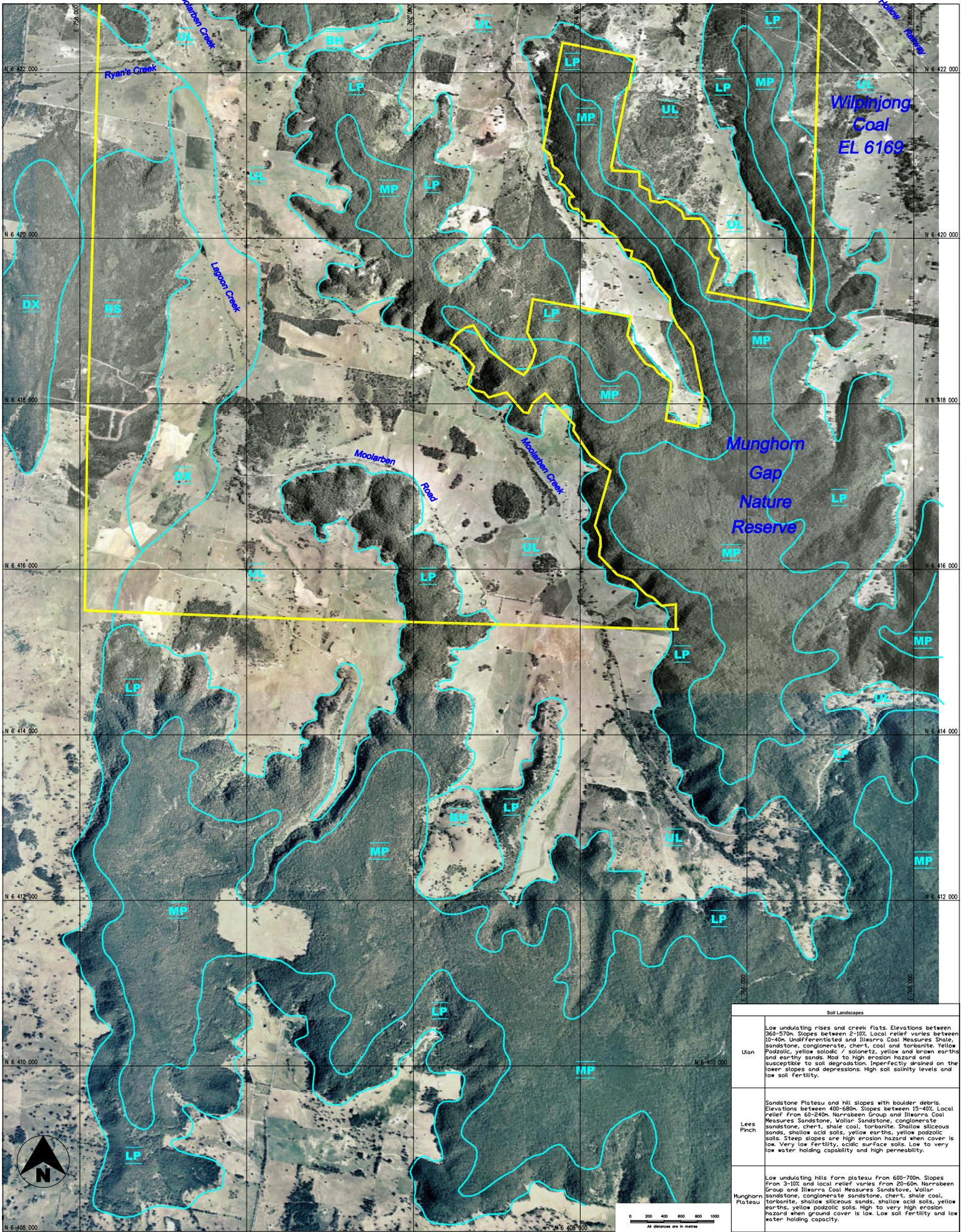
Moolarben Coal Project					Drawing No.
Figure 6: Stage 1 Heritage Management - North					02625
Date	Scale	Drawn	Checked	Approved	Revision No.
26.10.07	1:20,000	NM		GH	B
					Sheet Size
					A3



Rev.	Drawn	Description	Approved
B	NM	Issued Drawing	AW
A	CS	Preliminary Issue	AW

Moolarben Coal Mines Pty Limited
 ABN 62 106 601 672
 Level 14 213 Miller Street Phone: 02 9922 3777
 North Sydney NSW 2060 Fax: 02 9923 2427
 Prepared by Pegasus Technical Ph: 02 65 718888

Moolarben Coal Project					Drawing No. 02625
Figure 7: Stage 1 Heritage Management - South					Revision No. B
Date 26.10.07	Scale 1:20,000	Drawn NM	Checked	Approved AW	Sheet Size A3



Legend
 — EL 6288
 — Soil Landscapes

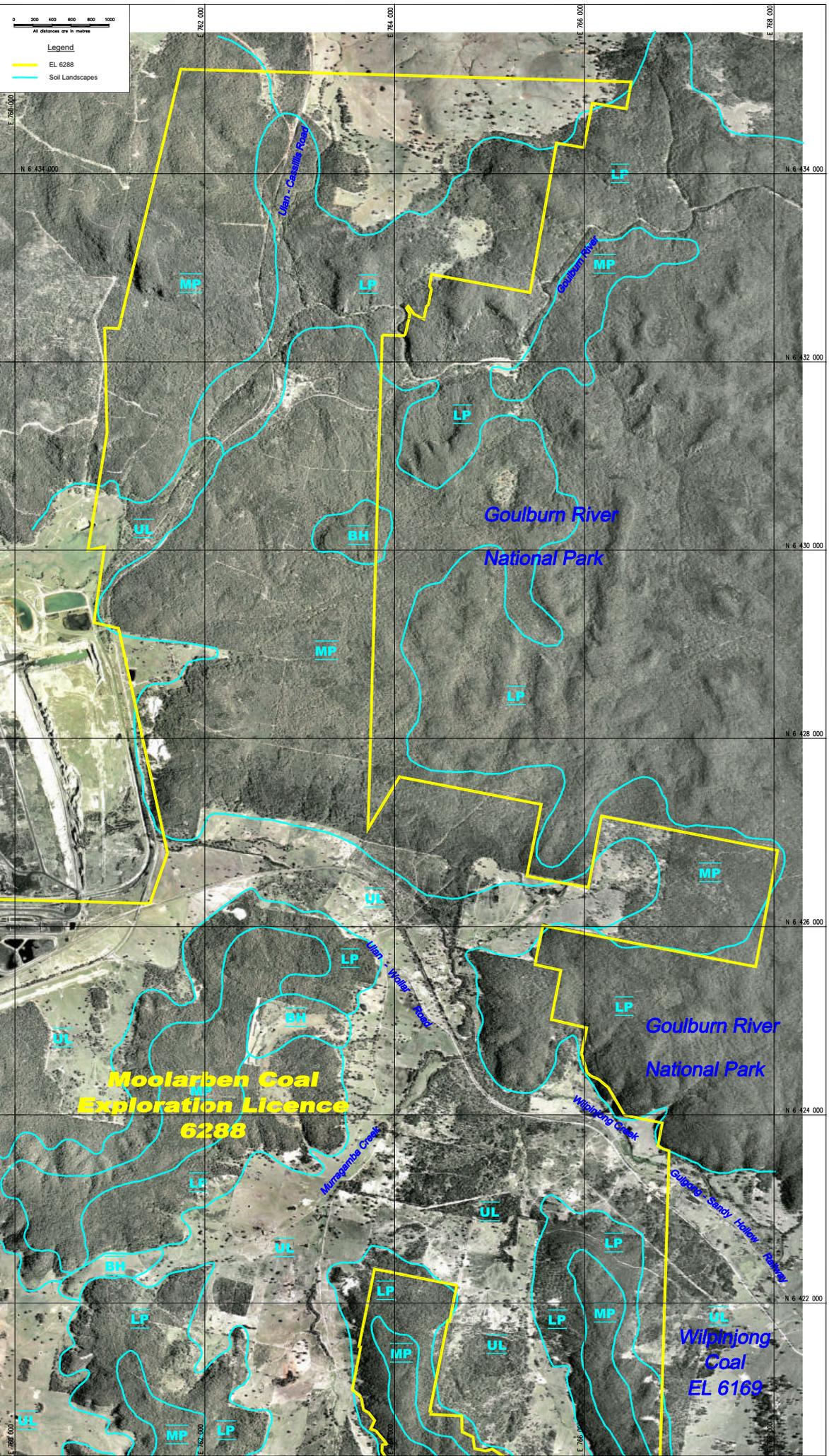
Soil Landscapes	
Ulan	Low undulating rises and creek flats. Elevations between 350-570m. Slopes between 2-10%. Local relief varies between 10-40m. Un differentiated and Illawarra Coal Measures: Shale, sandstone, conglomerate, chert, coal and torbanite. Yellow Podzolic, yellow solonch / solonetz, yellow and brown earths and earthy sands. Mod to high erosion hazard and susceptible to soil degradation. Imperfectly drains on the lower slopes and depressions. High soil salinity levels and low soil fertility.
Lees Finch	Sandstone Plateau and hill slopes with boulder debris. Elevations between 400-680m. Slopes between 15-40%. Local relief from 60-240m. Narrabeen Group and Illawarra Coal Measures: Sandstone, Molar Sandstone, conglomerate sandstone, chert, shale coal, torbanite. Shallow siliceous sands, shallow acid soils, yellow earths, yellow podzolic soils. Steep slopes are high erosion hazard when cover is low. Very low fertility, acidic surface soils. Low to very low water holding capacity and high permeability.
Munghom Plateau	Low undulating hills form plateau from 600-700m. Slopes from 3-10% and local relief varies from 20-60m. Narrabeen Group and Illawarra Coal Measures: Sandstone, conglomerate sandstone, chert, shale coal, torbanite, shallow siliceous sands, shallow acid soils, yellow earths, yellow podzolic soils. High to very high erosion hazard when ground cover is low. Low soil fertility and low water holding capacity.
Bald Hill	Low hills with elevations from 450-600m. Slopes 10-35%. Local relief from 60-120m. Drainage lines are 300-500m apart. Tertiary Basalt, Diabase basalt, dolerite, teschenite, andesite, - chocolate intergrades, Chocolate soils. Steep slopes with rock outcrops; stoniness mod to high fertility and water holding capacity.

Revision	Drawn	Description	Approved

Moolarben Coal Mines Pty Limited
 ABN 82 108 801 872
 Level 14 213 Miller Street Phone: 02 9922 3777
 North Sydney NSW 2060 Fax: 02 9923 2427

Moolarben Coal Project		Figure 8: Soil Landscapes - South		Drawing No. 01166
Date 16.12.05	Scale 1:20000 @ A1	Drawn CS	Checked JR	Approved
				Revision No. A
				Sheet Size A1

Soil Landscapes
<p>Ulan</p> <p>Low undulating rises and creek flats. Elevations between 360-570m. Slopes between 2-10%. Local relief varies between 10-40m. Unafforested and Illawarra Coal Measures Shale, sandstone, conglomerate, chert, coal and torbanite. Yellow Podzolic, yellow sodic / solonetz, yellow and brown earths and earthy sands. Mud to high erosion hazard and susceptible to soil degradation. Imperfectly drained on the lower slopes and depressions. High soil salinity levels and low soil fertility.</p>
<p>Lees Pinch</p> <p>Sandstone Plateau and hill slopes with boulder debris. Elevations between 400-600m. Slopes between 15-40%. Local relief from 60-240m. Narrabeen Group and Illawarra Coal Measures Sandstone, Wallar Sandstone, conglomerate sandstone, chert, shale coal, torbanite. Shallow siliceous sands, shallow acid soils, yellow earths, yellow podzolic soils. Steep slopes are high erosion hazard when cover is low. Very low fertility, acidic surface soils. Low to very low water holding capability and high permeability.</p>
<p>Mungahorn Plateau</p> <p>Low undulating hills form plateau from 600-700m. Slopes from 3-10% and local relief varies from 20-60m. Narrabeen Group and Illawarra Coal Measures Sandstone, Wallar Sandstone, conglomerate sandstone, chert, shale coal, torbanite, shallow siliceous sands, shallow acid soils, yellow earths, yellow podzolic soils. High to very high erosion hazard when ground cover is low. Low soil fertility and low water holding capacity.</p>
<p>Bald Hill</p> <p>Low hillocks with elevations from 460-600m. Slopes 10-35%. Local relief from 60-120m. Drainage lines are 300-500m apart. Tertiary Basalt, Dillvine basalt, dolerite, teschenite, Euclyptus - chocolate intergrades, chocolate soils. Steep slopes with rock outcrops, stoniness, nod to high fertility and water holding capacity.</p>



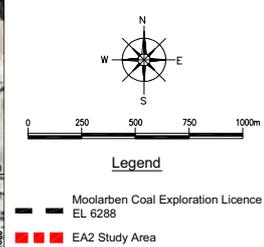
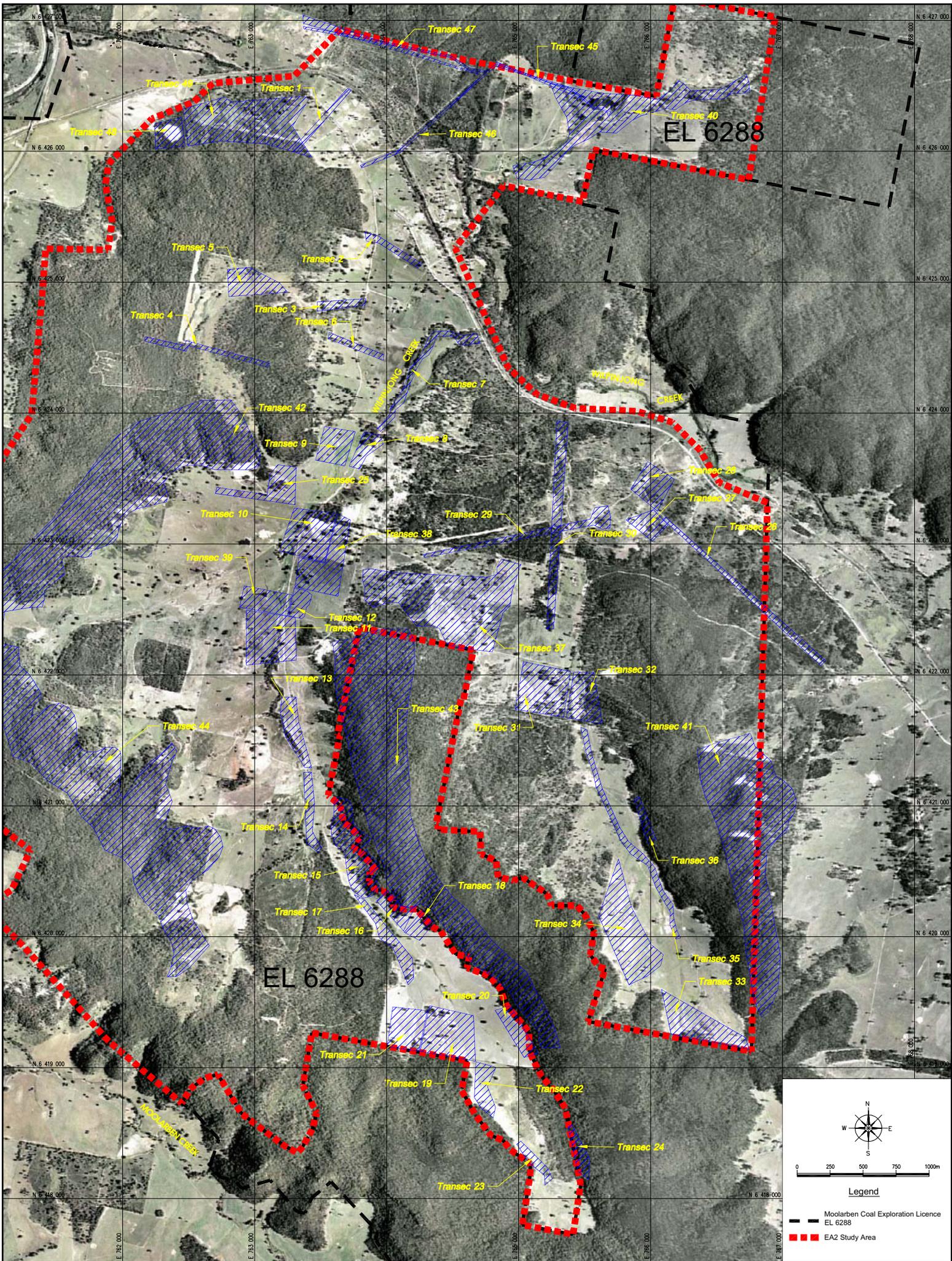
Revision	Rev.	Drawn	Description	Approved

Moolarben Coal Mines Pty Limited
 ABN 62 108 001 872
 Level 14 213 Miller Street North Sydney NSW 2060
 Phone: 02 9922 3777 Fax: 02 9923 2427

Moolarben Coal Project
Figure 9: Soil Landscapes - North

Date	Scale	Drawn	Checked	Approved
16.12.05	1:20000 @ A1	CS	JR	JL

Drawing No. 01166
 Revision No. A
 Sheet Size A1



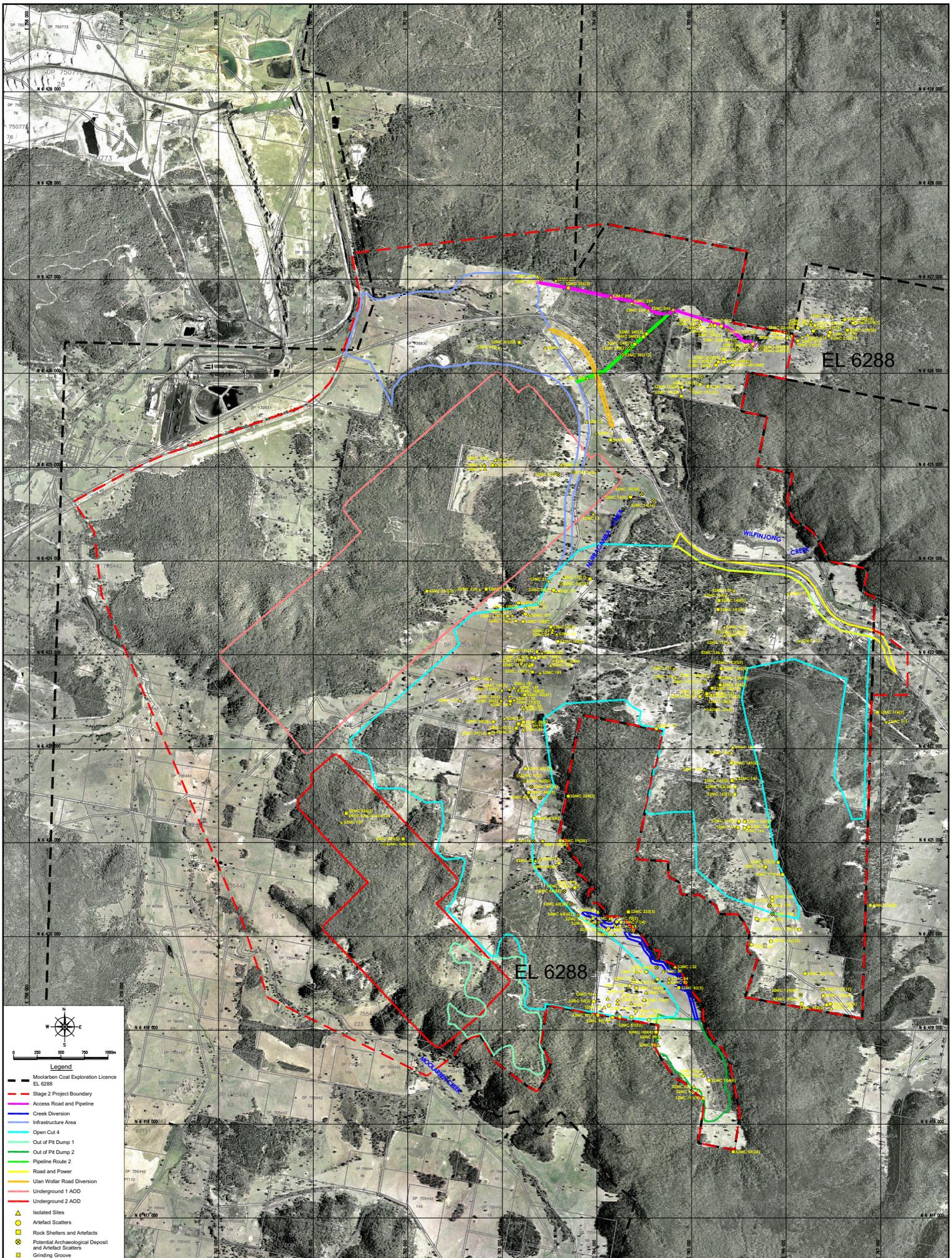
REVISIONS	DATE	BY	DESCRIPTION	CHK.
B		NM	Amendments to Transects	AW
C		CP	Amendments to Transects	AW
D		CP	Amendments to Transects	AW
E		CP	Amendments to Title	GH
F		CP	Title Block Changes	JB

Moolarben Coal Project
 ABN 62 108 001 672
 Level 14 213 Miller Street Phone: 02 9822 3777
 North Sydney NSW 2060 Fax: 02 9923 2427
 Prepared by Pegasus Technical Ph: 02 65 718888

FIGURE 10
ARCHAEOLOGICAL SURVEY TRANSECTS
FOR MCP STAGE 2 STUDY AREA

Date	Scale:	Drawn	Checked	Approved	Sheet Size
18.08.2008	1:12,500	CP	JB	JB	A1

Drawing No. 03099
 Revision No. F



Legend

- Moolarben Coal Exploration Licence EL 6288
- Stage 2 Project Boundary
- Access Road and Pipeline
- Creek Diversion
- Infrastructure Area
- Open Cut 4
- Out of Pit Dump 1
- Out of Pit Dump 2
- Pipeline Route 2
- Road and Power
- Utan Wollar Road Diversion
- Underground 1 AOD
- Underground 2 AOD
- ▲ Isolated Sites
- Artefact Scatters
- Rock Shelters and Artefacts
- Potential Archaeological Deposit and Artefact Scatters
- Grinding Groove

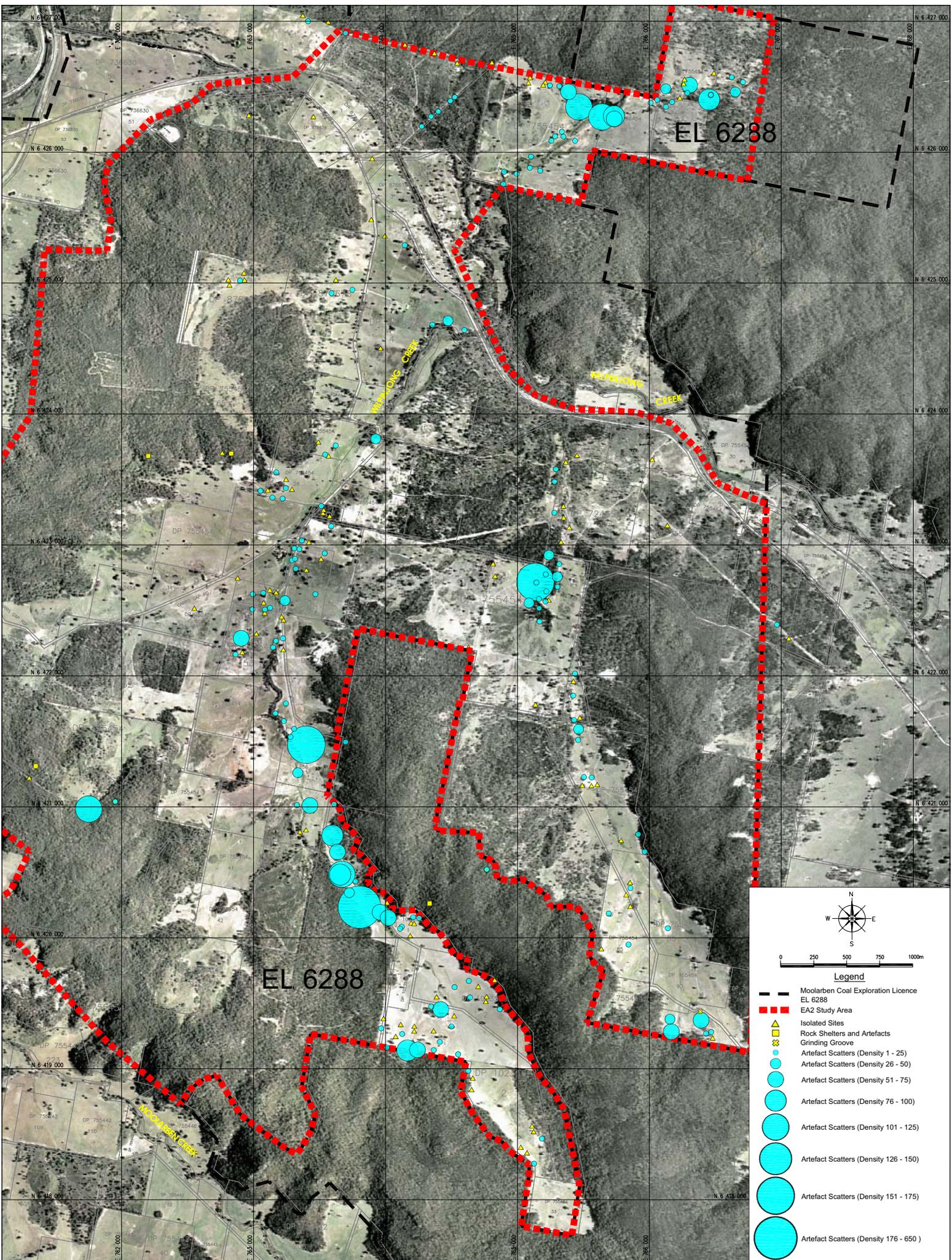
Rev.	Drawn	Description	Approved
F	CS	Amendments to Artefact Sites 22.07.2008	JB
G	CS	Amendments to Artefact Sites and Disturbance Boundaries	JB
H	CS	Client Amendments	JB
I	CP	Client Amendments to Artefact Sites	JB
J	CP	Amendments to Title	GH

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 ABN 82 108 801 672
 Level 14 213 Miller Street Phone: 02 9622 3777
 North Sydney NSW 2060 Fax: 02 9923 2427
 Prepared by Pegasus Technical Ph: 02 65 718888

**FIGURE 11
 MCP STAGE 2
 ABORIGINAL SITE DISTRIBUTION**

Date	Scale	Drawn	Checked	Approved
18.08.08	1:25,000	CP	GH	GH

Drawing No. 03098
 Revision No. J
 Sheet Size A2



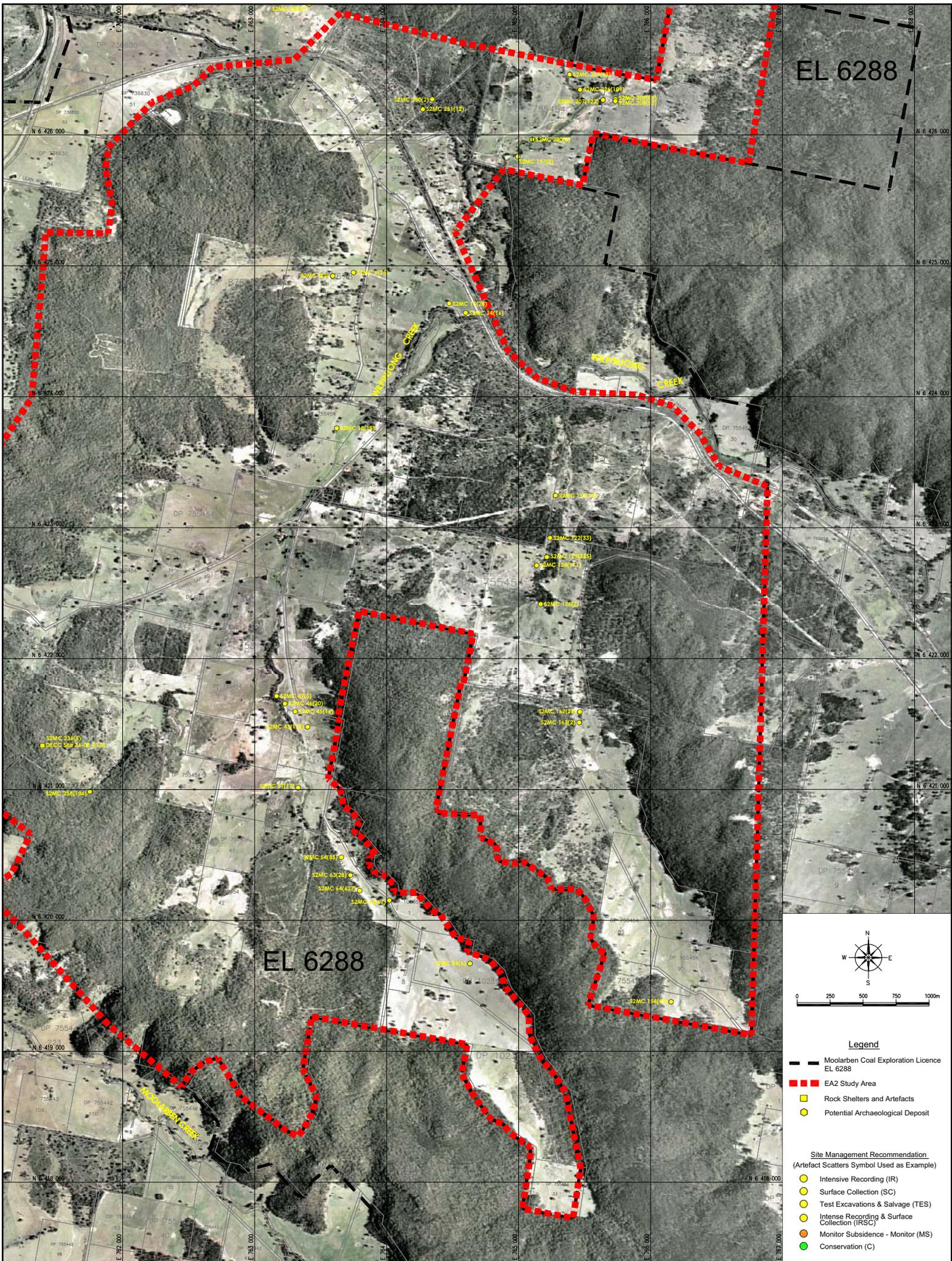
Legend

- Moolarben Coal Exploration Licence EL 6288
- EA2 Study Area
- Isolated Sites
- Rock Shelters and Artefacts
- Grinding Groove
- Artefact Scatters (Density 1 - 25)
- Artefact Scatters (Density 26 - 50)
- Artefact Scatters (Density 51 - 75)
- Artefact Scatters (Density 76 - 100)
- Artefact Scatters (Density 101 - 125)
- Artefact Scatters (Density 126 - 150)
- Artefact Scatters (Density 151 - 175)
- Artefact Scatters (Density 176 - 650)

REVISIONS	DATE	BY	DESCRIPTION	CHK.
C		NM	Additional Artefact Sites Added.	AW
D		NM	Additional Artefact Sites Added.	AW
E		CP	Amendments to Artefact Sites	GH
F		CP	Amendments to Title	GH
G		CP	Title Block Changes	JB

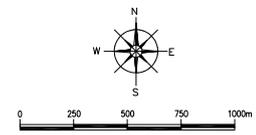
Moolarben Coal Project
ABN 62 108 901 672
 Level 14 213 Miller Street Phone: 02 9922 3777
 North Sydney NSW 2060 Fax: 02 9923 2427
Prepared by Danese Technical Pty 02 94 74 8688

FIGURE 12 MCP STAGE 2 ABORIGINAL SITE DISTRIBUTION AND SITE DENSITY		Date	Scale	Drawn	Checked	Approved	Drawing No.
		18.08.08	1:12,500	CP	JB	JB	03097
							Revision No.
							G
							Sheet Size
							A1



EL 6288

EL 6288



- Legend**
- Moolarben Coal Exploration Licence EL 6288
 - EA2 Study Area
 - Rock Shelters and Artefacts
 - Potential Archaeological Deposit

- Site Management Recommendation**
(Artefact Scatters Symbol Used as Example)
- Intensive Recording (IR)
 - Surface Collection (SC)
 - Test Excavations & Salvage (TES)
 - Intense Recording & Surface Collection (IRSC)
 - Monitor Subsidence - Monitor (MS)
 - Conservation (C)

REVISIONS	DATE	BY	DESCRIPTION	CHK.
A		NM	Original Issue	AW
B		NM	Amendments to Artefact Sites	AW
C		CP	Amendments to Artefact Sites	GH
D		CP	Amendments to Title	GH
E		CP	Title Block Changes	JB

Moolarben Coal Project
 Level 14 213 Miller Street North Sydney NSW 2060
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 Prepared by Pegasus Technical Ph: 02 65 718888

FIGURE 13 REGISTERED SITES AND NEWLY RECORDED PADS WITHIN THE MCP STAGE 2 STUDY AREA				
Date	Scale	Drawn	Checked	Approved
18.08.08	1:12,500	CP	JB	JB

Drawing No. 03095	Revision No. E	Sheet Size A1
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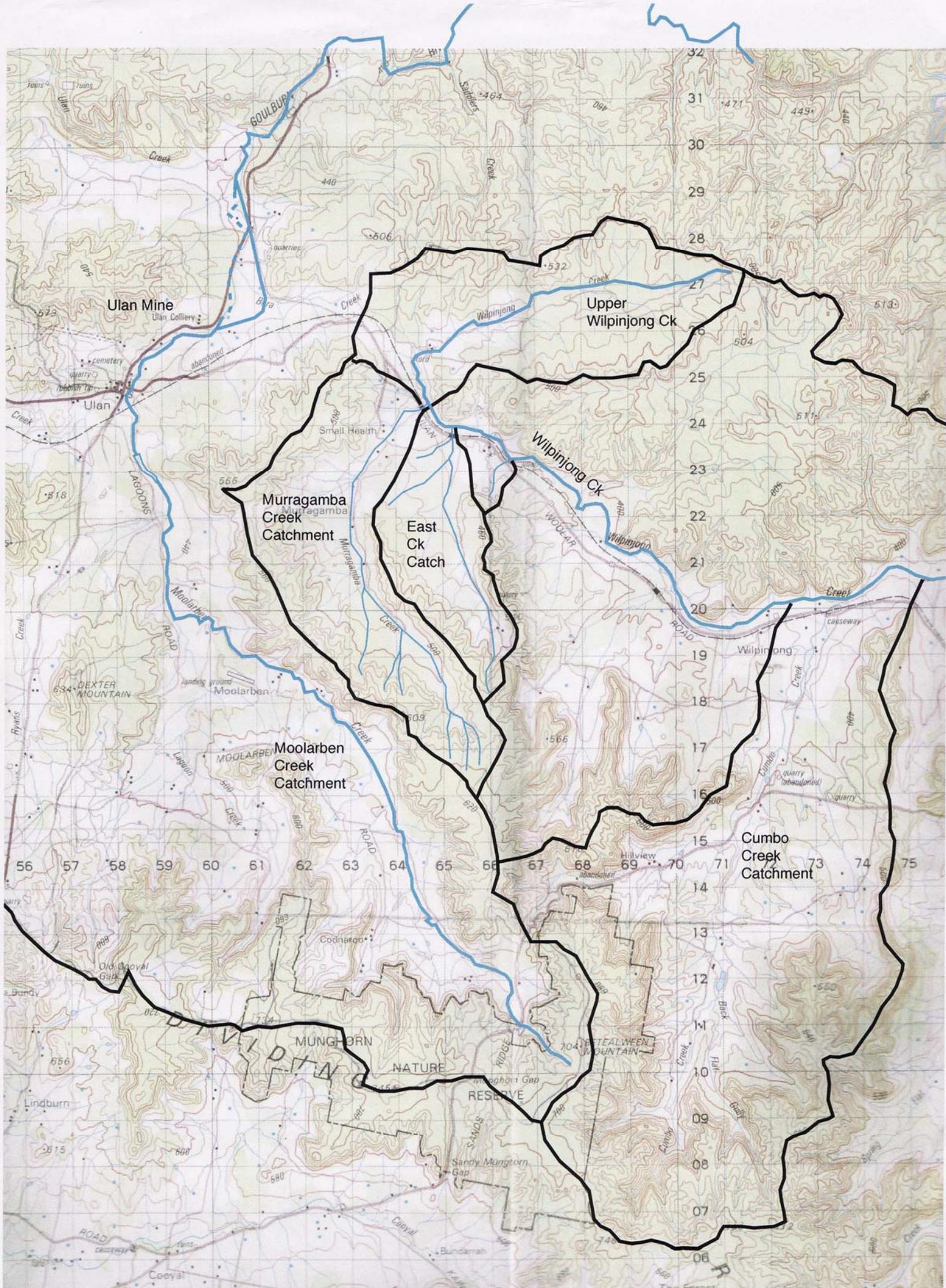


FIGURE 14: Drainage and catchment features of the MCP Stage 2 study area. Scale = 1:25,000 Wollar sheet.

Figure 15: Raw Material Types MCP Stage 2 N=4825

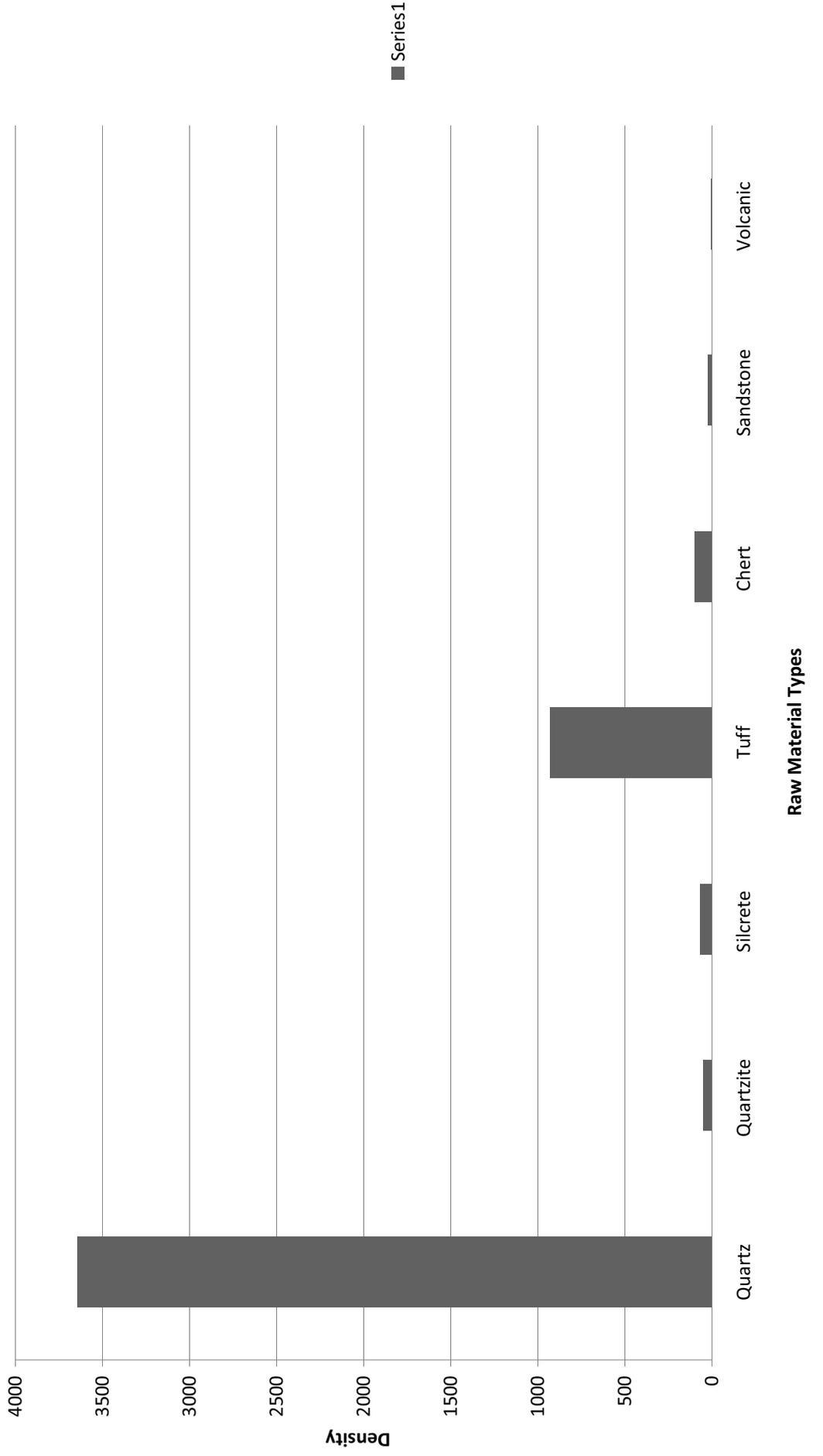


Figure 16: Artefact Types recorded in MCP Stage 2 N=4825

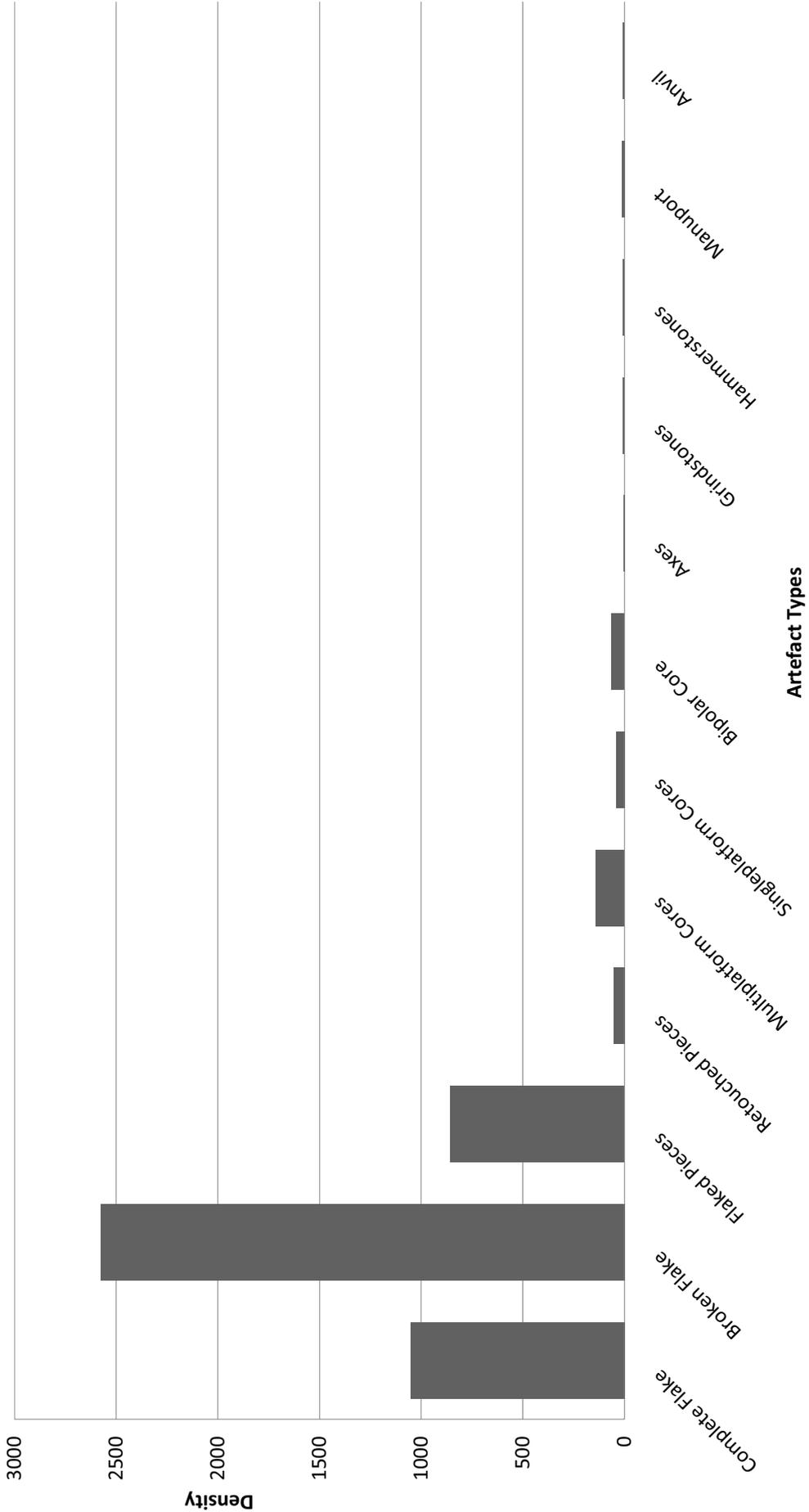


Figure 17: Size Distribution of Complete Flakes recorded for MCP Stage 2
N=1095

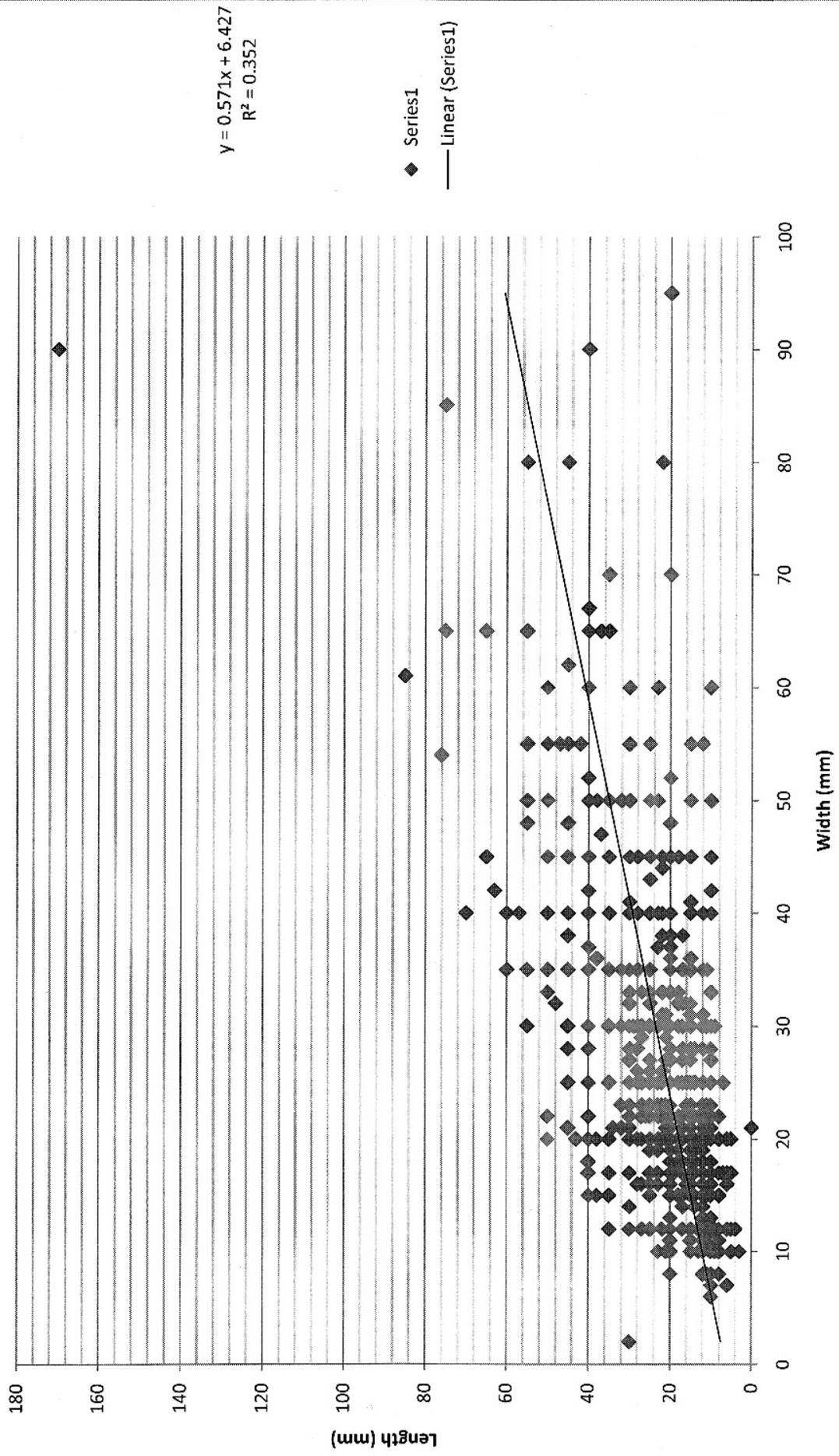


Figure 18: Bipolar Cores Size Distribution N=62 (all quartz)

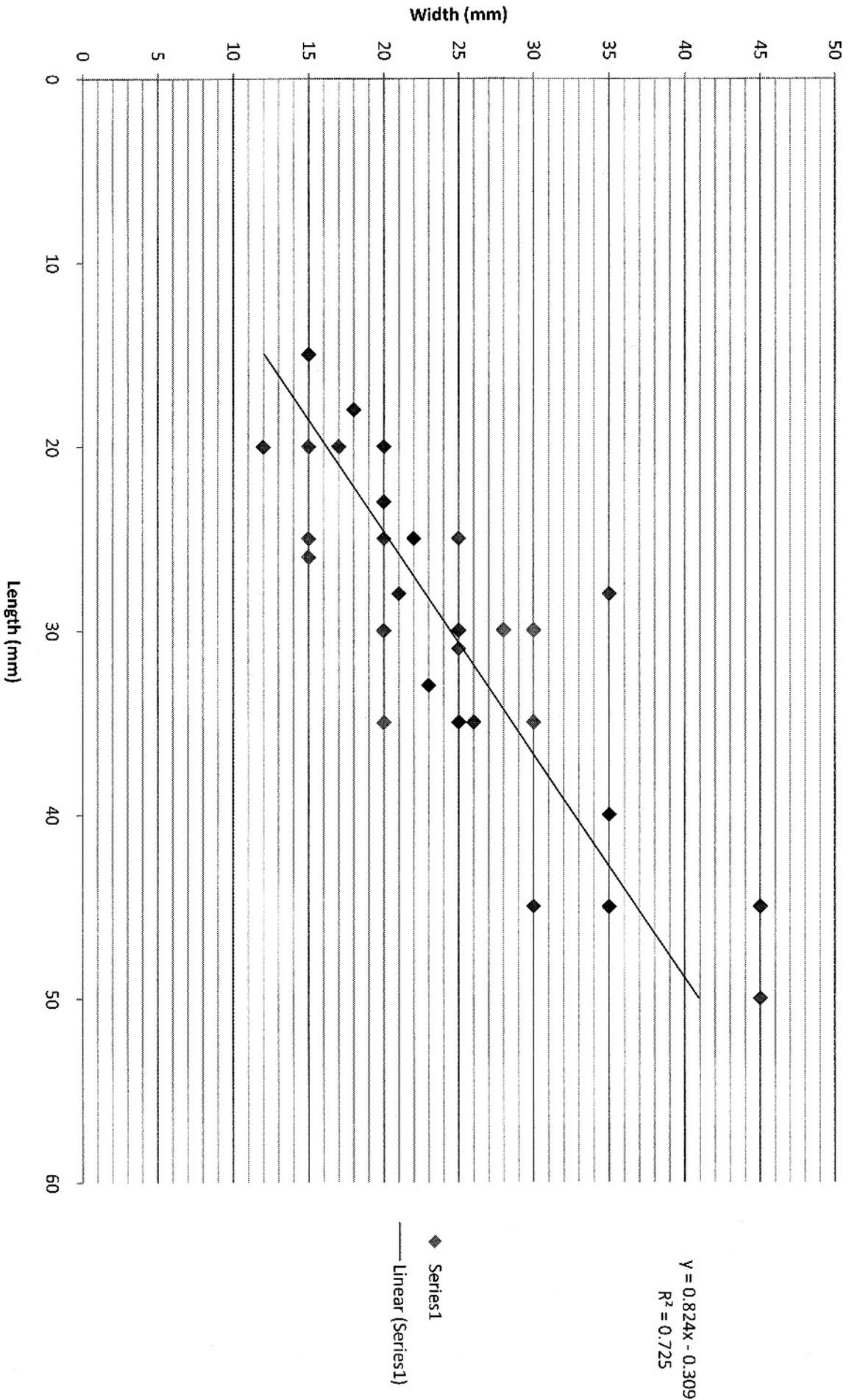
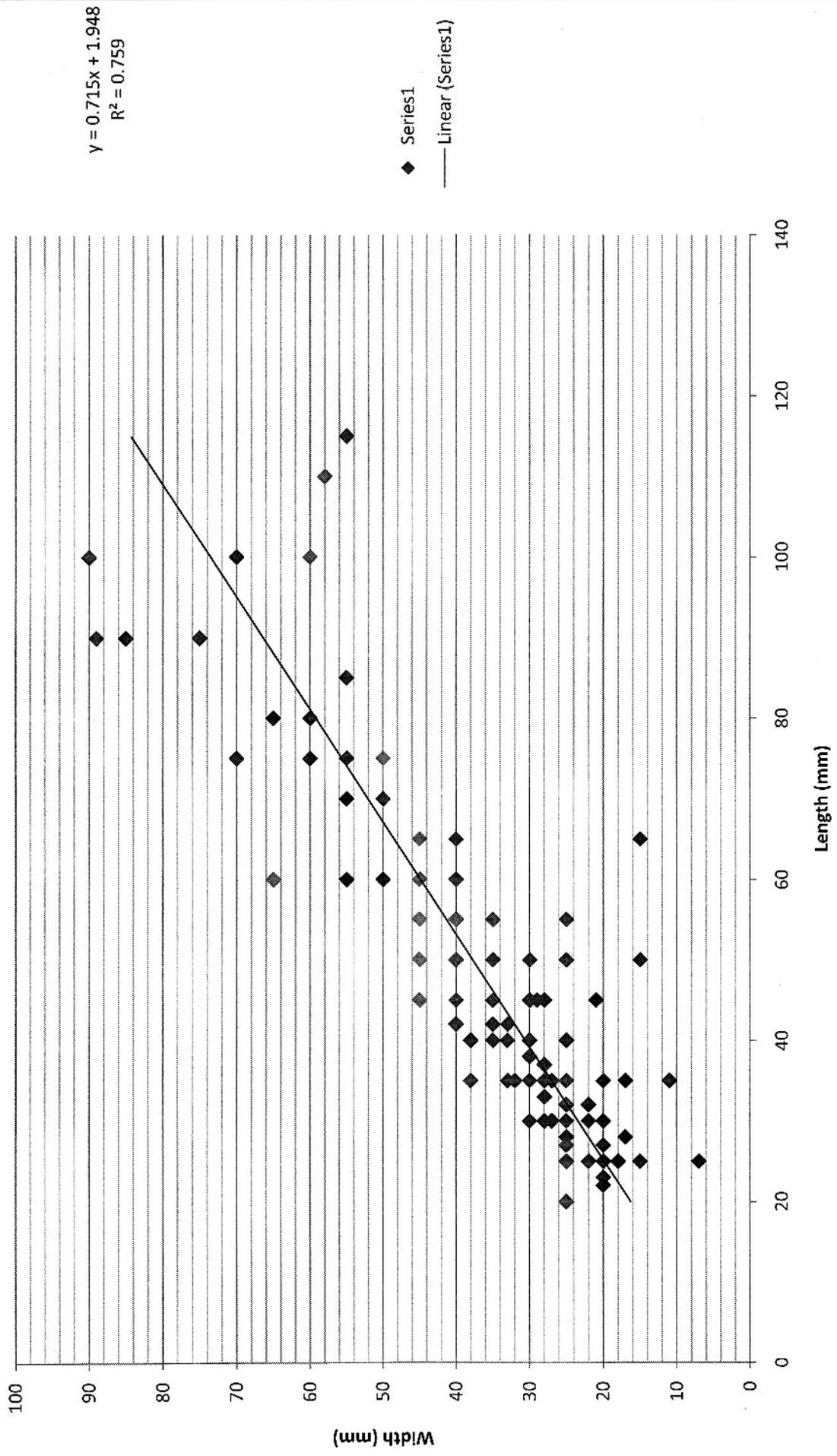
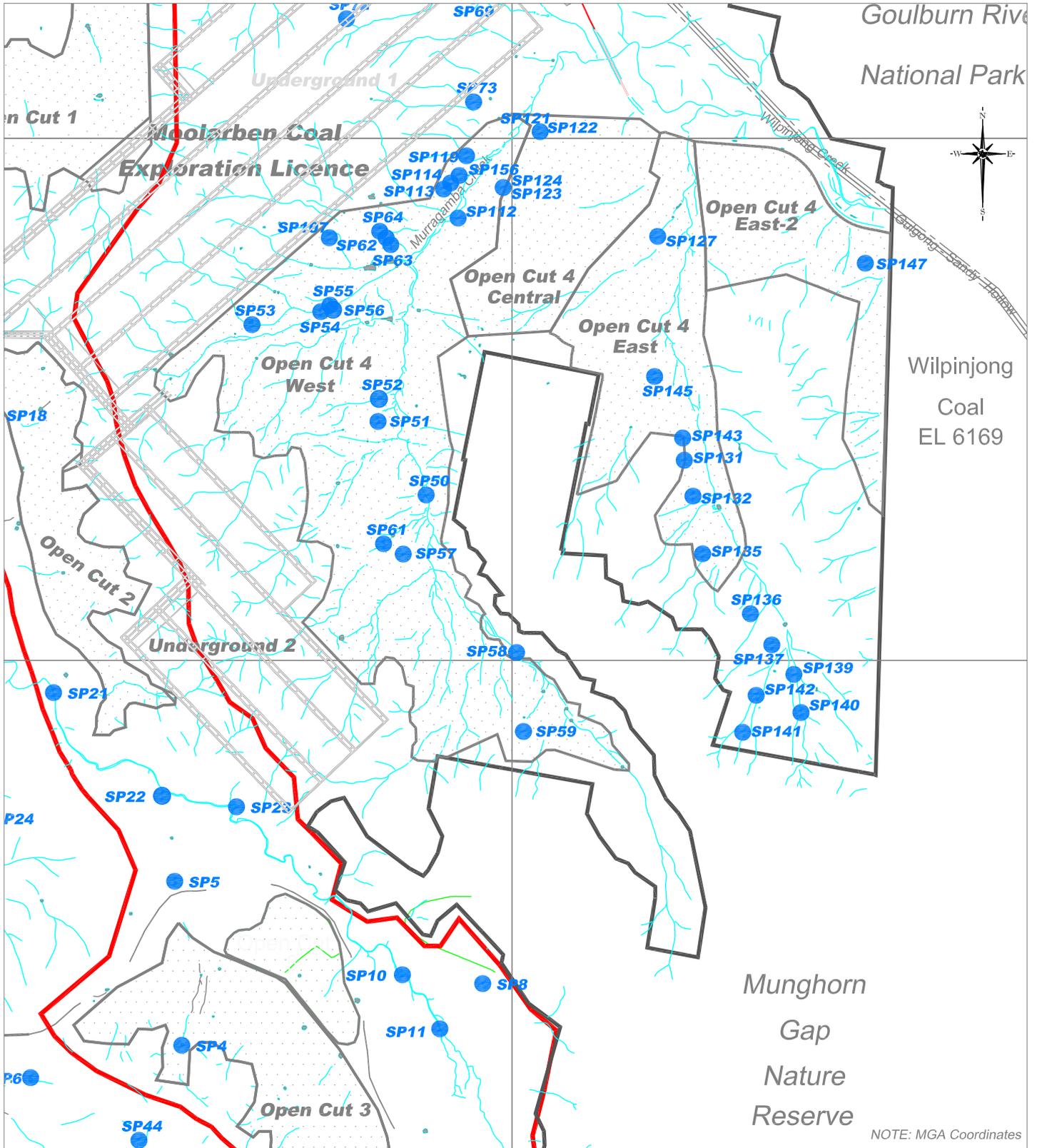


Figure 19: SP & MP Cores Size Distribution MCP Stage 2 N=179 (all raw materials)





Legend

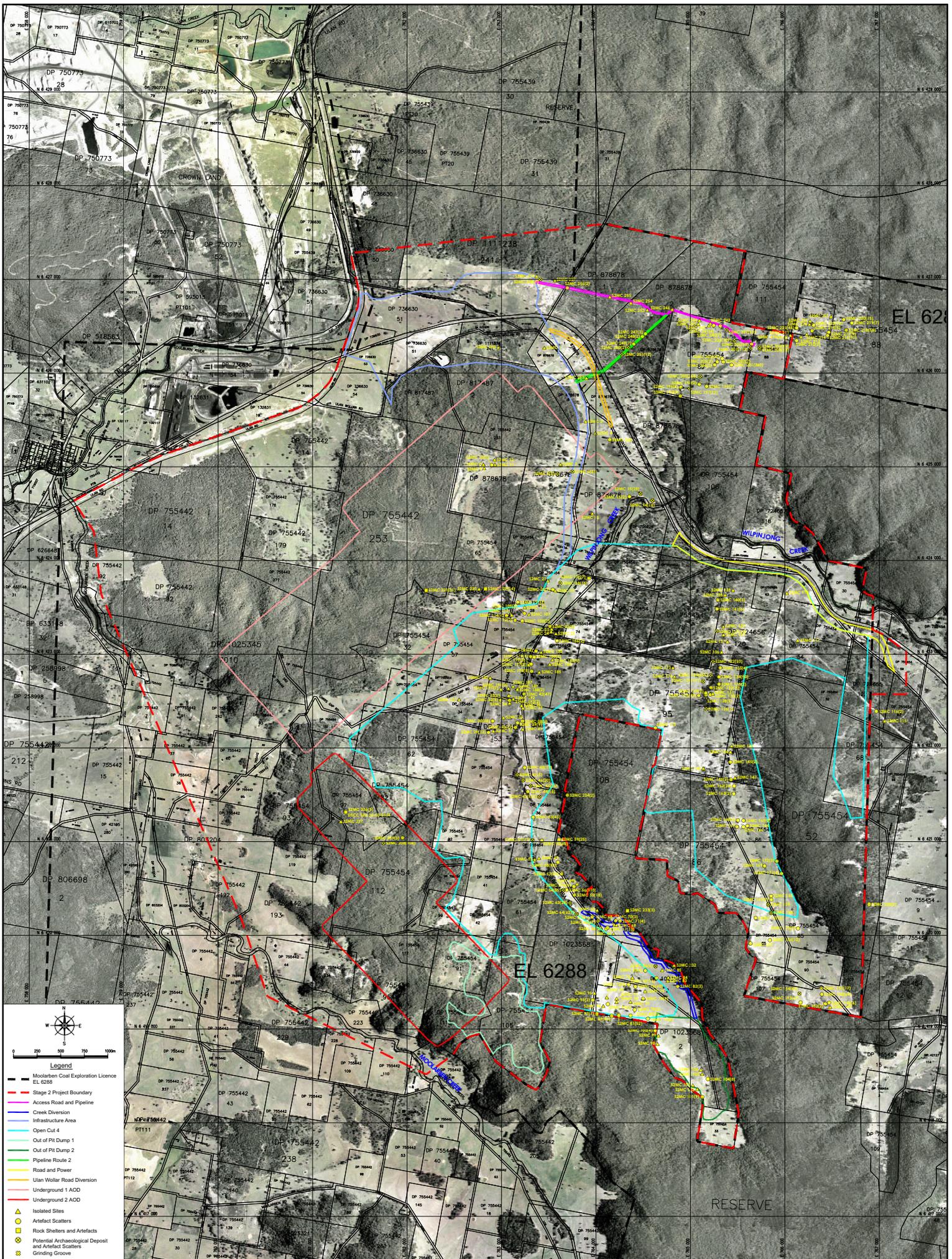
- SP78 Spring or Soak
- EL6288 Lease Boundary
- Moolarben DA Boundary

Date: 09 July 2008	Scale: 1: 40,000 (as A3)
Initials: SRD	Job No: S06
Drawing No: S06/C2-001	Rev: A

aquaterra

Moolarben Coal Mines Pty Ltd
Moolarben Coal Project
 Locations of Existing Bores, wells, springs,
 soaks and groundwater fed dams

FIGURE 20



Legend

- Moolarben Coal Exploration Licence EL 6288
- Stage 2 Project Boundary
- Access Road and Pipeline
- Creek Diversion
- Infrastructure Area
- Open Cut 4
- Out of Pit Dump 1
- Out of Pit Dump 2
- Pipeline Route 2
- Road and Power
- Utan Wollar Road Diversion
- Underground 1 AOD
- Underground 2 AOD
- ▲ Isolated Sites
- Artefact Scatters
- Rock Shelters and Artefacts
- Potential Archaeological Deposit and Artefact Scatters
- Grinding Groove

Rev.	Drawn	Description	Approved
D	NM	Amendments to Artefact Sites 23.06.2008	GH
E	NM	Amendments to Artefact Sites 30.06.2008	GH
F	CS	Amendments to Artefact Sites 22.07.2008	JB
G	CS	Amendments to Artefact Sites and Disturbance Boundaries	JB
H	CS	Client Amendments	JB

Moolarben Coal Mines Pty Limited
 ABN 82 108 801 872
 Level 14 213 Miller Street North Sydney NSW 2060 Phone: 02 9922 3777 Fax: 02 9923 2427
 Prepared by Pegasus Technical Ph: 02 85 718888

FIGURE 21:MCP STAGE 2 ABORIGINAL SITE DISTRIBUTION & DEVELOPMENT

Date	Scale	Drawn	Checked	Approved
29.07.08	1:25,000	CS	JB	AW

Drawing No. 03098
 Revision No. H
 Sheet Size A2

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL

APPENDIX 3: PLATES

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL

APPENDIX 3: PLATES



Plate 1: Artefact Scatter Site: S2 MC 43 located in ploughed paddocks. Open Cut 4. Red flags represent artefacts.



Plate 2: Artefact Scatter Site: S2MC 54 Open Cut 4 area. Red flags represent artefacts.

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL



Plate 3: Artefact Scatter Site and PAD: S2 MC64: Murragamba Creek. Red flags represent artefacts.



Plate 4: Grinding Groove and Artefacts Scatter Site: S2MC 151 within Ridge Crest Creek drainage. Powers Conservation Area. Red flags represent artefacts.

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL



Plate 5: Rock-shelter Site S2MC 236 (36-3-0134) Underground No 2. Red flags represent surface artefacts.



Plate 6: Rock-shelter Site S1MC 236 (36-3-0134) Underground No 2 Area. Scale =2m.

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL



Plate 7: Rock-shelter Site S2 MC 236(36-3-0134): Area. Red hand stencils with European graffiti overlain.



Plate 8: S2MC 200: Red Hills Conservation Area Artefact Scatter and PAD. Red flags represent surface artefacts.

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL



Plate 9: Site S2MC 207: Red Hills Conservation Area. Red flags represent surface artefacts.



Plate 10: Rock-shelter Site S2MC 231, Underground No 1: Red flags represent surface artefacts.

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL

APPENDIX 4

CULTURAL ASSESSMENT: ABORIGINAL COMMUNITY RESPONSES

Only available on request and with approval of the interviewee.



Moolarben Coal Project – Stage 2 Aboriginal Cultural Heritage Assessment

Date: 5 November 2008

Location: Country Comfort, Mudgee

Attendees:

Lyn Syme (North East Wirradjuri)

Kevin Williams (Murong Gialinga)

Wendy Lewis (Warrabinga)

Maria Cotter (National Parks and Wildlife Service)

Giles Hamm (A.R.A.S)

Ian Callow (Moolarben Coal Mines)

Edwina White (Moolarben Coal Mines)

Allan Wells (Wells Environmental Services)

Meeting Items

Alan Wells opened the meeting at 6.45pm and welcomed all

Alan stated that the purpose of tonight's meeting is go through Stage 2 of the Aboriginal Cultural Heritage Report currently being prepared by A.R.A.S.

Alan noted that some of the attendees had received reports and CD's (for those who registered).

Alan introduced Giles Hamm to give his presentation on the Stage 2 project

Giles Hamm – Presentation

Giles's presentation summarised the work completed for Stage 2 of the Moolarben Coal Project.

Stage2 of the Project totaled 37km² - main components being Open Cut 4 and Undergrounds 1 and 2.

Key natural features include Murragamba Creek, Eastern Creek, Carrs Gap Ridge and the Munghorn Gap Nature Reserve. The proximity to Wilpinjong mine lease and Ulan Coal Mines was also pointed out. The drainage areas within the Project area are significant and in the main are spring fed.

In terms of the survey, Community groups were consulted regarding the assessment area. There were comments put forward regarding the sensitivity of Murragamba Creek and Carrs Gap ridge and a focus on exposure on the ground, scarred trees, overhangs and the like.

Transects were designed and walked. Compared to Stage 1, many more sites were found

In total, 258 sites were found, 103 isolated finds, 150 artefact scatters and 33 potential archaeological deposits, 4 rock shelter sites (rock art was found on Carrs Gap Ridge), grinding grove on the Power's property. Giles presented where the sites were found

Every artefact was recorded with over 4,825 artefacts in total. Rock art was found above underground 2 and the richest area was Murragamba Creek in open cut 4 with around 600 artefacts found. There is a belief that there are more under the surface

The rock shelter site was long and narrow and was facing east (the only one found facing east) and located between Murragamba and Moolarben Creeks. Most of the art is in the roof panel. The rock art was made up of bird tracks, goannas, emu tracks. One section of it has a series of hand stencils. This site has been known for quite some time and was recorded by Warren Bluff in the 1940's. There are many management issues associated with this site. In 1999 DECC went out to the site and surveyed the

quality of the management. The biggest risk is graffiti. It was noted that there needs to be more Community input on the management of the site with the message that these sites need to be protected. The Company now owns the land. The question remaining is how we are to record, report, protect and manage the site.

Red Hills was also an area with a lot of artefacts.

A.R.A.S. view on the results of the survey is that the Murrumbidgee Creek is of high scientific significance, parts of Red Hill is also of quite significant (scientifically) and the rock art is also of high scientific significance.

The artefacts found are quartz dominated technology. There were also recorded backed blades, axes, reworked tools.

Giles presented one of the axes found showing edge grinding. It was noted that this artefact needs to be further assessed and would like permission to do thin sections to further analysis on the rock

Maria Cotter mentioned that she was particularly interested in geology and how it related to archaeology. She suggested a less invasive method of analyzing the material called laser ablation which takes a sample of the rock without seeing it by the naked eye and is less damaging to the artefact

Some of the artefacts were also of silcrete which was brought in to make tools

It was noted that the artefacts found were of high quality. The high number of Bondi points was also noted. An outstanding question was “how much of the material was coming from the Goulburn River”

In terms of consultation, the four main Aboriginal Groups of the area have been consulted and involved in the surveys including North East Wirradjuri, Murong Gialinga, Mudgee Local Aboriginal Land Council, Warrabingga. There were also expressions of interest from individuals. Each group will have their own say and it is very important that you provide us with your views.

Giles also asked if Community members could identify their sites of cultural significance and raise issues about the development impact on sites. It was requested that groups/individuals put their concerns in writing we do need to get some feedback on what the groups/individuals think. This type of feedback was missing from Stage 1.

The scientific assessment (not cultural assessment) showed that 11 sites were of high archaeological significance both locally and regionally. The remaining sites were medium to low.

In terms of cultural landscape, Murrumbidgee Creek and Carrs Gap ridge were significant.

Given the current mine plan, some 165 sites will be impacted from open cut mining. In terms of the rock art site, pillars of coal will be left in situ to minimise subsidence. A total of 93 sites will be conserved and set aside for conservation at Red Hills and the Power property.

Moolarben Coal Mines is asking for written responses. Giles suggested that he will also be preparing site specific information (in terms of scientific significance) on the sites impacts assuming the worst case scenario. This information will be provided to each Group for comment.

Alan Wells – noted that he did offer the opportunity for another site visit. There was no response from the floor

Giles then presented what would be addressed in the Report’s final recommendations:

1. The general strategy for site(s) management
2. Cumulative impacts will be addressed – whilst there is more pressure on sites, we do not know what is already preserved in the National Park areas. There is not much information on what is currently preserved. A suggestion might be to sample sites within the National Park
3. A review of the availability of information and site details within the local area such as a local sites register
4. Discussion on how to manage the sites salvaged. Do we have a keeping place?

Wendy Lewis mentioned that the last point is probably dealt with through Native Title agreements

Giles noted that comments on Keeping Place are welcomed and the issue needs to be discussed

David Maynard asked about the Chain of Ponds formation in Murrumbidgee Creek

Giles replied this area is highlighted in the assessment and Moolarben will be maintaining a “morphologically sound” length of creek in situ which includes the Chain of Ponds

Maria Cotter asked about the difference between the Stage 1 and Stage 2 assessment

Giles responded saying that there were twice as many transects and that a significant length of drainage line was surveyed in detail.

Wendy Lewis added that the visibility for Stage 2 was very good

Robyn commented on Sites Management (ie. Sites database) noting that the costs associated with setting up a sites database was prohibitively expensive and that National Parks and Wildlife needs to put more resources into managing the Sites database that currently exists. It was further noted that a local sites register would be outrageous.

Maria Cotter suggested that this feedback is important and this needs to be communicated

Alan Wells invited Maria Cotter from DECC-NPWS to talk about the approvals process

Maria Cotter

Part 3A (Environmental Planning and Assessment Act) is now the approvals path for major projects. When this process first came into play it was thought that section 87 and section 90's would be taken away. It is noted that the National Parks and Wildlife Act still applies in that cultural heritage is still protected and there are consequences if it is not.

Anyone who finds a site must report it under section 91 of the Act. DECC also needs to know how the site is managed.

There is still the issue of cumulative impact and intergenerational equity. DECC still needs to be mindful of the impacts because there is a point when cumulative impacts become so great that the DECC says “no” to proposals

In terms of intergenerational equity, DECC has to be responsible and must protect sites for the next generation. This is carried through in the section 91 process where we require information on how sites are managed.

For those with Native Title, there is a fundamental part of the Act, section 75. Artefacts are property of the Crown until they are transferred and we have a process for the transferral to happen as well. We need to know what is happening with the sites. In terms of a “Keeping Place”, the sites have to be transferred before they can be stored there. It is a Permit type process. There has to be evidence that the sites will be kept in perpetuity. For example, if sites are put back after the disturbance and the site is sold off and developed again, the sites will need to be re-registered.

Paul Houston is now the Aboriginal Heritage Planning Officer based in Dubbo. He talks to the community and listens to concerns. Giles has asked for Community input. We take this input on board when we assess the Aboriginal Cultural Heritage Report – we need to take account of all the information before us.

Robyn asked if there were any policies signed off by the Minister

Maria spoke of the Draft Guidelines from 2005 which is used to guide the way in which assessments should be done. They ask for scientific and cultural heritage input of equal weighting. These guidelines

also contain information on consultation such as advertisement, notifications, evidence of decision making

Letters of support for any proposal are also required as evidence by DECC. The Community/individuals do have a voice and they are taken into consideration. We need that voice and it is much better to obtain direct input from the Community/individuals.

Maria went on to say that Native Title and the NSW State requirements are two separate matters and the challenge is to manage both. DECCs role is to administer the NSW State requirements.

There was some discussion from the floor on Native Title

Alan Wells then invited Ian Callow to talk about the Moolarben Coal Project

Ian Callow

Ian noted that approval for the Moolarben Stage 1 Project was granted in September 2007 and it was envisaged that construction would have already started, however there have been numerous delays most of which have been out of our hands.

We do plan to start construction very soon with the archaeological works currently underway, an important forerunner. After that we will fence the boundary and by December/January we will commence bulk earth works

The construction timetable is driven by the end date of supplying coal to the new Newcastle Coal Infrastructure Group (NCIG) port facilities in Newcastle by the end of the first quarter of 2010.

The first activities are planned for Bora Creek and the Rail loop. Mining will commence in the south west of open cut 1. Within 12 months, we will pre-strip, construct the environmental bund, take coal out and send it to the port

Ian presented the Stage 2 general arrangement. We are seeking approval during 2009 and when approved, Stage 1 and Stage 2 will operate as a complex.

Alan Wells then asked if there were any questions from the floor. He reiterated that the purpose of tonight's meeting was to go through the Cultural Heritage Assessment Report which has followed the guidelines. The closing date for submissions is by the end of next week (ie. 14th November 2008).

The Environmental Assessment report for Stage 2 is very near finalized and ready for submission to the Department of Planning.

Submissions for the Aboriginal Cultural Heritage Report are needed. All Groups represented here have participated in the work and we expect that your responses may or may not agree with the Report. Your viewpoint is appreciated. If you do not provide a response within this timeframe, there is another opportunity to provide your response during the public exhibition phase.

There was some concern about the response timeframe

Giles Hamm noted that he will be sending out site specific recommendations for Community/individual comment. This will be distributed next week

Alan Wells noted that the final site recommendations will be distributed next week and the closure date for comments will be extended

Meeting closed at 8.10pm

Moolarben Coal Projcet
 Stage 2
 Aboriginal Community Consultaion Meeting

Name	Postal Address	Phone No	Email
Debbie Foley	9 Inglis st mudgee	63720859	
Kevin Williams	17 MAIN ST ULAN	63734875	
LARRY FOLEY	9 INGLIS ST MUDGEE	63720859	
WENDY ANN LEWIS	66 DANGAR ST KANDOS	0409966163	
Wayne Howden	Mudgee 220 Lowe's peak RD	63744382	
Sean Shorter	6 WILSON ST mudgee	63720408	

Moolarben Coal Projcet
Stage 2
Aboriginal Community Consultaion Meeting

Name	Postal Address	Phone No	Email
Sally Verrills	6 Robertson st Mudgeoo	03720965	
David Maynard.	91 Inglis St Mudgeoo	0263723323	
MARIA COHEN.	DECE 85 FAULKNER ST ARMIDALE NSW 2350	6773 7018	
Paul Hester	48-52 Wingemare St Dubbo	0268835361	
R. Williams	Wolled Rd Cumbao	0417024458	
Lyn Syne	17 maini Rd., LHASA	02 63734875	

Moolarben Coal Projcet
 Stage 2
 Aboriginal Community Consultaion Meeting

Name	Postal Address	Phone No	Email
LOLA MCCONNELL	"ROSELEA" 13 GUNTAWANG RD MUDGEEE 2850	02 63732289	
CRAIG MCCONNELL	6 WANDA CRES MUDGEEE 2850	0412634933	

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November 20, 2008

In regards to:Moolarben Coal Project Aboriginal cultural heritage Assessment
Report Stage 2

Mr Ian Callow

Dear Mr Callow,

Subject:Personal Recommendations

I Craig McConnell would formally like to express my opinion & recommendations on Moolarben Coal Project Stage 2

The report obviously shows significant occupation by Wiradjuri people, my people, for thousands of years before white settlement,in the area surveyed.This is a special location, water sources at there purest,bountiful food,shelter,Home.There spirits are part of this land,as is mine.The impact my peoples had on nature was minimal, as they were part of the very flow & ebb of Country, the natural cycle.Honor & respect & a knowing if you give back to the land, she takes you in her bosom.

Your coal mine will go against all the principals of Country mentioned.Your excitement Mr Callow at the coal project starting shortly was very foreign & sickening to me.To destroy the spirit of such special country, to rape her, to disregard the trueness of what is, this is against my very soul.Truly you must Know this in yourself.

My Undying recommendation is DO NOT Proceed with Moolarben Coal Mine stage 2 at all ,give back to nature, our Mother, Yours & mine.

In closing I would also like to formally express my objection to Moolarben Coal stage 1.I verbally expressed my objection to stage One at a meeting held by Mr Alan Wells at the Horatio Motor Inn,when consultation was sort on the stage one Cultural Heritage assessment.My failure to object formally against the mines approval is a mistake I must accept, but I must admit I did not fully understand the process, as I do not now.I know I am merely clearing my own conscience by expressing my opininions now, but it is written.I ask that a receipt of correspondence be forwarded to me asap,thank you.

Please take my recommendations seriously, as they have come from a source that does not lie, & that is my Heart.

Respectfully yours,

Craig Peter McConnell

.....

DAVID F MAYNARD
91 INGLIS STREET MUDGEE NSW
0263723323

TO: Wells ENVIRONMENTAL SERVICES.....

ATTN: Allan Wells.....

FAX NO: 0249346788.....

TEL NO: 0249346588.....

YOUR REF:.....

DATE: 21:11:08.....

SUBJECT: Site INSPECTIONS..Moolarben COAL.

Total number of pages including cover sheet 2.....

MESSAGE: ALLAN.....

find enclosed list of people
who wish to attend site inspections
Regards David,

David F Maynad Aboriginal Cultural Heritage Officer
91 Inglis Street
Mudgee NSW 2850

0263723323

Mr Allan Wells
Wells Environmental Services
3/95 High Street
East Maitland
PO Box 205
East Maitland NSW 2323

RECEIVED
21/11/08

Dear Alan

As per our phone conversation on Thursday the 20th of Nov 2008 regarding a request for members of Mudgee local Aboriginal Community to be able inspect significant Aboriginal Heritage sites within the Moolarben Coal area.

A number of members of the local Aboriginal organizations would like to look at some of these significant places before comment on the Archaeological report by Mr Giles Hamm Archaeologist ARAS for Stage 2.

Pease find enclosed a list of people who would like to attend this request as a matter of good faith by Moolarben Coal Mines Ltd. Our Heritage is important to the Mudgee people many of the local Aboriginal people did not attend other site inspections in the past during stage 1 or during stage 2.

List of those who would like to attend. Others could not come because of work commitments. The date for the inspection recommended is the 5th of December 2008.

Sally Verrils
Larry Flick Jnr
Larry Flick Snr
Nathan Flick
Lavinia Flick
Bridgett Adams
David Maynard
Christine Maynard
Cathy Franklin
Craig McConnel

Gedda Flick
Nathan Flick
Bridgett Adams
David Maynard
Christine Maynard
Julie Pumpa
Debbie Foley
Larry Foley
Todd Verrils

Yours Sincerely

D F Maynard 21/11/08
D F Maynard Aboriginal Cultural Heritage Officer

17 Main Street
ULAN. NSW. 2850
PH/FAX: 0263734875
email lsyme@aapt.net.au

22nd November, 2008-11-22
Mr. Alan Wells,
Wells Environmental Services,
PO Box 205,
EAST MAITLAND. NSW. 2323.

Dear Alan,

Please accept my apologies regarding this late submission. I have been awaiting the decision of the Delegate of the Native Title Registrar of the National Native Title Tribunal regarding the application for the North Eastern Wiradjuri People, the application having been made by myself and Peter O'Mara.

I am one of the Native Title Applicants for both Stage 1 and 2 of the Moolarben Coal operations.

You should be aware that the claim for registration was satisfied on the 13th November, 2008. The Delegate's decision states: "The North Eastern Wiradjuri people are the right people to speak for this country; to maintain knowledge of its sites and stories and to act on its behalf."

The Ancillary Deed Agreement and the Amended Ancillary Deed Agreement have been completed by the Native Title Party Applicants, and completion by Moolarben Coal Mine Operations is expected within the next few days. These agreements have relevance to Cultural Heritage Management; the establishment of an **Aboriginal Cultural Heritage Liaison Sub-Committee** and the establishment of a **Keeping Place** at Moolarben Coal.

The Ancillary Deed sets out in Schedule 3 establishes an Aboriginal Cultural Heritage Liaison Sub Committee". This Committee is to be setup within 1 calendar month of executing this Agreement and is called the Moolarben Cultural Heritage Liaison Sub Committee.

The Moolarben Cultural Heritage Liaison Sub Committee shall comprise 2 members from the Claim Group which at least one will represent Aboriginal interests in addition to those of the claim Group and two members nominated by the Moolarben Companies. The Native Title and Cultural Heritage Officer will attend meetings of the Cultural Heritage Liaison Sub Committee in an advisory capacity only.

The parties will ensure that any work required to protect Aboriginal cultural heritage associated with the Project is completed in the manner and within the timeframes determined by the Moolarben Companies'. These works are conducted in pursuant to the relevant Aboriginal Heritage Plan (or similar named document) required to be produced for the Project under any approval granted under the EP&A Act; and

The Parties agree to sign all documents and do all things that are necessary to assist the Moolarben Companies manage and protect Aboriginal cultural heritage in the Project Area. This is to be consistent with the provisions of any relevant aforesaid Aboriginal Heritage Plan (or similar named document) for the Project.

The Claim Group agree that in the event of a dispute regarding custodial ownership or treatment of any Aboriginal and/or Wiradjuri cultural heritage item and/or object located within the Project Area, the Moolarben Companies will be entitled to continue with the mining operations. This is notwithstanding the existence of such dispute provided that the Moolarben Companies comply with all the relevant legislative obligations imposed in relation to that Aboriginal and/or Wiradjuri cultural heritage. Any such dispute that might arise is to be dealt with in accordance with Clause 3 of Schedule 2.

The first meeting of the Cultural Heritage Liaison Sub-Committee will be held within 2 months of the date of this Deed and throughout the construction phase will meet no less than every 2 months. Following the completion of construction the Cultural Heritage Liaison Sub-Committee will meet not less than every 6 months.

The Moolarben Companies agree to meet all reasonable costs in connection with the operation of the Cultural Heritage Liaison Sub-Committee (including sitting fees and other meeting costs, as well as reasonable travel and accommodation expenses)

Clause 3 of Schedule 2 reads:

“Dispute Resolution

Requirement to comply with ADR subclauses

- ↳a) Unless a party to this Deed has complied with this clause, that party may not commence court proceedings or arbitration relating to any dispute arising from this Deed except where that party seeks urgent interlocutory relief in which case that party need not comply with this clause before seeking such relief.
- ↳b) Where a party to this Deed fails to comply with this clause, any other party need not comply with this clause before referring the dispute to arbitration or commencing court proceedings relating to that dispute.”

And it continues to detail:

- Notice of Dispute
- Investigations
- Agreement on process to resolve dispute
- No use of information obtained
- Termination of dispute resolution process.

At this stage we have been refused participation in the Aboriginal Cultural Management Activities despite the decision of the NNTT of 13/11/08. I would recommend to you that you review this position.

In relation to the Aboriginal Cultural Heritage Report –Stage 2 and that for Stage 1 – I would like to

see these combined to be an Aboriginal Cultural Heritage Report for the whole of Moolarben for the whole of the mining lease area, and it needs to be a living document.

For Stage 2 we have only surveyed 20% of the area of the mine affected land and we need to survey in strict accordance with the DECC guidelines.

These state that “...where developments occur over a large area the sampling regime **must** encompass the geographic extent of the development.” Clearly in this case where 80% of the development has not been surveyed, measures will be needed to comprehensively survey those areas that will be impacted by the development prior to those areas being impacted.

It is very difficult to be in a fully informed position to comment on the impacts of this development on our heritage because of the results of the survey methodology. There needs to be consideration of the different types of mining – i.e. open –cut and underground. Further, there need to be mitigation effects put in to place now, rather than later.

The Aboriginal Cultural Heritage Management Plan needs to be established holistically, as opposed to being developed in bits and pieces. We received the Aboriginal Cultural Heritage Assessment Report by Giles Hamm October 2008 and it was presented at a meeting on Wednesday 5th November, 2008. We are then to receive an addendum on the 11/11/08 regarding site specific management recommendations by email (and hand delivered) which will state that “although the final impacts especially for Open Cut 4 may change after the Department of Planning have their final say...”, the site specific management needs further discussion and I expect will be updated once the whole of Stage 2 has been surveyed. This report contains very little detail (& fragmented detail) and is not consistent with “best practise” – this is a Part 3A application which then denies us any Section 90 consent approvals.

You are asking us to sign off on a major development project that will have a massive impact on our heritage.

Very little detail has been provided and we need to discuss and agree on all of the management measures of the identified sites and further sites (other sites as identified)

To my knowledge:

- Giles Hamm’s Aboriginal Heritage Assessment Report relies heavily on Ulan Mine and Wilpinjong Mines’ wealth of knowledge in the area associated with Moolarben which is very rich with evidence of Aboriginal occupation.
- Giles Hamm’s report talks about six Aboriginal representatives being present for Stage 2, however there were 8, two from each group as detailed below:
 - North East Wiradjuri
 - Warrabinga Native Title Claimants Corporation
 - Murong Gialina Aboriginal & Torres Strait Islander Corporation
 - Mudgee Local Aboriginal Land Council

Certainly additional Aboriginal sites will be found in relation to future surveys and measures will

need to be put in place to manage these sites. These need to be thoroughly discussed with the Aboriginal community and included in a detailed Management Plan. It is vital that there is an up-front agreement upon procedures to manage any new heritage sites that are found.

The recommendations should clearly identify the role of and continued involvement of Aboriginal stakeholders which should include the right to review and comment on the proposed methodology of further archaeological studies and on any archaeological reports.

The methodology and relevance of collection, test excavation and salvage for every Aboriginal site should be to the same level as would be required for the normal Section 90 process as opposed to Part 3A approval.

Yours in Indigenous Spirit,

Lyn Syme



Moolarben Coal Mines Pty Limited

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Australia

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MOOLARBEN COAL PROJECT STAGE 2 ABORIGINAL CULTURAL HERITAGE ASSESSMENT

ABORIGINAL COMMUNITY STAKEHOLDER CONSULTATION BRIEFING: SITE TOUR

TO:

Aboriginal community stakeholder members or groups registered for the MCP Stage 2 Aboriginal Cultural Heritage Assessment process.

SUBJECT:

An invitation to undertake a site tour to review MCP Project Stage 2 Aboriginal Cultural Heritage Assessment final draft report and site management recommendations.

PURPOSE:

To make aboriginal community stakeholders aware of MCP Stage 2 final draft Aboriginal cultural heritage assessment report recommendations and likely impact issues through a field inspection.

BACKGROUND:

This site inspection is to provide those Aboriginal community members who were not involved directly with the Aboriginal cultural heritage assessment process to see the sites in their landscape setting and understand the impact issues. This is an opportunity for Aboriginal community members to provide direct feedback to Moolarben Coal Mines Pty Ltd about their main concerns about impact issues and their Aboriginal cultural values.

DATE:

Friday the 5th of December 2008.

TIME:

7.00am – 5.30pm

PLACE :

MCP Stage 2 development area off Murragamba road Murragamba.

TRANSPORT AND CATERING:

Those Aboriginal community participants without 4WD transport will be picked up from Mudgee at 7.00am and dropped back by 5.30pm on the day. Lunch and refreshments will be provided. For those coming from other locations outside of Mudgee, a meeting place can be arranged at Ulan Village before the site tour commences.

SPECIAL NEEDS:

Aboriginal community members who want to attend but need special assistance due to medical issues, will need to notify Moolarben Coal Mines Pty Ltd in advance so appropriate transport can be arranged.

SITE TOUR ITINERARY:

- Site 36-3-0134 : Carr's Gap ridge-line Rock Art Site. Some walking up slopes may be required.
- Murragamba Valley main open site occupation areas, access is via road.
- Eastern Creek Valley main open site occupation areas, access is via road.
- Powers Property Conservation area: Axe grinding grooves and open site complex.
- Red Hills Conservation area if time permits.

RECORDING FEEDBACK DURING SITE TOUR:

A written record will be made of any comments made during the site tour from community participants or Moolarben personnel, this will include questions and answers given by all participants.

MOOLARBEN PERSONNEL AND CONSULTANTS ATTENDING:

The following people representing Moolaben Coal Mines will be attending:

- Ms Edwina White : Environmental Manager Moolarben Coal Mines Pty Ltd .
- Mr Giles Hamm Archaeological Risk Assessment Services Pty Ltd.
- Mr Alan Wells Wells Environmental Services Pty Ltd.
- Mr Ian Callow Moolarben Coal Mines Pty Ltd.

RSVP

Please notify Giles Hamm ARAS Pty Ltd (0423) 046 208 if you will be attending by no later than 5pm on the 3rd of December 2008.

Mr Ian Callow
Project Manager

Moolarben Coal Mines Pty Ltd
PO BOX 1320
NORTH SYDNEY
NSW 2509

Mr Alan Wells
Wells Environmental
Services
PO BOX 205
EAST MAITLAND
NSW 2323

8 December 2008

RECEIVED
16/12/08

Messrs Ian Callow and Allan Wells

Dear Messrs Callow and Wells

OUR SUBMISSION ABOUT MOOLARBEN COAL PROJECT STAGE 2

We are all members of both the Mudgee Local Aboriginal Community and Murong Gialinga. We are writing to you both about Moolarben Mine and the local Mudgee and Gulgong Aboriginal Community. We are worried that Moolarben will follow in the foot steps of Ulan Coal and Wilpingjong and will not involve the local Community. We are concerned that opportunities for employment, traineeships, Tafe courses, etc, will be given to the one family. Even in the past fortnight, three people, not local, but in the family mentioned, received jobs in Wilpingjong, meaning that three local people missed out. There is no formal communication with the local Community. What our Community really needs is better health service care for people with disabilities, jobs, traineeships, education and Tafe courses. Our Community needs a community house where we can help people by providing courses, eg, training people of the Aboriginal Community in site identification which would benefit Aboriginal Community members and assist Moolarben by having skilled people working on their projects. The community house would benefit our Community. We could have it for all cultural purposes; we could do art there and it could be a meeting place for our people. Our culture is, and will always be, important to us.

We hope to have an open, honest relationship with Moolarben. We would like to be able to see the artefacts found on Moolarben land and the other sites, like the Rock Shelter site 36-3-0134. Destruction of Murragamba Creek is very special to us and we would like a Plan of Management and Community consultation. The Grinding Grooves site on Power's property was heart warming, but also sad. We need to preserve what we can. All the artefacts that have been found should be placed on a piece of land so they will be there for us and our future generations. We would like Moolarben to donate a piece of land with a building on it to keep our artefacts free from damage and for us to be able to have that land. We ensure that this will keep them safe. If this can not happen, we suggest the artefacts be kept in a locked showcase at Moolarben with details about them so they are there for our future.

There is another key issue; the impact of Native Title on the Aboriginal Community of Mudgee and Gulgong. It has a social and economic impact on us and has divided our long-term Aboriginal residents. It has brought nothing but conflict to our Community. Has Moolarben assessed the social and economic impact of supporting Native Title and recognising people who may have no Native Title rights? How does Moolarben know that Native Title exists within their mine's lease? On past experiences, the Koori Community believes that only one group of people are benefiting from Native Title Agreements. This can be shown by the people who are getting jobs within the mines, like Wilpingjong. We understand that non-Aboriginal people are also being employed through the Wilpingjong Native Title Agreement. There is high unemployment amongst the Aboriginal youth of Mudgee and Gulgong. They need secure jobs.

How can we be confident that Moolarben will not just follow Wilpingjong's lead and only employ one family and their mates? We have seen houses given to one family who only allow their family and friends to use these so called "community resources". We thought the mines were here to support all the Koori Community, not just the ones who speak the loudest. Can Moolarben assure the Aboriginal Community that it will implement an open and transparent consultation process on the impact of Native Title on the rest of the Aboriginal Community? Will the rest of the Aboriginal Community be involved in decisions made through the Native Title Agreement? How will this be done?

Under Section 75F of the Environmental Planning and Assessment Act 1979, Social and Economic Key Issue, the Department of Planning should request that a formal report be prepared regarding the social impact of Moolarben supporting Native Title. We would like to see a commitment from Moolarben that it will not negatively affect the rest of the Aboriginal Community by implementing a bias and one-sided employment programme where other Aboriginal people, not part of the Native Title claimant group, are overlooked for potential jobs and training. How will Moolarben implement this approach? We believe the first Stage 1 Moolarben EIS was flawed because it did not assess the social and economic impacts of Native Title Agreement on the rest of the Aboriginal Community. Also, can the New South Wales Department of Planning assure the Mudgee and Gulgong Aboriginal Communities that it will request a proper assessment of the impact of Native Title Agreements on the social and economic welfare of the Koori Communities of Mudgee and Gulgong?

HOW DO WE SAVE THESE SITES?

We know the Axe Grinding Grooves are in the conservation, but we would like a fence erected around the area and all European constructions by the troughs left. We would like the Aboriginal Community to be involved in this work.

Rock Shelter

This site must have full protection and all the distasteful, degrading graffiti removed with great care. We would like David from National Parks and Wildlife and the Aboriginal Community to be involved with this. We find the graffiti spiritually degrading.

Murragamba Valley

This is s a very highly important area to our Community. These sites should not be impacted at all. It is very populated with numerous artefacts.

HOW DO WE FEEL ABOUT OUR COUNTRY?

We feel very deeply about our country. We will always have respect for our country. It is where our culture was born and grew. Mudgee has so much Aboriginal culture to be learnt and seen. We are a strong race and value our culture deeply. We feel peaceful around our hills of Mudgee. We should all try to work and learn about development and culture so we can watch it grow strong for all our futures. Our country is very spiritual and for those who believe so, it can also be a healing place. Smoking ceremonies are a part of us and our culture. To see the artefacts we have found throughout our country gives us a special feeling within us. We only wish we could watch and learn from our people who used them in their every day lives. So, please, when it comes to development, think at what cost it will have to our culture and try to find a way around it. We want to save our culture because once it is gone, we can never get it back.

We speak for ourselves and do not allow others to speak for us or represent us. This needs to be understood by Moolarben. When we are consulted, we want to be consulted as a group. We see a clear conflict of interest in those who say they are representing the Koori Community, but are only representing Native Title interests.

Regards,

D. Foley.
L. Foley

Debbie Foley
Larry Foley

9 Inglis St Mudgee

Julie Pumpa
143 Denison St
Mudgee NSW
2850

To Moolarben Coal Mine
Ian Callow
Giles Hamm
Edwina White

15.12.08

Dear Ian, Giles and Edwina

First, I would like to thank you for allowing my child and I to look at the landscape that the reports refer to. This allowed me to experience and feel the site in full. And to see the landscape that will be destroyed by the open cut.

Powers Property – Grinding stones

It is clear that these stones have been disturbed. Being upside down and on their sides it would be good to see them corrected.

The area needs to be maintained and protected from further damage.

It is an ideal location to show our youth a part of our culture in a traditional location. I can see them sitting near there with a contemporary grinding stone gathering water from the spring and looking out over the landscape as they grind an axe feeling what their ancestors felt. What a powerful experience this would be.

I have a concern about the spring and how the mining will impact on its water source. All cultures value water and Wiradjuri culture is based around water locations.

The Art Site

To see the damage done by vandals over our ancestor's art made me feel ill and I almost vomited on the way back to the vehicles.

I felt that part of that location to the right of the art sight as you descend is only for males.

I understand that the descendants of the first white people that molested the art site want the old signatures protected. As do we want our ancestors art work protected.

I am in two minds about it. Because I see the historical value of both.

The continued vandalism of the area is unforgettable some of the dates were as recent as 2005. They should know better and to continue is racist and disrespectful for not only Wiradjuri culture but for all Australia and its history.

I think that all the vandalism is to be documented and if possible with out damaging the traditional art be removed.

Any one that has a connection to the vandals, if they request should be given a copy of the documentation.

- ◆ I would like to see the Aboriginal art protected from further damage and disrespect.
- ◆ Removal of the wasp nests.
- ◆ Documentation of the art for future generations
- ◆ Further visits should be accompanied by an aboriginal person preferable Wiradjuri.

My concerns are the impact the mining will have on the site

Rock movement, Further cracking and Dust

The Open Cut Areas

The collection of as many artefacts as possible. Documentation of what context they were in along with what context they were in within the landscape, water source and other sites that are significant.

A keeping place or building in the area that the artefacts were taken would be ideal. They should be available to aboriginal people and future generations. Then relocated when the mining has finished.

My Concern, What happens if when the open cut commences they unearth something that is of cultural significance?

Some of my Cultural Beliefs

Work at night concerns me; I was brought up to never stir up dust at night

I never let my child wonder alone at night. As I was raised if we went out at night, my mother would keep me close by her side, as did her Wiradjuri parents and grandparents

My night beliefs are spiritual things and I do not wish to go any deeper into its meaning.

Community Needs

No other mine in the area has helped the Aboriginal community

I would like all the aboriginal community to benefit from the mine.

Things like a

- ◆ Four Wheel Drive Vehicle / Community Bus
- ◆ Health Care
 - Dental is a major problem within the local Aboriginal community.
- ◆ A Community Building with needs like
 - Research of local Aboriginal History and Families.
 - Research of white history would also be of value.
 - Art / Cultural Center.
 - Support Network.
- ◆ Land for Cultural Experiences including Employment Training.
- ◆ Housing.

Individual Benefits

Individual benefits are selfish and do not take into account the future generations that also need to be able to learn and have a say about their culture.

It is not an individual's property they do not own it. It belongs to Wiradjuri people and the future Wiradjuri generations. We need to preserve our culture for them.

One person does not have the right to any compensation

Destruction of our sites is a destruction of our culture and disrespects the ancestors and spirits of the land.

I come from this land I was born on this land I continue the connection to this land. My ancestors roamed the hills, rivers and valleys I have a right to what others have claimed. However, I will not disrespect my Culture, Elders and future generations as other individual's have. It's just not the Aboriginal Way!

Mines do destroy and will destroy some sites this I am totally against.
However, I am thankful to the mine for allowing me to see the sites. This has allowed the community to see what is happening and now the opportunity to protect sites that would have continued to be damaged and lost for good if the mine didn't go ahead.

Regards Julie Pumpa



Wiradjuri Bulan
Wiradjuri Woman
Board Member of the Mudgee
LALC
And
Member of Murong Gialinga
ATSIC

APPENDIX 5

GENERAL GLOSSARY OF TERMS

Aboriginal Object	Aboriginal object is defined under the Act as “any deposit, object, or material evidence (not being a handicraft for sale) relating to Aboriginal habitation of the area that comprises New South Wales being habitation before or concurrent with the occupation of that area by persons of non Aboriginal extraction, and includes Aboriginal remains” (as defined within the meaning of the NPW Act 1974: See <i>Guidelines for Aboriginal Heritage Impact Assessment</i> July 2003).
Analytical Recording	A process of site recording which obtains detailed archaeological data useful in archaeological analysis.
Analysis	Evaluation of archaeological data to determine the archaeological significance of sites recorded within an impact area.
Archaeological Deposit	A layer of soil material containing archaeological remains.
Archaeological Investigation	The process of assessing the archaeological potential of an impact area by a qualified archaeologist.
Archaeological Comparability	The evaluation of whether archaeological sites are uniformly different or similar across an impact area.
Archaeological Data	Archaeological information that is recorded as a result of an archaeological investigation.
Archaeological Significance	The evaluation of the scientific significance of a site, artefact, object or potential archaeological deposit as being unique, representative, information laden, intact or disturbed, easily dateable, or having special qualities that will add new knowledge to our understanding of human history.
Artefact	Any object made by human agency (stone artefacts).

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Artefact Scatter	A collection of artefacts usually lying as a lag deposit on an eroding surface.
Assemblage	<ol style="list-style-type: none">1. A group of stone artefacts found in close association with one another.2. Any group of items designated for analysis without any assumptions of chronological or spatial relatedness (Witter 1995).
Avoidance	A management strategy which protects Aboriginal sites within an impact area by development totally avoiding them.
Broken Flake	A flake which is either a distal fragment or proximal fragment.
Campsite	A site which contains a variety of artefactual data not specific to one type of stone tool reduction sequence.
Complete Flake	A flake which is whole and not broken.
Core	A lump or nodule of stone from which flakes have been removed.
Debitage	Unmodified flakes or fragments of stone material removed as a result of stone tool manufacture or modification.
Flake	A piece of stone detached from a core displaying a bulb of percussion and striking platform.
Flaked Piece	A fragment of stone where negative flake scarring is visible but no obvious striking platforms are present.
Hearth	The site of a campfire represented by charcoal, burnt earth, ash and sometimes stones used as heat retainers.
Intensive Recording	The process of recording in detail aspects of a site or object's cultural fabric and character using the latest scientific methods otherwise unavailable at the time of the archaeological survey.
Isolated Find	A single artefact found in an isolated context.

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Impact Area	An area that requires archaeological investigation and management assessment.
Knapping Floor	A location on a site which normally represents a stone artefact reduction episode.
Landform	Any one of the various features that make up the surface of the Earth.
Landscape	That part of the land's surface, more or less extensive being viewed or under study, that relates to all aspects of its physical appearance, including various vegetation associations and landforms.
Land system	An area, or group of areas, commonly delineated on a map, throughout which there is a recurring pattern of topography, soils, and vegetation.
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.
Management Plans	Conservation plans which identify short and long term management strategies for all known sites recorded within an impact area.
Methodology	The procedures used to undertake an archaeological investigation.
Minimum Requirements	The minimum standard for which NPWS will accept the reporting of an archaeological investigation.
Mitigation	To address the problem of conflict between land use and site conservation.
Open 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.)
Open Area Excavation	A method of excavation where large areas of an archaeological site are open at any one time. A horizontal representation of Aboriginal occupation of different archaeological features is considered to be more important than vertical stratigraphic relationships.

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Research Design	A research strategy for carrying out an intensive archaeological investigation and analysis.
Sampling	The process of selecting part of an area under archaeological investigation as a basis for generalising about the whole.
Sample Unit	An area of investigation which is uniform size or density and which can be quantified for analytical reasons.
Salvage	A method by which an archaeological site or group of sites may be fully investigated before they are totally destroyed by a development.
Site	A place where past human activity is identifiable.
Site Recording	The systematic process of collecting archaeological data for an archaeological investigation.
Spatial Significance	A site which may contain potential sub-surface deposits or <i>in situ</i> material useful in the analysis of human use of land and site formation process.
Summary Recording	A process of site recording where archaeological data is collected on a summary level only.
Survey Coverage	A graphic and statistical representation of how much of an impact area was actually surveyed and therefore assessed.
Technological Significance	Artefactual material which may contain types or items which, although not unique, may be included in a sample to demonstrate an aspect of stone artefact variability.
Test excavation	A process of exploratory excavation done on a small scale used to determine site extent, site condition and excavation potential.

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES

MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL

GLOSSARY BIBLIOGRAPHY

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APPENDIX 6:

***NEW SOUTH WALES DEPARTMENT OF ENVIRONMENT AND CLIMATE
CHANGE INTERIM GUIDELINES FOR ABORIGINAL COMMUNITY
CONSULTATION***

DRAFT

**Guidelines For Aboriginal Cultural Heritage
Impact Assessment and Community
Consultation**

Department of Environment and Conservation

July 2005

This Guideline identifies the important factors and/or heads of consideration that needs to be considered by proponents and consultants when assessing potential impacts on Aboriginal cultural heritage for development applications assessed under Part 3A of the Environmental Planning and Assessment Act 1979.

1. PURPOSE AND SCOPE OF THE GUIDELINES

1.1 Background

The purpose of this Guideline is to:

- identify matters which are relevant in assessing whether a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* applies is likely to have an impact on Aboriginal cultural heritage; and
- list the requirements that the proponent must address in the environment assessment if the project is likely to have such an impact.

The Guideline aims to:

- define Aboriginal cultural heritage for the purpose of the Guideline;
- list the factors that will be considered in assessing whether a project is likely to have an impact on Aboriginal cultural heritage;
- advise on the consultation that should occur with Aboriginal people in assessing this impact; and
- list the requirements the proponent needs to address in the environment assessment if the project is likely to have such an impact

1.2 Guiding principals for Aboriginal cultural heritage assessment and consultation

The objective of the assessment process is to provide information to enable decision makers to ensure that developments have considered the following:

- information regarding the significance to those Aboriginal people with a cultural association with the land of any Aboriginal cultural heritage values on which the proposed activity is likely to have an impact;
- the views of those Aboriginal people regarding the likely impact of the proposal on their Aboriginal cultural heritage;
- any measures which could be implemented to avoid, mitigate or offset the likely impact(s); and
- any justification for any likely impact(s), including any alternatives considered for the proposal.

1.3 What is Aboriginal cultural heritage?

Aboriginal cultural heritage consists of places and items that are of significance to Aboriginal people because of their traditions, observances, customs, beliefs and history. It is evidence of the lives of Aboriginal people right up to the present. Aboriginal cultural heritage is dynamic and may comprise physical (or tangible) or non-physical (non-tangible) elements. As such, it includes things made and used in earlier times, such as stone tools, art sites and ceremonial or burial grounds, as well as more recent evidence such as old mission buildings, massacre sites and cemeteries.

Aboriginal people have occupied the NSW landscape for at least 50,000 years. The evidence and important cultural meanings relating to this occupation are present throughout the landscape, as well as in documents and in the memories, stories and associations of Aboriginal people. Therefore, activity that impacts on the landscape may impact on Aboriginal cultural heritage.

For Aboriginal people, the significance of individual features is derived from their inter-relatedness within the cultural landscape. This means that features cannot be assessed in isolation, and that assessments need to consider the feature and its associations in a holistic manner. This may require a range of assessment methods with the close involvement and participation of Aboriginal people. Assessment will include lands, waterways, landscape features and native plants and animals that are culturally significant to Aboriginal people.

As with the heritage of all peoples, Aboriginal cultural heritage provides essential links between the past and present for Aboriginal people. It is an essential part of Aboriginal identity.

2. FACTORS TO CONSIDER WHEN PREPARING A PROJECT APPLICATION

All project applications must state whether or not the project is likely to have an impact on Aboriginal cultural heritage and must include information about how this assessment was made.

This assessment must demonstrate that input by affected Aboriginal communities has been considered, when determining and assessing impacts, developing options, and finalising the application.

The earlier that Aboriginal cultural heritage issues are addressed in planning and development approval processes and conservation solutions determined, the less likely it will be those same issues will come back during later stages of the development. The impact assessment steps below include a number of mechanisms that will enable Aboriginal cultural heritage issues to be dealt with 'up-front' in the planning process.

3. STEPS IN THE ASSESSMENT PROCESS

This section provides an outline of the assessment process and should be read in conjunction with the DEC's Aboriginal Cultural Heritage Standards and Guidelines Kit.

The Aboriginal cultural heritage assessment process is outlined in the following steps and includes:

- Undertaking a preliminary assessment to determine if the project is likely to have an impact on Aboriginal cultural heritage;
- Identifying the Aboriginal cultural heritage values associated with the area through consulting with Aboriginal people with cultural knowledge or responsibilities for country in which the proposed project occurs, written and oral research and field investigations;
- Understanding the significance of the identified Aboriginal cultural heritage values;
- Assessing the impact of the proposed development on Aboriginal objects and Aboriginal places;
- Describing and justifying the proposed outcomes and alternatives; and
- Documenting the Aboriginal cultural heritage impact assessment and the conclusion and recommendations to afford appropriate protection of Aboriginal cultural heritage.

The close and on-going involvement and participation of Aboriginal people will be needed during the collection of the information and the development of management outcomes. The assessment requirements are described in the following steps and illustrated in the Attached Flow Chart. Further details on each of these steps can be obtained from the DEC.

STEP 1 Preliminary assessment

The main purpose of a preliminary assessment is to identify whether there are Aboriginal cultural heritage values associated with the subject site. The preliminary assessment is primarily a desktop exercise that involves examination and collation of the information required for understanding the cultural landscape. This information will include information detailing the physical setting (landscape); the history of the peoples living on that land (documentation from archival and oral sources, as well archaeological information); the material evidence (archaeological and contemporary) that has been created by and is manifested by the occupation of people/s in that land, and the cultural and social values attached to the land and the material

evidence. Assessment will include lands, waterways, landscape features and native plants and animals and the various types of cultural sites that have been created by Aboriginal people throughout the last 50,000 + years.

Therefore the preliminary assessment should include:

- a description of the location and nature of the proposed development;
- a description of any social and cultural values including the spiritual, traditional, historical or contemporary associations and attachments which the place or area has for the present-day Aboriginal community; and
- an assessment of which of the Aboriginal cultural heritage values that are known or likely to occur are likely to be directly or indirectly affected by the proposal.

There will be situations where it could be anticipated that an Aboriginal cultural heritage assessment would not be necessary, for example:

- redevelopment of a site where objects are not previously found or have been removed or damaged;
- excavation of a site has previously occurred and there is little likelihood of objects remaining.

If following a preliminary assessment, it is determined that Aboriginal cultural heritage values are not likely to occur on the proposed development site, no further assessment is required. This conclusion, and the rationale for this finding, must be documented in the preliminary information and subsequent application submitted for determination.

If Aboriginal cultural heritage values are likely to be affected by the proposal proceed to next step.

STEP 2 Information Requirements

Aboriginal heritage assessment requires a "multi-value" approach which includes a range of methods to satisfy data/information/reporting needs. The information required for understanding Cultural Landscape includes a range of data sets detailing the physical setting (landscape); the history of the peoples living on that land (documentation from archival and oral sources, as well archaeological information); the material evidence (archaeological and contemporary) that has been created by and is manifested by the occupation of people/s in that land, and the cultural and social values attached to the land and the material evidence. Assessment will include lands, waterways, landscape features and native plants and animals and the various types of cultural sites that have been created by Aboriginal people throughout the last 50,000 + years.

Social/cultural information

The social and cultural information leading to the establishment of social and cultural values includes the spiritual, traditional, historical or contemporary associations and attachments which the place or area has for the present-day Aboriginal community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed.

This information will be obtained primarily from the Aboriginal community based on a process of community consultation and will involve a range of methodologies, such as cultural mapping, oral histories, archival documentation, and specific information provided by the Aboriginal community for the purposes of the study.

A description of the consultation process and documentation from the Aboriginal community must be included in the final assessment report. Guidance on consultation with Aboriginal people and communities can be found in the Interim Aboriginal Community Consultation Guidelines at <http://www3.environment.nsw.gov.au/npws.nsf/Content/Protecting+Aboriginal+objects+and+places>

Landscape

A description of the landscape (the physical setting of the land to be assessed) and its resources is essential for understanding the nature of the Cultural Landscape, as the opportunities and character of the land has a major influence over the nature of the interaction of the people with that land. This should describe and map landscape and landform units being used for the study (at the different levels of landscape, landscape unit, landform, topographic unit). It should also identify and map landscape features, places and natural resources of interest to the Aboriginal community;

Archival Documentation

This information includes relevant archival, historic and ethnohistoric sources as well as existing data bases such as Aboriginal Heritage Information Management System (AHIMS), Commonwealth and state heritage registers. A field component should be allowed for.

This research will provide the historical narrative of the peoples who have and continue to live in this region, and assist in the identification and mapping of places and landscapes and features of importance which may be affected by the project. It should be noted that Places identified through this process may no longer have physical evidence of their importance (such as structures, planted vegetation or landscape modifications).

Archaeological investigation

This comprises two components, an analysis of previous archaeological work (overview) within the study area and vicinity, and a physical inspection of the proposed development area.

The required intensity and extent of survey will vary greatly depending upon the objects likely to be present, size of the development area, and extent of previous land disturbance. For example, a comprehensive assessment could be required where there is a likelihood of burials being present or levels have not previously been disturbed. Where developments occur over a large area the sampling regime must encompass the geographic extent of the development.

STEP 3 Integration of information and identification of heritage values

The synthesis and integration of the information collected will provide the description of the Cultural Landscape to provide the basis for identifying the range of heritage values present. It will also provide the basis for development of criteria to clearly support the identification of areas/places/landscapes/features and sites of high heritage value to be considered as candidates for conservation/protection and/or the consideration of suitable off-set strategies eg community enhancement projects. This assessment will then also support the decisions regarding which areas/places/landscapes/features and sites will be impacted and any appropriate short and long-term mitigation requirements.

STEP 4 Information regarding the proposed development

This step will identify the nature and extent of the development and impacts on the Aboriginal heritage values across the development area. The extent of impact will include both direct and indirect impacts and their effect on Aboriginal heritage needs to be quantified to ensure that appropriate management in the context of the assessed values can be determined. Indirect impacts may affect sites or features located immediately beyond the development area or within the development area.

Examples of indirect impacts would be increased impact on art in a shelter site from increased visitation; impacts to a landscape or cultural feature from mine subsidence; destruction from increased erosion; changes in waterflows effecting the value of a cultural site; continued collapse of a significant building from lack of maintenance; changes in access to wild food resources.

STEP 5 Integration of assessment with proposed development

This involves using the above information as the basis for assessing the cultural values against the impacts from any proposed development to identify specific outcomes.

This will include consideration of the following:

- justification for any likely impact(s), including any alternatives considered for the proposal;
- any measures which will be implemented to avoid, mitigate or offset the likely impact(s).
- demonstration that the input by affected Aboriginal communities has been considered when determining and assessing impacts, developing options, and making final recommendations to ensure that Aboriginal cultural heritage outcomes can be met by the proposed development.

STEP 6 Management strategy for Aboriginal heritage

This section will set out the specific management outcomes arising from the above assessment stages agreed to by the developer for management of the Aboriginal heritage values. This is to include identification of the final development impacts and the places, sites and landscape areas to be avoided and protected or conserved.

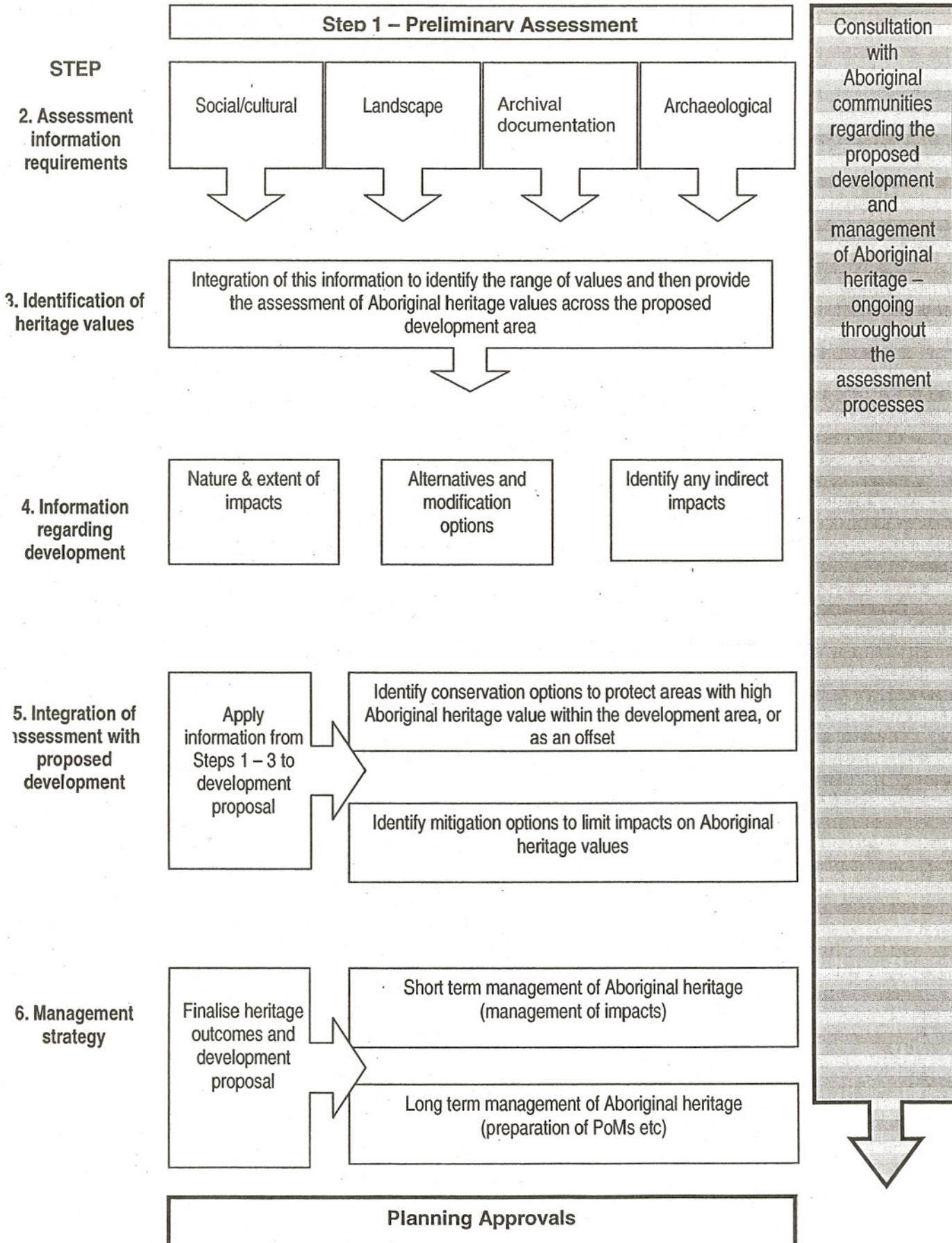
It is also to include the nature of and location of any offsets, requirements for further work such as archaeological salvage or community collection for objects of high archaeological or community value; specific on-going management protocols for both physical conservation outcomes and specific Aboriginal community requirements. This would include a contingency plan that details the measures to be taken in the event that Aboriginal objects of significance or a nature not anticipated, such as burials or ceremonial items, are discovered during the course of works on the development site.

These measures as negotiated with the Aboriginal community are to be included in the Statement of Commitments as part of the Project Application document.

5. CONTACT FOR FURTHER ENQUIRIES

If you have any questions regarding this Guidance, preparing a Aboriginal cultural heritage assessment report, or other Aboriginal cultural heritage matters please contact the DEC's Environment Line on 131555.

ABORIGINAL HERITAGE ASSESSMENTS



ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL

APPENDIX 7:
ABORIGINAL COMMUNITY SURVEY ATTENDANCE RECORDS

APPENDIX 7

**MOOLARBEN COAL EA 2 : ABORIGINAL CULTURAL HERITAGE SURVEY
ASSESSMENT: SIGN IN/OUT SHEET.**

Name	Organisation	Date	Sign In/Time	Sign Out/Time
WENDY ANN LEWIS	WARRABINGA.	30.8.06	10.00.	4'00
Thelma Pye	NEW	30/8/06	10.00	4:00
Lyn Syme	NEW	30/8/06	10.00	4:00
KEVIN WILLIAMS	MURONG GIALINGA	30/8/06	10.00	4:00
DAVID MAYNARD	M L A L C	30.8.06	10.00	4:00
Geoff Murray	Mudgee Land Council	30.8.06	10.00	"
CHRISTINE MAYNARD	Murong Gialinga.	30.8.06	10.00	"
<hr/>				
WENDY LEWIS	WARRABINGA	31.8.06	8.30	4.00
JOHN BARTON	"	"	"	"
STEVEN FLICK	Murong Gialinga	"	"	"
ROSIE PYE	M L A L C	"	"	"
DAVID MAYNARD	M L A L C	"	"	"
GAIL RATCLIFFE	"	"	"	"
LYN SYME	"	"	"	"
KEVIN WILLIAMS	"	"	"	"
<hr/>				
		4.9.06		
Steven Flick	Murong Gialinga	4.9.06	8.00	3.30
D. MAYNARD	M L A L C	4.9.06		3.30
Thelma Pye	M L A L C	4.9.06	8.00	3.30
WENDY LEWIS	WARRABINGA	4.9.06	8.00	3.30
Toni Whillock	"	"	8.00	3.30
Lyn Syme	NEW	4/9/06	8.00	3.30
Gail Ratcliffe	NEW	4/9/06	8.00	3.30
K. WILLIAMS	MURONG GIALINGA	4/9/06	8.00	3.30
CHRISTINE MAYNARD	Murong Gialinga	5.9.06	8.00	4.00 4.00
Geoff Murray	Mudgee Land Council	5.9.06	8.00	4.00
KEVIN WILLIAMS	MURONG GIALINGA	5/9/06	8.00	4.00 K Williams
Lyn Syme	NEW	5/9/06	8.00	4.00
Gail Ratcliffe	NEW	5/9/06	8.00	4.00
D. MAYNARD	M L A L C	5.9.06	8.00	4.00
TONI WHILLOCK	WARRABINGA	"	8.00	4.00 pm
WENDY LEWIS	"	"	8.00	4.00 pm

APPENDIX 7

**MOOLARBEN COAL EA 2 : ABORIGINAL CULTURAL HERITAGE SURVEY
ASSESSMENT: SIGN IN/OUT SHEET.**

Name	Organisation	Date	Sign In/Time	Sign Out/Time
D. MAYNARD	MHALC	22.9.06	Maynard 7:00	Maynard 3:00
Thelma Pye	MHALC	22.9.06	Pye 7:00	Pye 3:00
Wendy Ann Lewis	WARRABINGA	"	Lewis 7:00	Lewis 3:00
Gail Ratcliffe	NEW	22/09/06	Ratcliffe 7:00	Ratcliffe 3:00
Lyn Syne	NEW	22/9/06	Syne 7:00	Syne 3:00
Kevin Williams	MURONG GIALINGA	22/9/06	Williams 7:00	Williams 3:00
Wendy Lewis	Narrabingga	3/10/06	Lewis 8:00	Lewis 2:30
Toni Whillode	Warrabingga	3/10/06	Whillode 8:00	Whillode 2:30
Kelli Whillode	Warrabingga	3/10/06	Whillode 8:00	Whillode 2:30
Thelma Pye	MHALC	3/10/06	Pye 8am	Pye 2:30
Heather Porter	Warrabingga	3/10/06	Porter 8am	Porter 2:30
Kevin Williams	MURONG GIALINGA	3/10/06	Williams 8:00	Williams 2:30
Lyn Syne	NEW	3/10/06	Syne 8:00	Syne 2:30
Gail Ratcliffe	NEW	3/10/06	Ratcliffe 8:00	Ratcliffe 2:30
Wendy Lewis	Warrabingga	4/10/06	Lewis 8:00	Lewis 3:30
Toni Whillode	Warrabingga	4/10/06	Whillode 8:00	Whillode 3:30
Heather Porter	Warrabingga	4/10/06	Porter 8:00	Porter 3:30
Thelma Pye	MHALC	4/10/06	Pye 8:00	Pye 3:30
Kelli Whillode	Warrabingga	4/10/06	Whillode 8:00	Whillode 3:30
Lyn Syne	NEW	4/10/06	Syne 8:00	Syne 3:30
Kevin Williams	MURONG GIALINGA	4/10/06	Williams 8:00	Williams 3:30
David Maynard	MHALC	5.10.06	Maynard 8:00	Maynard 4:05
Lyn Syne	NEW	5/10/06	Syne 8:00	Syne 4:05
Gail Ratcliffe	NEW	5/10/06	Ratcliffe 8:00	Ratcliffe 4:05
Kevin Williams	MURONG GIALINGA	5/10/06	Williams 8:00	Williams 4:05
Wendy Lewis	WARRABINGA	"	Lewis 8:00	Lewis 4:05
Heather Porter	Warrabingga	5/10/06	Porter 8:00	Porter 4:05
Kevin Williams	MURONG GIALINGA	6/10/06	Williams 8:05	Williams 3:30
Gail Ratcliffe	NEW	6/10/06	Ratcliffe 8:05	Ratcliffe 3:30
Lyn Syne	NEW	6/10/06	Syne 8:05	Syne 3:30
David Maynard	MHALC	6.10.06	Maynard 8:00	Maynard 3:30
Wendy Ann Lewis	WARRABINGA	6.10.06	Lewis 8:00	Lewis 3:30
Heather Porter	Warrabingga	6.10.06	Porter 8:00	Porter 3:30

APPENDIX 7

**MOOLARBEN COAL EA 2 : ABORIGINAL CULTURAL HERITAGE SURVEY
ASSESSMENT: SIGN IN/OUT SHEET.**

Name	Organisation	Date	Sign In/Time	Sign Out/Time
WENDY LEWIS	WARRABINGA	5-9-2006	W Lewis 8:00	W Lewis 3:00
TONI WHILLOCK	"	"	Toni Whillock 8:00	Toni Whillock 3:00
Lyn Syme	NEW	6/9/06	Syme 8:00	Syme 3:00
K. WILLIAMS	MURONG GIALINGA	6/9/06	K Williams 8:00	K Williams 3:00
Thelma Pye	NEW	6/9/06	TPye 8:00	TPye 3:00
Geoff Murray	Mudgee land council	6.9.06	Geoff Murray 8:00	Geoff Murray 3:00
Steven Flick	Murong Gialinga	6.9.06	StF 8:00	StF 3:00
DAVID MAYNARD	MLALC	6.9.06	D Maynard 8:00	D Maynard 3:00
DAVID MAYNARD	MLALC	11.9.06	D Maynard 8:00	
Thelma Pye	MLALC	11.9.06	TPye 8:00	
Lyn Syme	NEW	11/9/06	Syme 8:00	Syme 4:00
Kevin Williams	MURONG GIALINGA	11/9/06	K Williams 8:00	K Williams 4:00
Roby Williams	WARRABINGA	11/9/06	Roby Williams 8:00	
Roby Williams	Warrabingga	12/9/06	Roby Williams 8:00	
Gail Ratcliffe	N.E.W.U	12/9/06	G Ratcliffe 8:00	G Ratcliffe
Geoff Murray	Mudgee land council	12.9.06	Geoff Murray 8:00	
Steven Flick	Murong Gialinga	12.9.06	StF 8:00	
DAVID MAYNARD	MLALC	12.9.06	D Maynard 8:00	
Lyn Syme	NEW	12.9.06	Syme 8:00	
KEVIN WILLIAMS	MURONG GIALINGA	12-9-06	K Williams 8:00	
WENDY ANN LEWIS	WARRABINGA N.T.C.A.E	13-9-06	W Lewis 8:00	W Lewis 4:00
KEVIN WILLIAMS	MURONG GIALINGA	13/9/06	K Williams 8:00	K Williams 4:00
DAVID MAYNARD	MLALC	13.9.06	D Maynard 8:00	D Maynard 4:00
Emma Syme	NEW	13.9.06	Syme 8:00	Syme 4:00
Lyn Syme	NEW	13/9/06	Syme 8:00	Syme 4:00
Thelma Pye	MLALC	13.9.06	TPye 8:00	TPye 4:00
Gail Ratcliffe	N.E.W.	14/09/06	G Ratcliffe 8:00	G Ratcliffe 3:30
Geoff Murray StFlick	Mudgee land council	14 09 06	StFlick 8:00	StFlick 3:30
Geoff Murray Geoff Murray	Murong Gialinga	14 09 06	Geoff Murray 8:00	Geoff Murray 3:00
DAVID MAYNARD	Mudgee Land Council	14.9.06	D Maynard 8:00	D Maynard 5:00
EMMA SYME	WARRABINGA	14.9.06	Syme 8:00	Syme 3:30
Lyn Syme	NEW	14.9.06	Syme 8:00	Syme 3:30
KEVIN WILLIAMS	MURONG GIALINGA	14/9/06	K Williams 8:00	K Williams 3:30
Wendy Lewis	WARRABINGA	14/9/06	W Lewis 8:00	W Lewis 3:30

APPENDIX 7

**MOOLARBEN COAL EA 2 : ABORIGINAL CULTURAL HERITAGE SURVEY
ASSESSMENT: SIGN IN/OUT SHEET.**

Name	Organisation	Date	Sign In/Time	Sign Out/Time
Wendy Ann Lewis	WARRABINGA	15-9-2006	W Lewis 8:00	W Lewis 11:30
Emma Syme	NEW	15-9-2006	Syme 8:00	Syme 11:30
DAVID MAYNARD	M L A L C	15-9-06	D Maynard 8:00	D Maynard 11:30
Geoff Murray	Mudgee land council	15-9-06	Geoff Murray 8:00	Geoff Murray 11:30
Stevens Flick	Murong Galinga	15-9-06	Flick 8:00	Flick 11:30
Lyn Syme	NEW	15/9/06	Syme 8:00	Syme 12:00
KEVIN WILLIAMS	MURONG GIALINGA	15/9/06	K Williams 8:00	K Williams 12:00
Wendy Ann Lewis	WARRABINGA	18/9/2006	W Lewis 8:00	W Lewis 3:30
KEVIN WILLIAMS	MURONG GIALINGA	18/9/06	K Williams 8:00	K Williams 3:30
Lyn Syme	NEW	18/9/06	Syme 8:00	Syme 3:30
Gail Ratcliffe	NEW	18/9/06	Ratcliffe 8:00	Ratcliffe 3:30
CHRISTINE MAYNARD	MGATSIK	18/9/06	Christine 8:00	Christine 5:30
Geoff Murray	Mudgee land council	18-9-06	Geoff Murray 8:00	Geoff Murray 3:30
DAVID MAYNARD	Mudgee Council	18-9-06	D Maynard 8:00	David Maynard 3:30
Lyn Syme	NEW	19/9/06	Syme 8:00	Syme 2:00
Stevens Flick	Murong Galinga	19-9-06	Flick 8:00	Flick 2:00
KEVIN WILLIAMS	MURONG GIALINGA	19/9/06	K Williams 8:00	K Williams 2:00
Gail Ratcliffe	N.E.W.	19/9/06	Ratcliffe 8:00	Ratcliffe 2:00
DAVID MAYNARD	M L A L C	19-9-06	D Maynard 8:00	D Maynard 2:00
Wendy Ann Lewis	WARRABINGA	19-9-06	W Lewis 8:00	W Lewis 2:00
Thelma Pye	M L A L C	19-9-06	Pye 8:00	Pye 2:00
Kevin Williams	MURONG GIALINGA	19-9-06		
Wendy Ann Lewis	WARRABINGA	20-9-06	W Lewis 8:00	W Lewis 3:30
Thelma Pye	NEW	20-9-06	Pye 8:00	Pye 3:30
Lyn Syme	NEW	20/9/06	Syme 8:00	Syme 3:30
KEVIN WILLIAMS	MURONG GIALINGA	20/9/06	K Williams 8:00	K Williams 3:30
Geoff Murray	Mudgee land council	20-9-06	Geoff Murray 8:00	Geoff Murray 3:30
Stevens Flick	M L A L C	20-9-06	Flick 8:00	Flick 3:30
DAVID MAYNARD	M L A L C	20-9-06	D Maynard 8:00	D Maynard 3:30
KEVIN WILLIAMS	MURONG GIALINGA	21/9/06	K Williams 8:00	K Williams 4:00
Wendy Ann Lewis	WARRABINGA	"	W Lewis 8:00	W Lewis 4:00
Gail Ratcliffe	NEW	21/09/06	Ratcliffe 8:00	Ratcliffe 4:00
Thelma Pye	M L A L C	21-9-06	Pye 8:00	Pye 4:00
D. MAYNARD	M L A L C	21-9-06	D Maynard 8:00	D Maynard 4:00
CHRISTINE MAYNARD	MURONG GIALINGA	21-9-06	Christine 8:00	Christine 4:00

NLM

12.00

ARCHAEOLOGICAL RISK ASSESSMENT SERVICES
MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL

APPENDIX 8:
GEOMORPHIC ASSESSMENT REPORT
DR PETER MITCHELL

Groundtruth Consulting

ABN: 66 179 449 249

Dr P.B. Mitchell.

P.O. Box 515,

GLADESVILLE 1675

Phone: + 02 9817 4859

groundtruth@optusnet.com.au

3 September 2007

Preliminary geomorphic evaluation of the southern part of the Moolarben Coal Project Area EL 6288 in relation to Aboriginal archaeology.

This report describes results of a brief geomorphic examination of the southern part of the Moolarben Coal Project Area EL 6288 east of Ulan in the Western Coalfield of the Sydney Basin. It was prepared at the request of Giles Hamm, Director of Archaeological Risk Assessment Services. The fieldwork only covered the valley of Murragamba Creek and was undertaken on 10 July in company with Mr Hamm and Dr W. Shawcross. A previous study (Mitchell 2005) of an adjacent lease assisted field interpretation.

Location and climate

The Project area is located on a major black coal resource in the Ulan seam (Geol Survey 1988). The lease covers most of Moolarben Creek a tributary of the Goulburn River and Murragamba Creek a right bank headwater tributary of Wilpinjong Creek.

Local rainfall is about 600mm per annum and pan evaporation is about 1500mm per annum. Given that it is common to find saline groundwater in some sedimentary rocks of the Illawarra coal measures dryland salinity and brackish stream flows can be expected in the lowest parts of the landscape. Small salt scalds were noted in places along the valley floor and it is expected that the quality of surface water will deteriorate downstream.

Geomorphically and archaeologically it is useful to compare this landscape to the upper parts of the Hunter River valley where numerous archaeological studies have been conducted.

- In the Moolarben area there is a greater diversity of landscape types in a smaller area than in the Hunter Valley and this should reflect a greater diversity of resources available to Aboriginal people.
- The region has a larger area of Triassic sandstone landscapes with cliffs and extensive plateau. These will be important in that they may contain rock shelters, art sites, stone arrangements etc, that are not common in the Hunter. The sandstone is important as a source of sandy sediment to the valley floor.
- The tributaries and main channels of Moolarben, Murragamba, and Wilpinjong Creeks are smaller than similar sized catchments in the Hunter and they have been less affected by post-European erosion. In fact soil erosion in this landscape is limited which means that Aboriginal sites will be less disturbed but more difficult to locate.

- The stream order approach to landscape analysis and Aboriginal site prediction that has proved useful in the Hunter and on the Cumberland Plain in western Sydney is not so easy to apply in these catchments as many of the tributary streams do not have well defined channels after leaving the sandstone hillslopes. Much of the water that flows in upper tributaries after rain enters deep alluvium to become groundwater and long sections of the valley floor have no defined channel and rarely see surface flow. After prolonged rain groundwater emerges as springs and seepages at numerous locations and these places may be important as sites of Aboriginal occupation.
- An initial model of Aboriginal occupation and land use may be built on variations in the availability and quality of water under different streamflow conditions and at different times of the year.

Geomorphology

Four main geomorphic units were identified on the Project Area and are briefly described below.

1. Dissected sandstone plateau with elevations between approximately 500 and 600m ASL.

These areas are lower Triassic Narrabeen Sandstone plateau or ridges standing above the cliff lines of Unit 2. The plateau top was not examined in the field but Lawrie and Murphy (1998/9) mapped it as the Munghorn plateau soil landscape. They described it an area of extensive rock outcrop with siliceous sands, yellow earths and yellow podzolic soil profiles. The vegetation is reported to be scribbly gum, narrow-leaved ironbark, narrow-leaved stringybark and black cypress pine.

2. Steep cliffs and coarse debris slopes with large fallen boulders partly buried in the colluvial mantle below the margin of the plateau.

Near vertical cliff faces of sandstone and conglomerate up to 20m high mark the edge of Unit 1 and form a prominent escarpment along the south-western edges of Murragamba and Moolarben Creeks. Cliff distribution is asymmetric on either side of the valley as there is a regional dip in the sedimentary rocks of about 10° to the northeast.

Orientation of the cliff faces and drainage lines on the plateau are structurally controlled. Joint planes and bedding planes define coherent blocks of sandstone in the cliff face and open cracks or crevasses develop along the upper edge of the cliff line. Three near vertical joint sets are evident. All have similar spacing and persistence and are oriented at 10-20°, 80-100° and 140-150°. At the cliff face blocks of sandstone or conglomerate up to 6-8m high, and with generally prismatic section about 8-12m wide on either face slowly become isolated as pillars that are eventually subject to mass failure. The cause of failure may be slow collapse of weaker sedimentary rocks (shale for example) at the base of the cliff enabling the slow outward movement of joint blocks and eventual toppling of the blocks as individual rock fall events. This process was described by Young (1983) as 'block gliding'. Some blocks fall backward and receive support from the cliff face. They can remain in this quasi-stable condition for centuries before falling again. Other blocks topple and roll down the 16-20° debris slope and come to rest on one another or as isolated large boulders on the slope. Over time they are partly buried by fine colluvium.

Two forms of rock shelter can be expected along the foot of the cliff. The first is the normal situation where a cavern has weathered into friable sandstone at the base of the cliff. The second is where a block has moved so as to lean back against the cliff face or a cantilevered block has collapsed onto other rocks leaving a substantial open space beneath or behind it. Larger examples of these caverns may contain Aboriginal occupation debris. The rock surface in these shelters is commonly cemented and is not prone to fretting. The internal rock surface of most shelters does not appear to be suitable for the application or preservation of rock painting or stencils.

Slopes immediately below the cliff faces are steep debris slopes (16-20⁰), grading to more gentle slopes (5-10⁰) and then to an abrupt change of slope against the valley floor. This landscape unit was mapped by Lawrie and Murphy (1998/9) as the Lees Pinch soil landscape.

The soil materials on these steep slopes are not well exposed but the descriptions of Lawrie and Murphy (1998/9) provide some guidance. They range from shallow siliceous sands, yellow earths and yellow podzolic (texture contrast) soils depending on the subsoil materials present. It is not clear from their descriptions whether the clay subsoils of the podzolic profile are the results of *in situ* weathering of bedrock or if this is an older deposit of slope mantle material. The latter is quite likely to be the case and it is possible that buried land surfaces may exist beneath these steep slopes. Older land surfaces may contain Aboriginal artefacts though their location is not predictable without excavation.

Any archaeological excavation in this landscape should test all soil materials including subsoil clays that would normally be regarded as sterile.

3. Wide valley floors often without defined stream channels but containing relict 'chains of ponds' and springs.

Unusual features of Murrumbidgee Creek and other streams in the region are that they do not have a continuous defined stream channel, only parts of the channel are eroded and incised, and that some Nineteenth Century 'chains of ponds' and valley floor springs remain intact.

The main valley floors are fed by second order tributary streams that flow off the plateau and form low angle sandy fans below the debris slopes. These streams are ephemeral and even after heavy rainfall surface flow rarely reaches any central valley channel. The water quickly enters the alluvial fan or apron sediment and only when this body of material is saturated does some of that water emerge lower down the valley in seepage zones and springs (Figures 1 and 2).

In a few locations that may be related to valley side constrictions some of the original (pre-19th Century) 'chain of ponds' waterhole feature remain relatively intact (Figures 3 and 4). These waterholes were widely described as normal valley floor features in eastern NSW before European settlement but very few examples remain intact today (Eyles 1977 a and b). Waterholes of this nature were an important factor in the selection of land by European settlers and were probably equally important to the original Aboriginal inhabitants. Any Aboriginal sites located near existing waterholes

or where ponds may have existed before the valley floor was eroded should be examined in detail with the assistance of a geomorphologist.



Figures 1 and 2. Left: valley floor near the head of Murragamba Creek. No defined channel is present and a pool located near the figure has been excavated on a spring. Right: the pool and spring.



Figures 3 and 4. 'Chain of ponds' feature located in the mid-section of Murragamba Creek.

4. Isolated low hills of porous quartz sand within the valley.

In at least one location on the right bank of Murragamba Creek there is an extensive deposit of medium to coarse quartz sand forming a low hill. The origin of this feature is uncertain but it appears to be a source bordering sand sheet deflated from the stream channel. Other sand bodies are known along tributaries of Wilpinjong Creek where they may be terrace deposits or bodies of sand resulting from complete weathering of Triassic Wollar Sandstone and conglomerate.

The Murragamba Creek example contains Aboriginal artefacts and should be further examined both archaeologically and geomorphologically.

Conclusions

Despite a century or more of European land use the Wilpinjong valley is in remarkably good condition and preserves geomorphic features such as; an alleviated valley floor, 'chain of pond' features, and valley floor springs and seepage zones that have been destroyed by erosion on most other parts of the Sydney Basin.

It is expected that the availability and the quality of surface water will vary down the valley according to rainfall events and seasonal conditions. The highest springs and seepages are expected to be ephemeral and the most permanent waters are expected to be lower down the valley. On the other hand the freshest water will be found high in the valley and salinity is expected to increase downstream. This model of water distribution may be a useful tool for predicting the location of Aboriginal sites.

Other sites can be anticipated at the base of the sandstone cliffs and further work is needed on the aeolian sand body.

No data is yet available on the internal stratigraphy of the valley fills and it is possible that these may contain buried soil sequences that may preserve sites of Pleistocene age.

Further geomorphic work is recommended to assist the archaeologist in understanding the archaeology of the valley.

Archaeological Risk Assessment Services should provide copies of this report to their client, to DECC, and to all participating Aboriginal groups.



References.

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Young, R.W. 1983. Block gliding in sandstones of the southern Sydney Basin. In: R.W. Young and G.C. Nanson (Eds.) 1983. *Aspects of Australian sandstone landscapes*. Aust and NZ Geom. Group Spec. Pub. No 1. p31-38.

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APPENDIX 9

***ADDENDUM TO
ABORIGINAL CULTURAL HERITAGE ASSESSMENT REPORT***

***MOOLARBEN COAL PROJECT STAGE 2:
SITE SPECIFIC MANAGEMENT RECOMMENDATIONS***

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MOOLARBEN COAL PROJECT: STAGE 2 APPROVAL

Site specific management recommendations Moolarben Stage 2 assessment sites S2MC 1–260

S2MC= Stage 2 Moolarben Coal MCM = Moolarben Coal Mines Pty Ltd

Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Infrastructure	S2MC 1	Isolated Find	T1	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Infrastructure	S2MC 2	Isolated Find	T2	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Infrastructure	S2MC 3	Artefact Scatter	T2	5	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 4	Isolated Find	T2	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Infrastructure	S2MC 5	Artefact Scatter and PAD	T3	2	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Infrastructure	S2MC 6	Artefact Scatter and PAD	T3	25	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Underground No. 1	S2MC 7	Isolated Find	T3	1	Low	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979
Underground No. 1	S2MC 8	Isolated Artefact	T5	1	Low	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979
Underground No. 1	S2MC 9	Isolated Artefact	T5	1	Low	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Underground No. 1	S2MC 10	Artefact Scatter	T5	3	Low	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Underground No. 1	S2MC 11	Isolated Artefact	T5	1	Low	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Infrastructure	S2MC 12	Isolated Artefact	T5	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Murragamba Creek: Conservation	S2MC 13	Isolated Artefact	T6	1	Low	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Murragamba Creek: Conservation	S2MC 14	Artefact Scatter and PAD	T7	16	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Murragamba Creek: Conservation	S2MC 15	Artefact Scatter and PAD	T7	28	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Murragamba Creek: Conservation	S2MC 16	Artefact Scatter	T7	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 17	Artefact Scatter	T8	27	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 18	Artefact Scatter and PAD	T9	15	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 19	Isolated Find	T9	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 20	Artefact Scatter	T9	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 21	Isolated Find	T9	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 22	Artefact Scatter	T10	6	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 23	Isolated Find	T10	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 24	Isolated Find	T10	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 25	Isolated Find	T10	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 29	Artefact Scatter	T11	12	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 30	Artefact Scatter	T11	58	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 31	Isolated Find	T11	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 32	Artefact Scatter	T11	8	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 33	Artefact Scatter	T11	6	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 34	Isolated Find	T11	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 35	Isolated Find	T11	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 36	Isolated Find	T11	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 37	Isolated Find	T11	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 38	Artefact Scatter	T11	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 39	Artefact Scatter	T11	9	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 40	Artefact Scatter	T11	12	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 41	Isolated Find	T11	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 42	Artefact Scatter	T12	47	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 43	Artefact Scatter and PAD	T13	152	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 44	Artefact Scatter	T13	18	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 45	Artefact Scatter and PAD	T13	16	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 46	Artefact Scatter and PAD	T13	20	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 47	Artefact Scatter and PAD	T13	5	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 48	Artefact Scatter	T13	17	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 49	Isolated Find	T14	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 50	Artefact Scatter	T14	68	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 51	Artefact Scatter and PAD	T14	17	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 52	Isolated Find	T14	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 53	Artefact Scatter	T14	43	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 54	Artefact Scatter and PAD	T15	85	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 55	Artefact Scatter	T15	18	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 56	Artefact Scatter	T15	110	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 57	Artefact Scatter	T15	53	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 58	Artefact Scatter	T15	98	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 59	Artefact Scatter	T15	25	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 59a	Artefact Scatter	T15	6	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	SCMC 59b	Isolated Find	T15	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 60	Isolated Find	T16	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 61	Artefact Scatter	T16	51	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 62	Artefact Scatter and PAD	T16	67	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 63	Artefact Scatter and PAD	T17	28	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 64	Artefact Scatter and PAD	T17	627	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 65	Artefact Scatter	T18	21	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 66	Isolated Find	T18	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 67	Artefact Scatter	T18	13	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 68	Isolated Find	T18	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 69	Isolated Find	T18	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 70	Artefact Scatter	T18	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 71	Artefact Scatter	T18	4	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 72	Artefact Scatter	T19	4	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 73	Isolated Find	T19	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 74	Artefact Scatter	T19	9	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 75	Isolated Find	T19	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 76	Artefact Scatter	T19	60	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 77	Artefact Scatter	T19	4	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 78	Artefact Scatter	T19	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 79	Isolated Find	T19	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 80	Artefact Scatter	T19	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 81	Artefact Scatter	T19	52	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 82	Artefact Scatter	T20	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 83	Isolated Find	T20	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 84	Isolated Find	T20	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 85	Isolated Find	T20	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 86	Artefact Scatter and PAD	T20	6	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 87	Artefact Scatter	T20	13	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 88	Artefact Scatter	T20	4	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 89	Artefact Scatter	T21	93	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 90	Isolated Find	T21	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 91	Isolated Find	T21	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 92	Isolated Find	T21	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 93	Artefact Scatter	T21	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 94	Isolated Find	T21	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 95	Isolated Find	T21	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 96	Artefact Scatter	T21	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 97	Artefact Scatter	T21	7	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 98	Isolated Find	T22	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 99	Isolated Find	T22	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC100	Artefact Scatter	T22	4	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 101	Artefact Scatter	T23	9	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 102	Isolated Find	T23	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 103	Isolated Find	T23	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 104	Artefact Scatter	T24	8	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 105	Isolated Find	T24	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 106	Isolated Find	T24	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC107	Isolated Find	T25	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 108	Artefact Scatter	T25	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC109	Artefact Scatter	T25	5	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 110	Isolated Find	T25	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 111	Artefact Scatter	T25	3	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 112	Artefact Scatter	T25	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC113	Isolated Find	T25	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 114	Artefact Scatter	T25	4	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 115	Isolated Find	T26	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 116	Artefact Scatter	T26	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 117	Isolated Find	T26	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 118	Isolated Find	T28	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 119	Artefact Scatter and PAD	T29	14	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 120	Isolated Find	T29	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 121	Isolated Find	T29	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC 122	Artefact Scatter and PAD	T30	33	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC 123	Artefact Scatter and PAD	T30	255	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 124	Artefact Scatter and PAD	T30	171	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 125	Artefact Scatter	T30	30	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 126	Artefact Scatter and PAD	T30	7	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC 127	Isolated Find	T30	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC128	Artefact Scatter	T30	5	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC129	Artefact Scatter	T30	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC130	Artefact Scatter	T30	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC131	Isolated Find	T30	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC132	Artefact Scatter	T30	10	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC133	Artefact Scatter	T30	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC134	Artefact Scatter	T30	50	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC135	Artefact Scatter	T30	4	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC136	Isolated Find	T30	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC137	Isolated Find	T30	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC138	Isolated Find	T30	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC139	Isolated Find	T30	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC140	Artefact Scatter	T30	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC141	Artefact Scatter	T30	6	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC142	Isolated Find	T31	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC143	Isolated Find	T32	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC144	Isolated Find	T32	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC145	Artefact Scatter	T32	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC146	Artefact Scatter	T32	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC147	Isolated Find	T32	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Powers Property Conservation Area	S2MC148	Artefact Scatter	T33	6	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Powers Property Conservation Area	S2MC149	Isolated Find	T33	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Powers Property Conservation Area	S2MC150	Artefact Scatter	T33	64	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Powers Property Conservation Area	S2MC151	Grind Grooves/Art Scatter	T33	17	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Powers Property Conservation Area	S2MC152	Artefact Scatter	T33	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Powers Property Conservation Area	S2MC153	Artefact Scatter	T33	67	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Powers Property Conservation Area	S2MC154	Artefact Scatter and PAD	T33	49	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC155	Isolated Find	T34	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC156	Artefact Scatter	T34	12	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC157	Artefact Scatter	T34	5	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC158	Isolated Find and PAD	T34	1	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC159	Isolated Find and PAD	T34	1	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC160	Isolated Find	T34	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC161	Artefact Scatter	T34	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC162	Artefact Scatter	T35	26	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC163	Artefact Scatter	T35	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC164	Isolated Find	T35	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC165	Artefact Scatter	T35	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC166	Isolated Find	T35	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC167	Isolated Find	T35	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC168	Artefact Scatter	T35	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC169	Isolated Find	T35	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC170	Artefact Scatter	T35	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC171	Artefact Scatter	T36	4	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC172	Artefact Scatter	T36	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC173	Isolated Find	T37	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC174	Isolated Find	T37	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC175	Isolated Find	T37	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC176	Artefact Scatter	T38	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC177	Artefact Scatter	T38	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC178	Artefact Scatter	T38	8	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC179	Artefact Scatter	T38	8	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC180	Artefact Scatter	T38	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC181	Artefact Scatter	T38	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC182	Isolated Find	T38	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC183	Artefact Scatter	T38	5	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC184	Isolated Find	T38	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC185	Isolated Find	T38	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC186	Artefact Scatter	T38	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC187	Isolated Find	T39	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC188	Artefact Scatter	T39	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC189	Isolated Find	T39	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Open Cut 4	S2MC190	Isolated Find	T39	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC191	Artefact Scatter	T39	2	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC192	Isolated Find	T39	1	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.
Open Cut 4	S2MC193	Artefact Scatter	T39	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Open Cut 4	S2MC194	Artefact Scatter	T39	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC195	Artefact Scatter	T40	3	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC196	Artefact Scatter	T40	8	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC197	Artefact Scatter and PAD	T40	13	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC198	Artefact Scatter	T40	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC199	Artefact Scatter	T40	7	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 200	Artefact Scatter and PAD	T40	260	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 201	Artefact Scatter	T40	360	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 202	Artefact Scatter	T40	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC 203	Artefact Scatter	T40	20	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 204	Artefact Scatter	T40	3	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 205	Artefact Scatter	T40	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 206	Artefact Scatter	T40	53	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC 207	Artefact Scatter and PAD	T40	112	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 208	Artefact Scatter and PAD	T40	53	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 209	Artefact Scatter and PAD	T40	89	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 210	Artefact Scatter	T40	8	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC 211	Isolated Find	T40	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 212	Artefact Scatter	T40	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 213	Isolated Find	T40	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 214	Isolated Find	T40	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under Mom's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC 215	Artefact Scatter	T40	5	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 216	Artefact Scatter	T40	91	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 217	Artefact Scatter	T40	9	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 218	Artefact Scatter	T40	50	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC 219	Artefact Scatter	T40	7	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 220	Artefact Scatter	T40	15	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 221	Isolated Find	T40	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 222	Artefact Scatter	T40	72	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC 223	Isolated Find	T40	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 224	Isolated Find	T40	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 225	Artefact Scatter	T40	45	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Conservation Area Red Hills	S2MC 226	Artefact Scatter and PAD	T40	109	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Conservation Area Red Hills	S2MC 227	Artefact Scatter and PAD	T40	62	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Open Cut 4	S2MC 228	Artefact Scatter	T41	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Underground No. 1	S2MC 229	Rock-shelter	T42	14	Low	Intensive recording and long term site monitoring for any effects of subsidence impacts
Underground No. 1	S2MC 230	Isolated Find	T42	1	Low	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Underground No. 1	S2MC 231	Artefact Scatter/Sandstone Overhang	T42	31	Low	Intensive recording and long term site monitoring for any effects of subsidence impacts.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Unshorn Nature Reserve/OC4	S2MC 232	Isolated Find/Shelter	T43	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Munghorn Nature Reserve/OC4	S2MC 233	Artefact Scatter/Shelter	T43	3	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within Mom's mine lease. This plan should be made auditable under Mom's environmental management system.
Unshorn Nature Reserve/OC4	S2MC 234	Artefact Scatter	T43	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Underground No. 2	S2MC 236	Shelter/Artefacts/Rock Paintings	T44	5	Low	36-3-0134: Intensive recording and long term site monitoring for any effects of subsidence impacts. The site should have its own plan of management and with Aboriginal community involvement be researched and managed to prevent any further impacts from public visitation and natural impacts (i.e. dust, wasps nests etc). The issue of graffiti removal and regional site significance should be thoroughly researched and have direct MCM involvement.
Underground No. 2	S2MC 237	Isolated Find	T44	1	Low	Intensive recording and long term site monitoring for any effects of subsidence impacts

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Underground No. 2	S2MC 238	Artefact Scatter and PAD	T44	104	Low	Intensive recording and long term site monitoring for any effects of subsidence impacts
Underground No. 2	S2MC 239	Artefact Scatter	T44	3	Low	Intensive recording and long term site monitoring for any effects of subsidence impacts
Infrastructure	S2MC 240	Artefact Scatter	T45	7	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 241	Artefact Scatter	T45	4	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 242	Isolated Find	T45	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Infrastructure	S2MC 243	Isolated Find	T45	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 244	Isolated Find	T45	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 245	Isolated Find	T45	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 246	Isolated Find	T46	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Infrastructure	S2MC 247	Artefact Scatter	T46	3	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Infrastructure	S2MC 248	Artefact Scatter	T46	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Infrastructure	S2MC 249	Artefact Scatter	T46	7	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Infrastructure	S2MC 250	Artefact Scatter and PAD	T46	2	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 251	Artefact Scatter and PAD	T46	12	High	Test Excavation by mechanical (grader scrapes or back hoe trenching), shovel testing and hand excavation if required. Salvage and recover all cultural material, mapped at the appropriate scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to the Aboriginal community under section 85A Care and Control Permit under the NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Infrastructure	S2MC 252	Isolated Find	T46	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Infrastructure	S2MC 253	Isolated Find	T 47	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 254	Isolated Find	T 47	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 255	Isolated Find	T 47	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.
Infrastructure	S2MC 256	Artefact Scatter	T 47	2	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.

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Moolarben Coal Development Area Stage 2	Site Name	Site Type	MCP Stage 2 Transect	Artefact Density	Impact Status	Site Management Recommendations
Infrastructure	S2MC 257	Isolated Find	T 47	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 258	Artefact Scatter	T 47	9	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 259	Isolated Find	T 47	1	None	Conservation of site by protective fencing. MCM should be made aware of the site's location and all contractors be made aware of their responsibility to protect all recorded Aboriginal sites and objects within the mine lease. The site should be incorporated into a plan of management for all recorded Aboriginal cultural heritage within MCM's mine lease. This plan should be made auditable under MCM's environmental management system.
Infrastructure	S2MC 260	Isolated Find	T 49	1	High	Surface Collection by control gridded method (20m x 20m) area. Bagged and labelled appropriately. Mapped according to scale. All retrieved material bagged and properly labelled for artefact analysis and catalogued for return to Aboriginal community under section 85A Care and Control Permit under NPW Act 1979.