Austar Coal Mine

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ENVIRONMENTAL ASSESSMENT

Proposed Stage 3 Extension to Underground Mining & Associated Infrastructure

VOLUME 2

Appendices 6 - 9

OCTOBER 2008

Umwelt
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Volume 2

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APPENDIX 6

Aboriginal Heritage Assessment

Austar Coal Mine Pty Ltd

Aboriginal Heritage Assessment: Austar Coal Mine Project, Stage 3

July 2008

Umwelt
Environmental Consultants

Aboriginal Cultural Heritage Assessment: Austar Coal Mine Project, Stage 3

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

Austar Coal Mine Pty Ltd

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Report No.	2274/R13/V5/Final	Date:	July 2008

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Summary

Austar Coal Mine operates an underground mine to the south of Kitchener in the lower Hunter Valley, and proposes to extend operations with an additional twelve longwalls and a new surface infrastructure site in the Quorrobolong Valley. This extension – known as Stage 3 – is a Part 3A project, and therefore will need approval from the Department of Planning (DoP) to proceed.

Umwelt has prepared this *Aboriginal Heritage Assessment* of the Stage 3 proposal, with input from Aboriginal stakeholders provided during survey and at meetings in September 2007, December 2007, January 2008 and July 2008. A summary of key points of the report is provided below.

Aboriginal Stakeholder Involvement

The following Aboriginal stakeholders registered an interest in the Stage 3 project at the start of the assessment: Aboriginal Native Title Consultants; Giwiirr Consultants; Arthur Fletcher; Hunter Valley Cultural Consultants; Hunter Valley Cultural Surveying; Lower Hunter Wonnarua Council; Lower Wonnarua Tribal Consultancy; Mindaribba Local Aboriginal Land Council; Upper Hunter Heritage Consultants; Wattaka Wonnarua Cultural Consultants Service; Wonnarua Culture Heritage; and Yarrawalk. The following Aboriginal stakeholders also registered an interest in the Stage 3 project during the assessment: Mingga Consultants, Tracey Skene and Wanaruah Custodians.

Aboriginal stakeholders were involved in all stages of the assessment process, with Aboriginal stakeholder meetings held at Austar Coal Mine between September 2007 and July 2008 to discuss the aims, methods, results and recommendations of the assessment. Issues discussed at the meetings included: the Stage 3 proposal (longwall mining and surface works); the archaeological survey strategy; the significance of sites recorded; the potential impact of Stage 3 to sites; and how sites should be managed. Aboriginal stakeholder views on management formed the basis of recommendations in this report. Aboriginal stakeholders who registered an interest at the start of the assessment were also involved in the archaeological survey.

Archaeological Survey and Assessment

Survey was conducted over six days in September and October 2007. Austar do not own the majority of land in Stage 3, so survey was only conducted in properties where landholders gave access. The properties surveyed were Austar land, the Werakata State Conservation Area (owned by NSW Parks and Wildlife Services) and five private properties. In these properties, all creek lines, flats and ridges were surveyed, and a sample of hillslopes were surveyed.

Survey found 17 archaeological sites that comprised of nine isolated finds, seven artefact scatters and one grinding groove. Aboriginal stakeholders involved in the survey identified that all sites are of cultural significance, and the grinding groove is of high cultural significance. Most sites were assessed to be of low to moderate scientific significance, and the grinding groove was assessed to be of moderate scientific significance.

Cony Creek and Sandy Creek (and surrounding lower hillslopes and flats) were identified to be areas of archaeological potential by Aboriginal stakeholders and archaeologists.

The potential for burial sites and ceremonial sites in the Quorrobolong Valley was also recognised, with a book about the Aboriginal history of the Cessnock area (Needham 1981) stating that these sites were in the valley. The potential for skeletal remains to survive in the

area is low as the soil is acidic, and no potential ceremonial sites have been recorded in the Stage 3 area.

Impact Assessment

Surface works will not impact Aboriginal heritage as no archaeological sites or areas of archaeological potential were found in the proposed surface infrastructure area.

Potential impacts from subsidence were assessed by Mining Subsidence Engineering Consultants (MSEC) (2008) and SCT Operations (SCT) (2008). MSEC (2008) state that artefact scatter and isolated find sites may be affected by cracking of the soil, but that this is likely to be isolated and as minor cracking is rarely seen in areas where mining is more than 500 metres deep. MSEC (2008) further states that if cracks occur, they are likely to be small and dispersed due to the presence of soil. These small cracks will be partially closed by following subsidence or subsequently filled in as a result of soil movement. Such minor cracking of soil may also affect areas of archaeological potential along Cony and Sandy Creek.

MSEC (2008) and SCT (2008) state that fracturing of bedrock at the grinding groove site is possible following removal of Longwalls A7 and A8, but this is not likely (i.e., no more than 10 to 30 per cent likelihood). Due to the natural jointing of the bedrock at the site, fracturing may occur along the joint to the south of the groove.

Management Strategies

As Stage 3 mining could impact the grinding groove site, Austar and Aboriginal stakeholders have agreed upon a grinding groove offset strategy of a monetary contribution of $100,000 to an Aboriginal project or program (to be decided by Aboriginal stakeholders). Austar will make this contribution when all necessary government approvals for the Stage 3 project have been obtained. Aboriginal stakeholders have requested that no engineering works be conducted at the grinding groove site.

Other recommendations made by this report, as discussed between Umwelt and Aboriginal stakeholders, include:

- that an Aboriginal Cultural Heritage Management Plan (ACHMP) be prepared for the Austar Coal Mine to outline all Aboriginal heritage management strategies for the project, responsibilities of all parties and the timeframe for required heritage works;

- that no Aboriginal archaeological site be visited, or have works done there, without Aboriginal stakeholders in attendance;

- that known sites on accessible properties are included in a monitoring program. This will involve recording each site before and after subsidence to identify any impacts. This will be done by an archaeologist and Aboriginal stakeholders;

- that if any future surface works are needed in areas that have not been previously inspected, or that may affect a known site or area, an archaeologist and Aboriginal stakeholders will survey and assess the area and provide advice on any Aboriginal heritage works needed;

- that if any artefacts are recovered as a result of future works, they will be stored in a Keeping Place to be provided by Austar Coal Mine within the Stage 3 surface infrastructure site following recording and analysis;

- that Aboriginal stakeholders (and an archaeologist if requested by Aboriginal stakeholders) provide relevant Austar personnel with a cultural heritage awareness training session;

- that if any additional sites are found within the Stage 3 area, these will be inspected by an archaeologist and Aboriginal stakeholders to assess the site and decide on how it should be managed; and

- that if any human or possible human skeletal remains are found during surface works, that works cease immediately to allow for forensic assessment and management.

It is noted that some Aboriginal stakeholders have requested that the NSW National Parks and Wildlife Service allow fencing of the grinding groove site (which is in the Werakata State Conservation Area) for its protection, and that this activity could be funded by the grinding groove offset strategy. Department of Environment and Climate Change (DECC) representatives have advised Aboriginal stakeholders that they will liaise directly on this matter.

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APPENDICES

1.0 Introduction

Austar Coal Mine Pty Ltd (Austar) operates the Austar Coal Mine south of Abernethy and Kitchener in the lower Hunter Valley of NSW (refer to **Figure 1.1**). The mine is an aggregate of the former Ellalong, Pelton, Cessnock No.1 and Bellbird South Collieries, with mining activities within the Consolidated Mining Lease 2 (CML 2) dating to 1916. Development consent for Stage 1 of the Austar Coal Mine project was obtained in 1996, and Stage 3 of the project represents an expansion of current operations with Austar proposing an additional twelve longwalls and a new surface infrastructure site under the conceptual mine plan. Consent under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) is required for this proposal, herein referred to as Stage 3 of the Austar Coal Mine project.

Umwelt (Australia) Pty Limited (Umwelt) has been commissioned by Austar to prepare an Environmental Assessment (EA) for Stage 3 of the project, with this Aboriginal heritage assessment undertaken as part of the EA. The aim of this assessment is to develop an understanding of the archaeological and cultural Aboriginal heritage values of the Stage 3 assessment area through consultation with Aboriginal stakeholders, background research and archaeological survey. To identify appropriate management strategies for each identified site/area, an assessment of scientific and cultural significance is required and any potential impact that may result from the Stage 3 proposal is evaluated. On this basis, management recommendations for each identified site/area have been formulated, spanning impact mitigation strategies and an offset strategy. This heritage assessment has been conducted in compliance with relevant policies and guidelines, specifically the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NSW Parks and Wildlife Services (NPWS) 1997), *Interim Community Consultation Requirements for Applicants* (DEC 2004a) and the Part 3A assessment guideline *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2004b).

As Stage 3 of the Austar Coal Mine is defined as a Major Project under State Environmental Planning Policy (SEPP) (Major Projects), the Minister for Planning will determine the Project Application and the provisions of the *National Parks and Wildlife Act 1974* (NPW Act) do not apply. Consequently, Part 6 Section 87 Permits and Section 90 Consents will not be required for any investigation or salvage works undertaken as part of this project, if approved. However, this will not change the level of investigation required and the heritage management outcomes, as Austar will be required to manage Aboriginal heritage issues in accordance with the recommendations of this report and with any approval conditions imposed by the Department of Planning (DoP) in consultation with the Department of Environment and Climate Change (DECC).

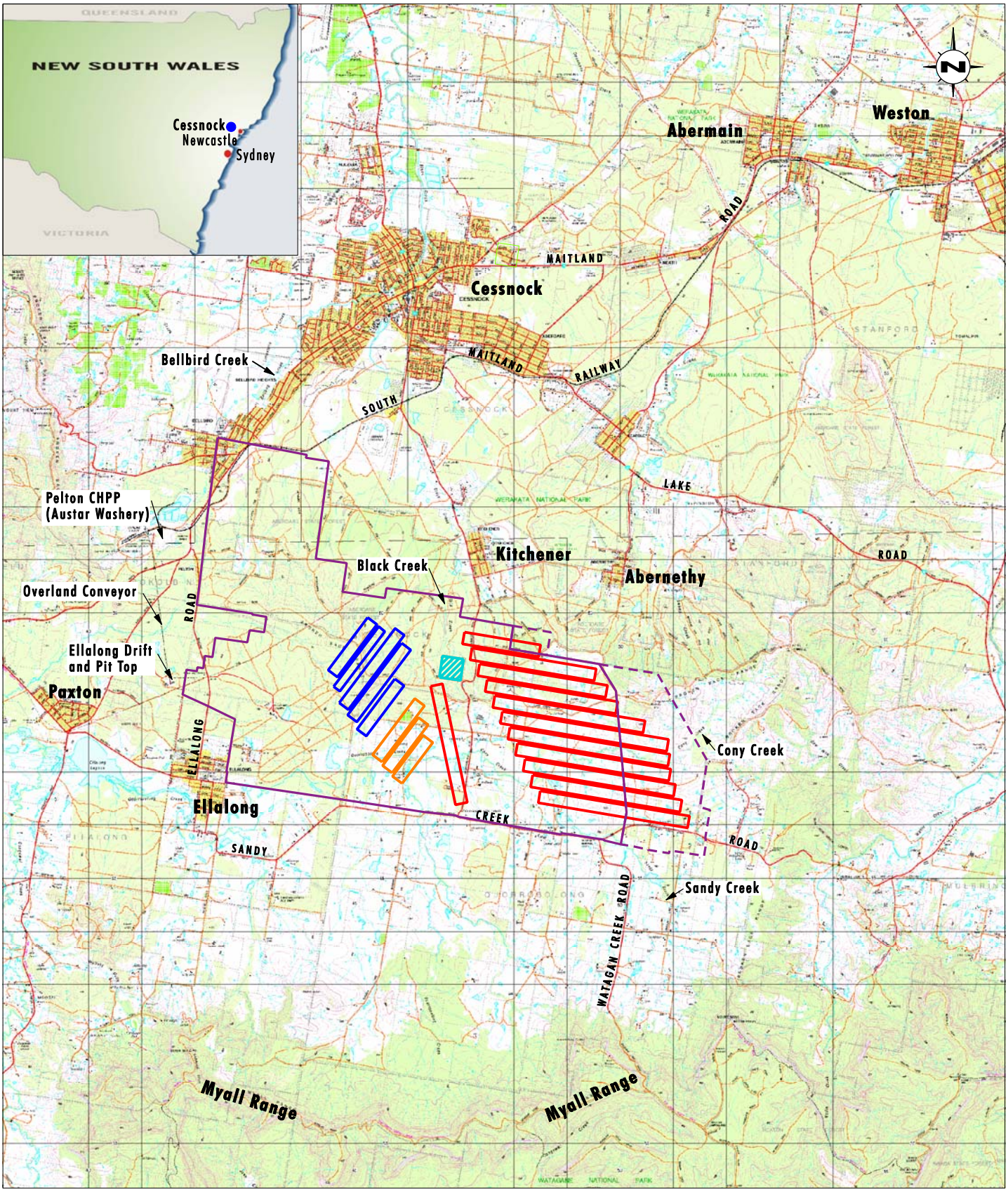
This report consists of the following sections:

Section 2 describes the Austar Coal Mine project, spanning history of the project, existing infrastructure and operations, and the Stage 3 proposal.

Section 3 identifies the Aboriginal stakeholders with a registered interest in the Stage 3 project, and outlines Aboriginal consultation and involvement in all stages of the assessment process.

Section 4 outlines consultation with the DECC throughout the course of the project.

Section 5 provides the assessment context, reviewing available literature about environmental context of the assessment area, ethnohistoric sources, land use history and previous archaeological research; and discusses the implications of this research for the archaeological assessment of the Stage 3 assessment area.



Source: Topo Maps: LPI NSW, Longwall Layout: Austar Coal Mine

0 1.0 2.0 4km
1:100 000

Legend

- Layout for Stage 1 Longwall Panels
- Layout for Stage 2 Longwall Panels
- Conceptual Layout for Stage 3 Longwall Panels
- Surface Infrastructure Site
- Consolidated Mining Lease (CML) 2
- Proposed Stage 3 Extension Boundary

FIGURE 1.1

Locality Plan

Section 6 presents the archaeological predictive model developed for the Stage 3 assessment, specifying site type occurrence, site type content, site type distribution and site type integrity.

Section 7 details the aims, objectives, methods and results of the archaeological survey, including known site inspections, survey coverage and additional sites recorded. This section also identified areas of high archaeological potential recorded, and evaluates survey results against the predictive model developed in **Section 6**. The likely Aboriginal archaeological values of properties that were not accessible are also discussed.

Section 8 identifies the cultural and scientific significance of sites identified within the Stage 3 assessment area.

Section 9 reviews the Stage 3 proposal in relation to all identified Aboriginal heritage sites and areas, and identifies likely impacts.

Section 10 defines factors influencing the management outcomes for the project, including the statutory framework and input from Aboriginal stakeholders.

Section 11 presents the management strategies developed for all Aboriginal heritage sites and areas identified within the Stage 3 assessment area.

Section 12 lists reports and publications referred to in the text.

Meaghan Russell (Senior Archaeologist) co-ordinated the Aboriginal heritage assessment and was the primary author of this report. Kym McNamara and Julian Travaglia (Archaeologists) conducted the archaeological survey, and Julian Travaglia contributed to **Sections 3**, **7** and **8** of this report. Jan Wilson (Manager, Cultural Heritage) provided strategic direction for the project and the quality review of draft and final reports. Peter Jamieson (Director) and Catherine Pepper (Environmental Engineer) managed the preparation of the Umwelt EA report, including the Aboriginal heritage component.

2.0 Austar Coal Mine Project

This section provides an outline of the history of the Austar Coal Mine and existing operations, and describes the surface infrastructure and underground mining proposed as Stage 3 of the project.

2.1 History of Austar Coal Mine and Existing Operations

Underground coal mining commenced at the Pelton Colliery in 1916. In 1960/1961, the Pelton Coal Handling and Preparation Plant (CHPP) was constructed. In 1975, development consent for the Ellalong Colliery was granted and the mine was officially opened in July 1979. The development approved in the 1975 development consent envisaged that coal from the Ellalong Colliery would be transported by conveyor from the Ellalong Drift and Pit Top to the Pelton CHPP.

In early 1994, high gas levels were encountered in the southern part of the Ellalong Colliery. In 1996, the Minister for Urban Affairs and Planning granted development approval to extend the Ellalong Colliery into the Bellbird South area to allow development in an area not affected by high levels of coal seam gas. The 1996 consent (DA29/95) permits mining in Consolidated Mining Lease 2 (CML2) with a production rate of up to three million tonnes of coal per annum (Mtpa) by conventional retreat longwall mining. The approved extraction height ranged from 3.5 to 4.5 metres. The consent also allows for the handling, processing and transport of coal to the Port of Newcastle via road and rail.

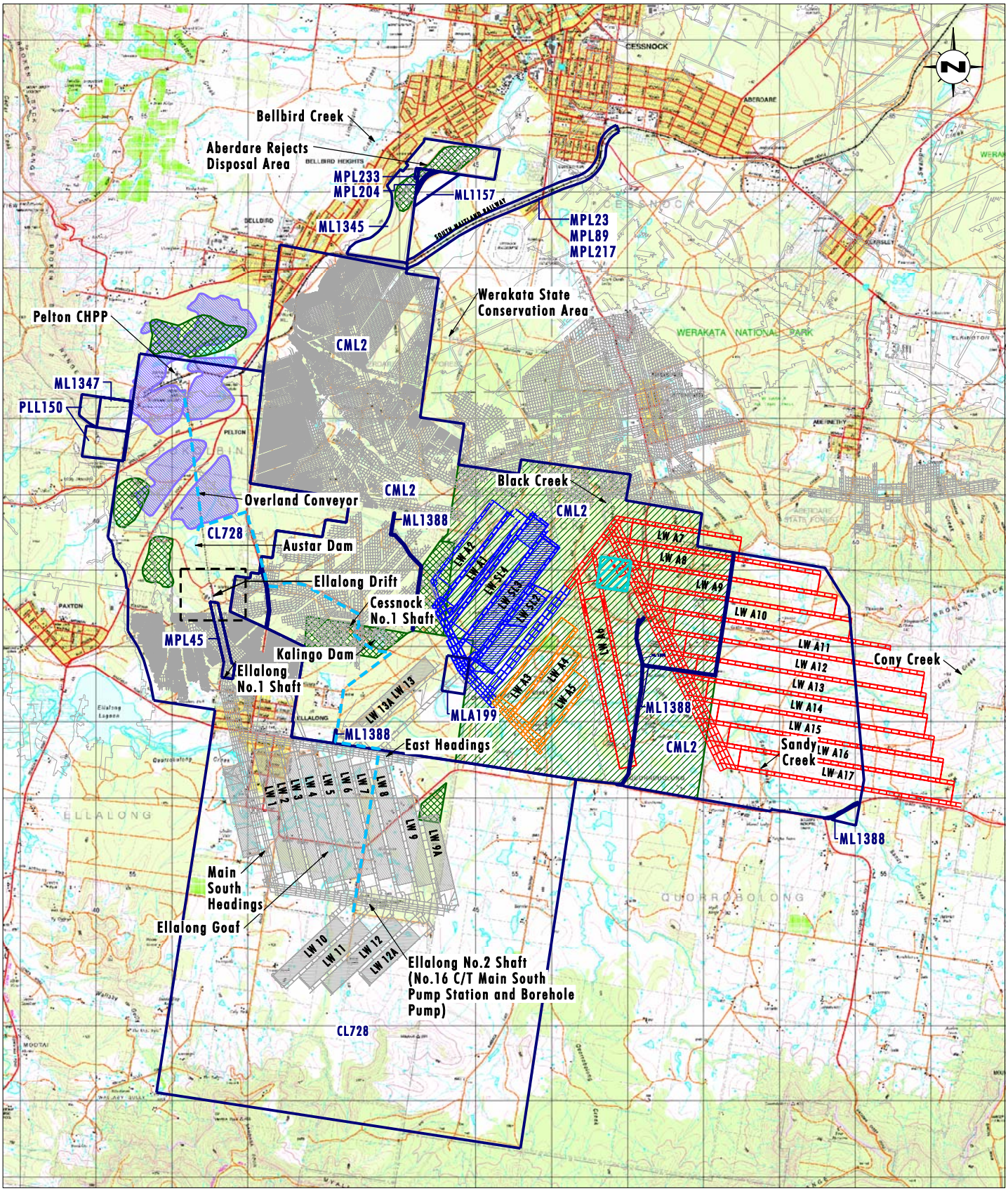
In 1998, Southland Coal Pty Limited acquired the Ellalong and Pelton Collieries and amalgamated them with Bellbird South. Ellalong, Pelton and Bellbird South Collieries became known as the Southland Colliery, which operated until 2003 when fire broke out in the underground workings. Subsequently, the mine went into receivership and operations were placed on care and maintenance.

In December 2004, YanCoal Australia purchased the Southland Coal assets and changed the name of the mine to the Austar Coal Mine. Mining was recommenced under the 1996 Minister's Consent in reconfigured Stages, 1, 2 and 3. The locations of the Pelton, Ellalong, Southland and Austar Collieries are shown on **Figure 2.1**.

Stage 1 approval was obtained in September 2006, and this allowed a modification of the 1996 Minister's Consent to allow for the extraction of coal by longwall top coal caving (LTCC) method. A further Section 96 modification (Stage 2) has been lodged to allow LTCC extraction of longwall panels A3 to A5. This modification is awaiting determination by the Minister for Planning.

Presently, coal is being extracted from the area subject to the 1996 Minister's Consent. Coal is bought to the surface at the Ellalong Drift and Pit Top, conveyed to the Pelton CHPP, processed and handled at the Pelton CHPP and railed to the Port of Newcastle via Pelton Branch Line and South Maitland Railway. Key activities approved under the 1996 consent (DA29/95) include:

- mining of up to three million tonnes (Mt) of coal per annum;
- transfer of the coal by underground conveyor to the surface;
- washing and preparation of coal;
- stockpiling of raw and washed coal;



Source: Topo Maps: LPI NSW, Longwall Layout: Austar Coal Mine

0 1 2 3km
1:70 000

Legend

- Layout for Stage 1 Longwall Panels
- Layout for Stage 2 Longwall Panels
- Conceptual Layout for Stage 3 Longwall Panels
- Surface Infrastructure Site
- Old Workings
- Mining Leases
- Surface Application Area (DA 29/95)
- Subsurface Application Area (DA 29/95)
- Water Pipeline
- Reject Emplacement Area (DA 74/75/79)

FIGURE 2.1

Existing Austar Infrastructure

- reject emplacement; and
- transport of product coal by rail (98 per cent) and road (up to 60,000 tonnes) to the Port of Newcastle.

2.2 Stage 3 Mining Proposal

Austar proposes to extend mining operations in the Greta Seam of the South Maitland Coalfield, to continue extraction of the 98 Mt of coal identified within the Bellbird South extension. The conceptual mine plan for Stage 3 of the project reflects a 21 year life with extraction of up to three Mt of coal annually. The annual production rate will vary depending on the seam, mining conditions and the timing of longwall panel changeovers. It is envisaged that mining in Stage 3 will begin in 2011, commencing with Longwall A6 and progress in accordance with the numerical order to Longwall A17. The conceptual layout of Stage 3 operations includes twelve longwalls (LWA6 to LWA17) and a surface infrastructure site, as illustrated on **Figure 2.2**. This figure also identifies the Stage 3 subsidence affectation area, which combined with the surface infrastructure site, is the assessment area of this report.

The following sections outline the surface infrastructure and underground operations of the Stage 3 proposal.

2.2.1 Surface Infrastructure

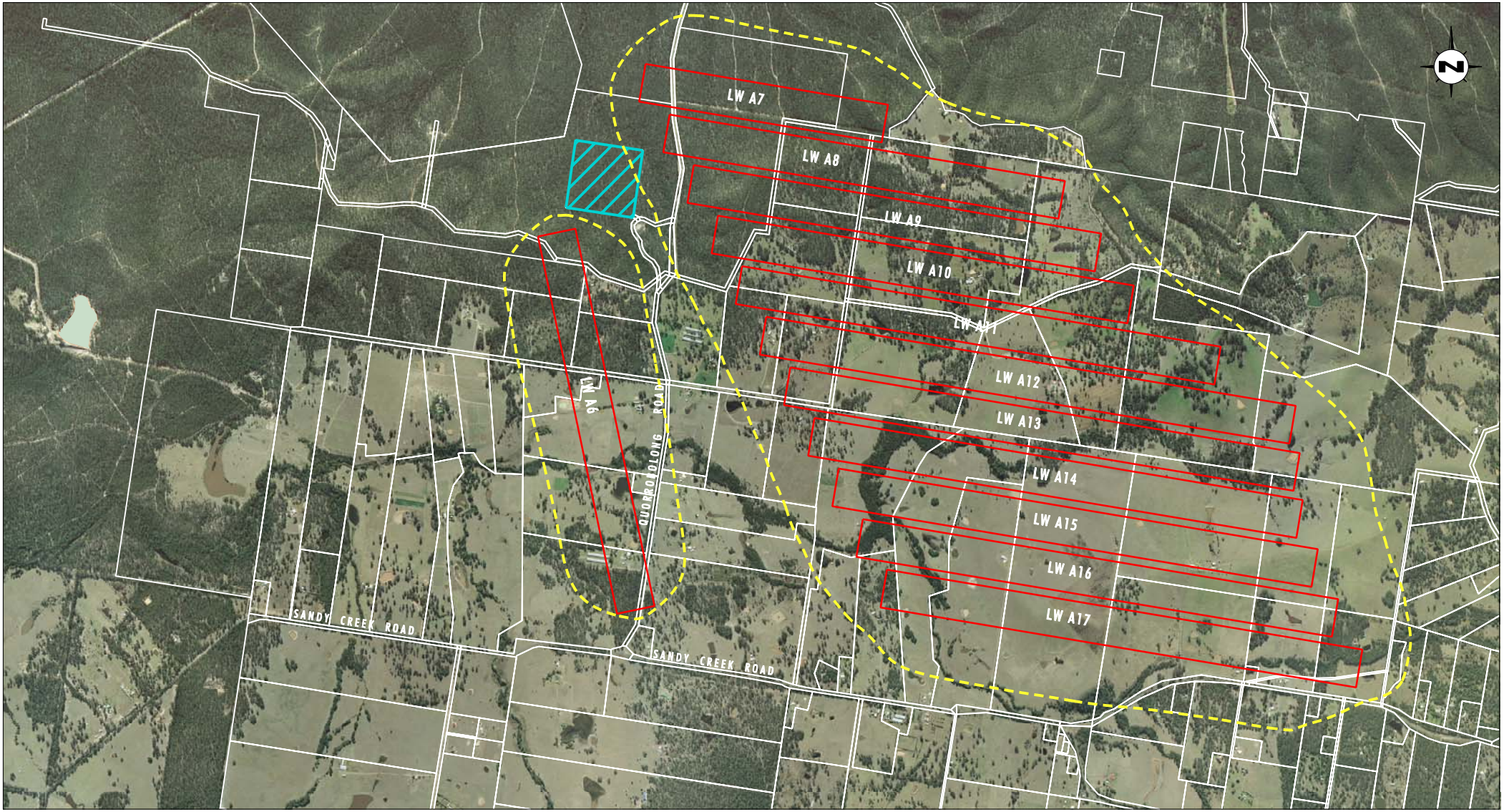
Stage 3 of the project has been designed to maximise the use of approved existing Austar infrastructure, including rail facilities and the CHPP. The existing CHPP is approved to handle up to three Mtpa of coal and will not require any modifications or changes to support the continued operation of the mine in Stage 3.

The Stage 3 proposal will require the construction of new surface infrastructure facilities to the south-west of Kitchener, including upcast and downcast ventilation shafts, bath house, workshop, electricity substation, store, service boreholes and offices. The surface infrastructure facilities are proposed to be built on land that is owned by Austar and is bordered by former State Forest and Werakata State Conservation Area. The location and proposed layout of the site is shown on **Figure 2.3**.

To ensure that adequate ventilation is provided for under mining operations in Stage 2 and Stage 3, construction of the new surface infrastructure facilities will need to commence in early 2009. This timing is governed by the time it takes to construct the proposed new upcast and downcast ventilation shafts.

The proposed upcast and downcast ventilation shafts will be approximately 4.5 metres and 6.5 metres in diameter respectively and will be bored to a depth of approximately 460 metres. The shafts will be constructed using raised bore techniques or a combination of raised bore and drill and blast techniques. A third construction bore will also be required to raise the cuttings from the large shafts during boring. The third shaft will be approximately 2.4 metres in diameter. This shaft will be retained and will be used to lower road base and other bulk materials into the underground workings.

The upcast ventilation shaft will allow air to be extracted from the mine and two exhaust fans will be placed over the shaft in order to draw air out of the workings. A second egress winder is proposed to be fitted to this shaft. The downcast shaft will allow access for people and materials and allow additional air to enter the mine.



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW, Aerial Photography: AAM Hatch 2006

0 0.5 1 1.5km
1:32 000

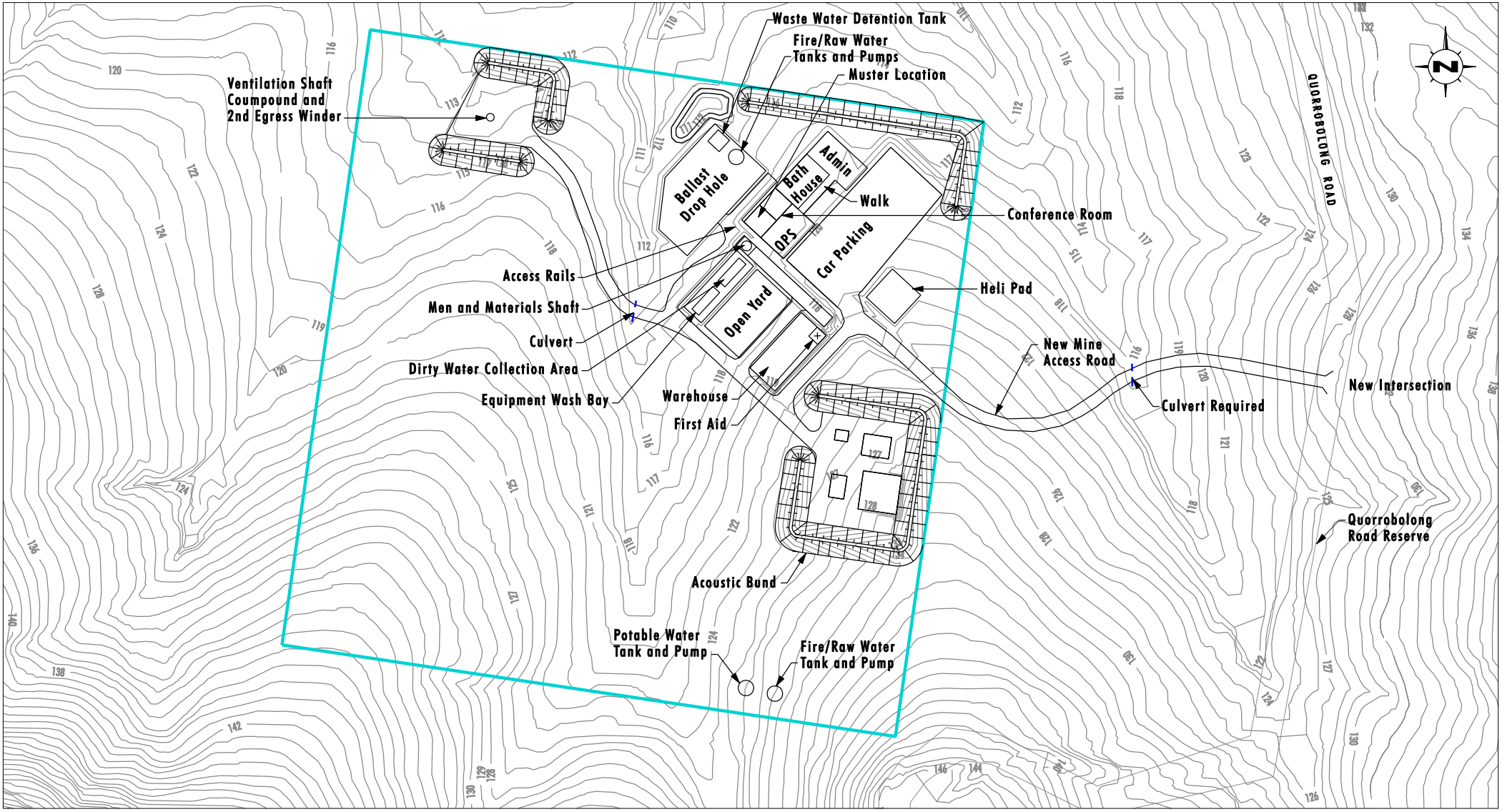
Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Surface Infrastructure Site

FIGURE 2.2

Stage 3 Proposal: Conceptual Mine Plan

File Name (A4): R13_V1/2274_236.dgn



Legend

Surface Infrastructure Site

FIGURE 2.3

Stage 3 Proposal: Surface Infrastructure Site Plan

Note: Contour Interval 1m

File Name (A4): R13_V1/2274_237.dgn

Access to the new surface infrastructure site will be off Quorrobolong Road, as shown on **Figure 2.3**. It is proposed to construct a new intersection on Quorrobolong Road to allow for the safe entry and exit of all mine related vehicles.

The following site services will also be required within the surface infrastructure site:

- installation of a five metre VA small substation and an electricity distribution line;
- installation of potable water and reticulated sewerage services by Hunter Water Corporation; and
- installation of telecommunication services by Telstra.

Other unspecified minor infrastructure may be required for the Stage 3 project, such as the construction of minor access roads or the remediation of surface cracking through infilling with sediment or locally regrading and recompacting the surface. The need for and nature of future surface works is at this stage unknown.

2.2.2 Underground Mining – Longwall Top Coal Caving

Within the Stage 3 project area, the Greta Coal Seam is found at depths ranging from 445 metres at LWA7 to 750 metres in the middle of LWA17. The thickness of the Greta Coal Seam varies between four metres at the eastern end of LWA11 to LWA17 to a maximum of seven metres near the northern end of LWA6.

The twelve longwalls of the conceptual Stage 3 mine plan vary between 1455 metres in length (LWA7) to 3175 metres in length (LWA12). Void widths for all are 227 metres, and the solid chain pillar between each is 45 metres wide. **Table 2.1** details the geometry of proposed longwalls (from MSEC 2008:2).

Table 2.1 - Geometry of Proposed Longwalls

Longwall	Length	Void Width (m)	Solid Chain Pillar Width (m)
LWA6	2280	227	*NA*
LWA7	1455	227	*NA*
LWA8	2370	227	45
LWA9	2445	227	45
LWA10	2495	227	45
LWA11	2870	227	45
LWA12	3175	227	45
LWA13	3055	227	45
LWA14	2930	227	45
LWA15	2875	227	45
LWA16	2850	227	45
LWA17	2850	227	45

Austar proposes to utilise LTCC technology to extract the twelve longwalls of the Stage 3 conceptual mine plan. LTCC is a method of mining that has been in practice in one form or another for over 130 years and is designed to extract thicker coal seams by recovering coal that would otherwise be lost in traditional forms of longwall mining.

LTCC combines a conventional retreat longwall face with a second armoured face conveyor (AFC) towed behind the shield to recover coal that falls into the goaf. The roof supports are of a modified design incorporating a system of hydraulically operated tail-canopies at the rear of the support, which can be moved up and down to allow the broken coal in the goaf area to spill onto a second AFC. This process continues until all of the coal is recovered and waste rock appears. Once waste rock appears, the tail canopies are lowered and the AFC pulled forward to stop the recovery of rock from the goaf.

LTCC consists of the following operational steps:

- shearing coal in front of the AFC;
- pushing the front conveyor;
- setting the support forward;
- opening the tail-canopy of support to allow broken coal to spill onto the rear conveyor; and
- pulling the rear conveyor.

The introduction of LTCC into the Australian coal mining industry was a collaborative achievement between Australian, Chinese and German engineers. The equipment was customised to meet the design requirements for operating within the New South Wales regulatory framework. Both the mining unions and the Department of Primary Industries safety division were integral in the process and were involved from the early stages of the project's inception.

As at 20 May 2007 in Longwall A1, the first panel extracted using LTCC, the system has extracted 0.477 Mt of top coal and 1.055 Mt total tonnes at a recovery rate of 88 per cent. This compares with 49 per cent recovery had the conventional longwall equipment previously in use at the mine been utilised. There has been a noticeable improvement in strata control with the introduction of the LTCC equipment and zero lost time injuries.

3.0 Aboriginal Stakeholder Consultation

Aboriginal stakeholders are the primary determinants of the significance of their heritage (DECC 2004:3), and therefore the consultation process should reflect the importance of Aboriginal stakeholder involvement in the identification, assessment and management of Aboriginal heritage objects/places. Specifically, the process should ensure that Aboriginal stakeholders have the opportunity to improve the assessment outcome by:

- involvement in the design of the cultural heritage assessment;
- participation in the identification of Aboriginal archaeological sites through involvement in fieldwork;
- assessing the cultural significance of archaeological sites identified, and providing input on the cultural values of the area in general;
- identifying the potential impacts of development on objects/places of cultural heritage significance;
- contributing to the development of cultural heritage management recommendations; and
- providing comment on draft assessment reports prior to their submission.

The following sections identify all Aboriginal stakeholders who registered an interest in Stage 3 of the Austar Coal Mine project, and outlines consultation with and involvement of Aboriginal stakeholders throughout all stages of the assessment process.

3.1 Stakeholder Identification

In conformance with current DECC policy – *Interim Community Consultation Requirements for Applicants* (2004), Umwelt contacted the following organisations in November 2006 to identify interested Aboriginal stakeholders:

- Mindaribba Local Aboriginal Land Council;
- Native Title Services;
- Registrar of Aboriginal Owners;
- Department of Environment and Conservation (now DECC); and
- Cessnock City Council.

Local media advertising was also conducted to identify any additional Aboriginal stakeholders, with advertisements appearing in *The Advertiser* and *The Koori Mail* on 22 November 2006. The closing date for Aboriginal stakeholders to register an interest in the project was 6 December 2006.

As a result of the above process, and from previous registrations of interest for the Lower Hunter Valley area with Umwelt, the following organisations and individuals registered an interest with Austar and/or Umwelt for the Austar Coal Mine project prior to 6 December 2006:

- Mindaribba Local Aboriginal Land Council; and

- Arthur Fletcher.

In addition to the above, Umwelt directly contacted a number of stakeholders prior to the commencement of Aboriginal heritage works for consultation and involvement in the Stage 3 project, based on previous registrations of interest in the Lower Hunter Valley/Cessnock area. These stakeholders include:

- Aboriginal Native Title Consultants;
- Giwiirr Consultants;
- Hunter Valley Cultural Consultants;
- Hunter Valley Cultural Surveying;
- Lower Hunter Wonnarua Council;
- Lower Wonnarua Tribal Consultancy Pty Ltd;
- Upper Hunter Heritage Consultants;
- Wattaka Wonnarua Cultural Consultants Service;
- Wonnarua Culture Heritage; and
- Yarrawalk.

In September 2007, following commencement of the Aboriginal heritage assessment, two additional stakeholders registered an interest in the project with Umwelt: Mingga Consultants; and Tracey Skene (Culturally Aware). Wanaruah Custodians also registered an interest in the project in April 2008.

3.2 Consultation and Involvement

DECC guidelines for Aboriginal heritage assessment and management acknowledge that it is primarily Aboriginal people who should determine the significance of their heritage, and therefore DECC require applicants to demonstrate that Aboriginal people have been involved in the identification, assessment and management decisions relating to their heritage.

All registered Aboriginal stakeholders listed above were consulted throughout the course of the project, from the time of their registration. In summary, this involved:

- provision of information on the Stage 3 project, with a project description provided in writing at the outset of the project and the project verbally described by Austar personnel at all Aboriginal stakeholders meetings. A summary of meeting attendance and discussion outcomes is provided in **Section 10**;
- opportunity to provide comment on the draft survey strategy developed by Umwelt for the Stage 3 archaeological survey, with input invited on survey aims and methods. Aboriginal stakeholder comments on the draft survey strategy influenced the final survey strategy, as detailed in **Sections 7** and **10**;
- invitation to attend all Aboriginal Stakeholder Meetings, held at key stages of the assessment and management process. As detailed in **Section 10**, these meetings were held on:

- 10 September 2007 to discuss the Stage 3 proposal, heritage assessment process; and the draft survey strategy developed by Umwelt;

- 11 December 2007 to discuss the results of the archaeological survey and scientific assessment, likely impacts resulting from the Stage 3 project and to obtain Aboriginal stakeholder views on cultural significance and appropriate management outcomes; and

- 30 January 2008 to continue discussions on management outcomes; and

- opportunity to provide comment on the draft Aboriginal Heritage Report prepared by Umwelt, providing further comment on the cultural significance of sites/areas within the Stage 3 project area and appropriate management strategies. An additional Aboriginal stakeholder meeting was held on 8 July 2008 to discuss Aboriginal stakeholder comments on the Stage 3 project and draft report prior to report finalisation.

Appendix 1 contains a log of Umwelt's consultation with Aboriginal stakeholders throughout the course of the project, and a copy of all Aboriginal stakeholder statements provided.

In addition to the above, all Aboriginal stakeholders who registered an interest at the outset of the project were provided with the opportunity to participate in the archaeological survey, with Austar offering six paid fieldwork positions each day of survey. Aboriginal stakeholder involvement in the archaeological survey is detailed in **Section 7**.

4.0 Government Agency Consultation

The government agency consultation process for the project commenced in September 2007, with briefing meetings held with representatives of DoP and DECC.

During the Aboriginal heritage assessment process, Umwelt archaeologists made direct contact with relevant DECC personnel, specifically Roger Mehr (Archaeologist, Planning and Aboriginal Heritage Section, North East), Len Anderson (Aboriginal Liaison Officer, Planning and Aboriginal Heritage Section, North East) and Glenn Morris (Aboriginal Heritage Conservation Officer, Upper Hunter). Correspondence regarding Aboriginal stakeholder meeting attendance was also directed to Gary Davey (Director, North East Branch).

On 6 September 2006, Meaghan Russell (Senior Archaeologist) provided an outline of the Austar Coal Mine Stage 3 proposal to Roger Mehr in writing, and called to discuss the broad survey/consultation approach and invite Mr Mehr to an Aboriginal stakeholder meeting to be held on 10 September 2007. At this time, Mr Mehr indicated that he was unable to attend the initial site meeting, but did wish to maintain contact with Umwelt and Aboriginal stakeholders throughout the project to ensure early identification and management of Aboriginal cultural heritage issues. Mr Mehr further suggested that following the scheduled archaeological survey, an on-site meeting with an Umwelt representative to discuss key project issues and inspect critical sites/areas would be useful. Glenn Morris was also invited to attend the 10 September 2007 meeting, but was unable to attend.

Mr Mehr, Mr Morris and Mr Anderson were invited to attend the Aboriginal stakeholder meeting held on 11 December 2007. Mr Mehr attended the second half of the meeting held on 11 December 2007, and during this meeting, was briefed on the Stage 3 proposal and the Aboriginal heritage issues identified to date. During this meeting, Mr Mehr also met independently with Aboriginal stakeholders present, and supported their requests for further information from Austar (on the cost of mitigation works at the grinding groove site), additional time for consideration of management issues, and another stakeholder meeting at Austar Coal Mine to discuss management outcomes. Following the Aboriginal stakeholder meeting, Umwelt representatives Meaghan Russell and Julian Travaglia met independently with Mr Mehr to discuss in greater detail Aboriginal heritage management strategies of this report, to which Mr Mehr expressed in principle agreement with the direction of the management recommendations.

Mr Mehr, Mr Morris and Mr Anderson were invited to attend the Aboriginal stakeholder meeting held on 30 January 2008. Mr Mehr and Mr Anderson attended, and participated in the discussion of all Aboriginal heritage management strategies presented in this report. At this time, DECC representatives stated support for Aboriginal stakeholder recommendations presented at the meeting.

An invitation for DECC representatives to attend the final Aboriginal stakeholder meeting held on 8 July was also issued to the agency via Gary Davey (Director, North East Branch), although no DECC representatives were able to attend the meeting.

5.0 Assessment Context

Review of environmental, ethnohistoric, historic and archaeological literature is crucial to the Aboriginal heritage assessment process, as it informs our understanding of past Aboriginal occupation and land use, archaeological site patterning, site survival and the potential for detection of extant archaeological sites. This section provides a summary of available literature for the Stage 3 assessment area, within a local and regional context, and discusses the implications for the archaeological evaluation of Stage 3 of the Austar Coal Mine.

5.1 Environmental Context

Knowledge about the landscape characteristics and resources of a region is important to the investigation of past Aboriginal land use and the analysis of the potential distribution of archaeological sites and areas. Information about sources of stone materials, availability of water and plant foods and animals can be used to identify environmental factors that influenced Aboriginal occupation and site selection. Information about the geomorphic evolution of a landscape can further identify the environmental factors influencing the chance of site preservation over time, and the environmental conditions producing site exposure in the contemporary landscape.

Stage 3 of the Austar Coal Mine is located in the Quorrobolong Valley, between Broken Back Ridge and the Myall Range and approximately one kilometre south of the towns of Kitchener and Abernethy. This area is contained within the Central Lowlands of the Hunter Valley, one of the nine subregions of the Hunter Valley defined by the CSIRO (Story 1963), and is also part of the larger Sydney Basin Bioregion defined by NPWS (2007) that covers more than 3,000,000 hectares and contains significant portions of the Hunter, Hawkesbury-Nepean and Shoalhaven River systems.

The following sections detail the environmental characteristics of the Stage 3 assessment area, spanning geology, soils, landforms, creek systems and land use history.

5.1.1 Geology

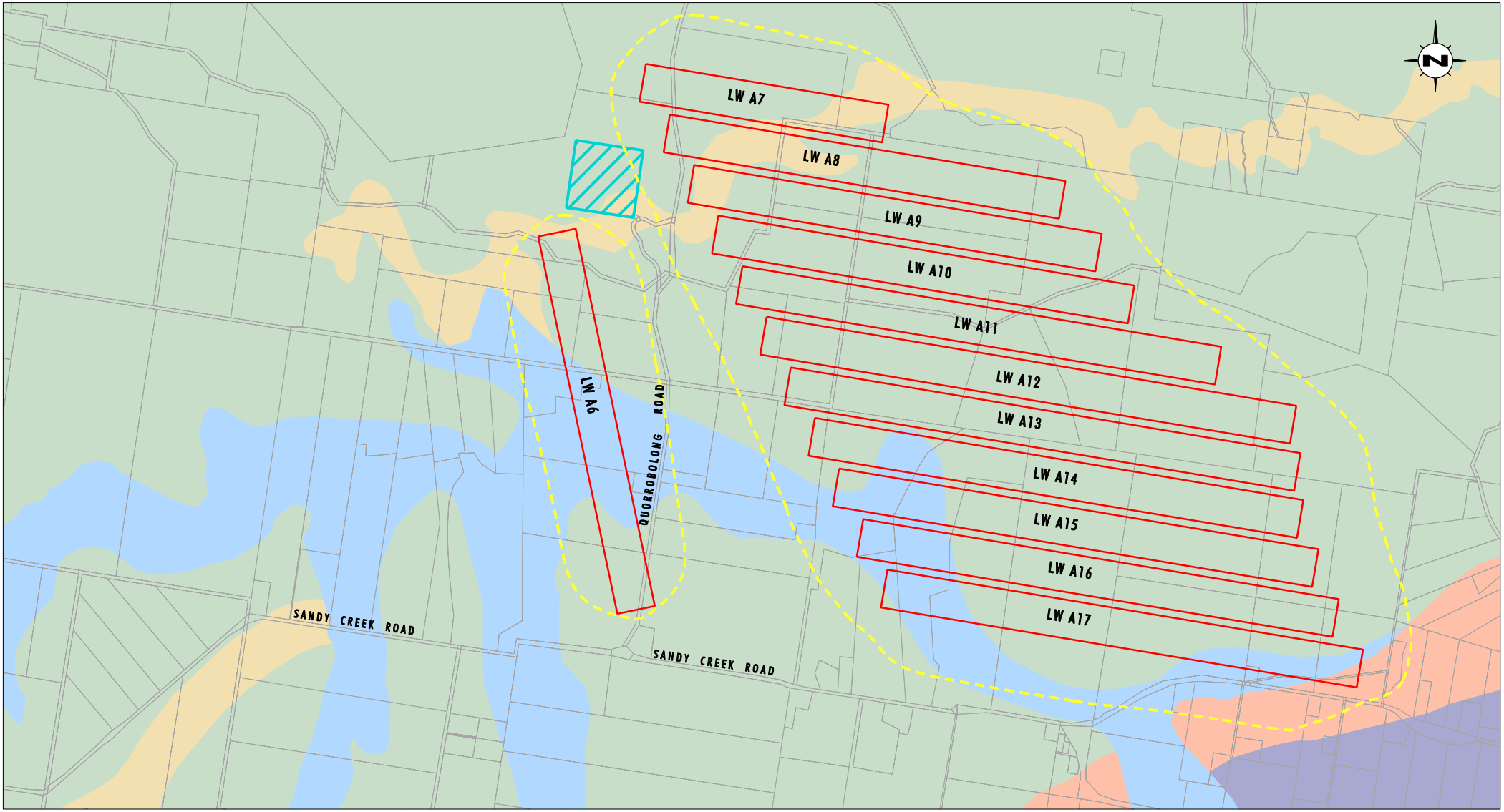
The Austar Coal Mine is located in the South Maitland Coalfield of the Maitland Group, with coal sourced from the Greta seam at depths of approximately 400 to 750 metres. Throughout the Maitland Group, marine sandstones and siltstones occur, extending from the coal measures to the ground surface (HLA 1995).

Four geological units occur within the assessment area, as illustrated on **Figure 5.1** and as described below:

- Branxton Formation: occupies the majority of the Stage 3 assessment area, excluding linear belts of Fenestella Shale in the north, undifferentiated alluvium along Cony Creek and Muree Sandstone in the south. This Early Permian formation is composed of sandstone, siltstone, conglomerate and a small amount of basalt;

- Muree Sandstone: occurs in a narrow band, no greater than 430 metres, in the south of the assessment area, running beneath the eastern portion of Sandy Creek Road. This geological unit is composed of fine to coarse-grained sandstone, conglomerate and minor clay, and is also Early Permian in age;

- Fenestella Shale: occurs in a narrow band, no greater than 380 metres, in the northern part of the assessment area. The landscape above this band of Fenestella Shale is contained within the Werakata State Conservation Area, and consists of steep slopes



Source: Cadastre: LPI NSW, Geology: Mineral Resources 2003, Longwall Layout: Austar Coal Mine

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Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Surface Infrastructure Site
- Branxton Formation (Conglomerate, sandstone, siltstone)
- Fenestella Shale (Conglomerate, sandstone, siltstone)
- Undifferentiated alluvial deposits; sand, silt, clay and gravel; some residual and colluvial deposits. Includes some channel, levee, lacustrine, floodplain and swamp deposits. May include some higher level Tertiary terraces
- Mulbring Siltstone (Siltstone, claystone, minor fine-grained sandstone)
- Muree Sandstone (Fine to coarse-grained sandstone, conglomerate, minor clay)

FIGURE 5.1

Geological Map

File Name (A4): R13_V1/2274_238.dgn

with intermittent gullies. Consists of fine to coarse grained sandstone, conglomerate and clay; and

- undifferentiated alluvium: defines the Sandy Creek alignment within the Stage 3 assessment area, and also parts of the eastern section of the Cony Creek system (to the east of its junction with Sandy Creek). This geological unit contains sand, silt, clay and gravel; some residual and colluvial deposits, includes channel, levee, lacustrine, floodplain and swamp deposits. Alluvium may include some higher level Tertiary terraces.

As detailed above, a significant portion of the assessment area is contained within sandstone geological units, excluding the narrow band of shale beneath the steep slopes of the Broken Back Range and the alluvium of Sandy and Cony Creeks. Surface outcrops of sandstone may occur within the Branxton Formation and the Muree Sandstone geological units, occurring as either horizontal surfaces or as shelters or overhangs where slopes are sufficiently steep.

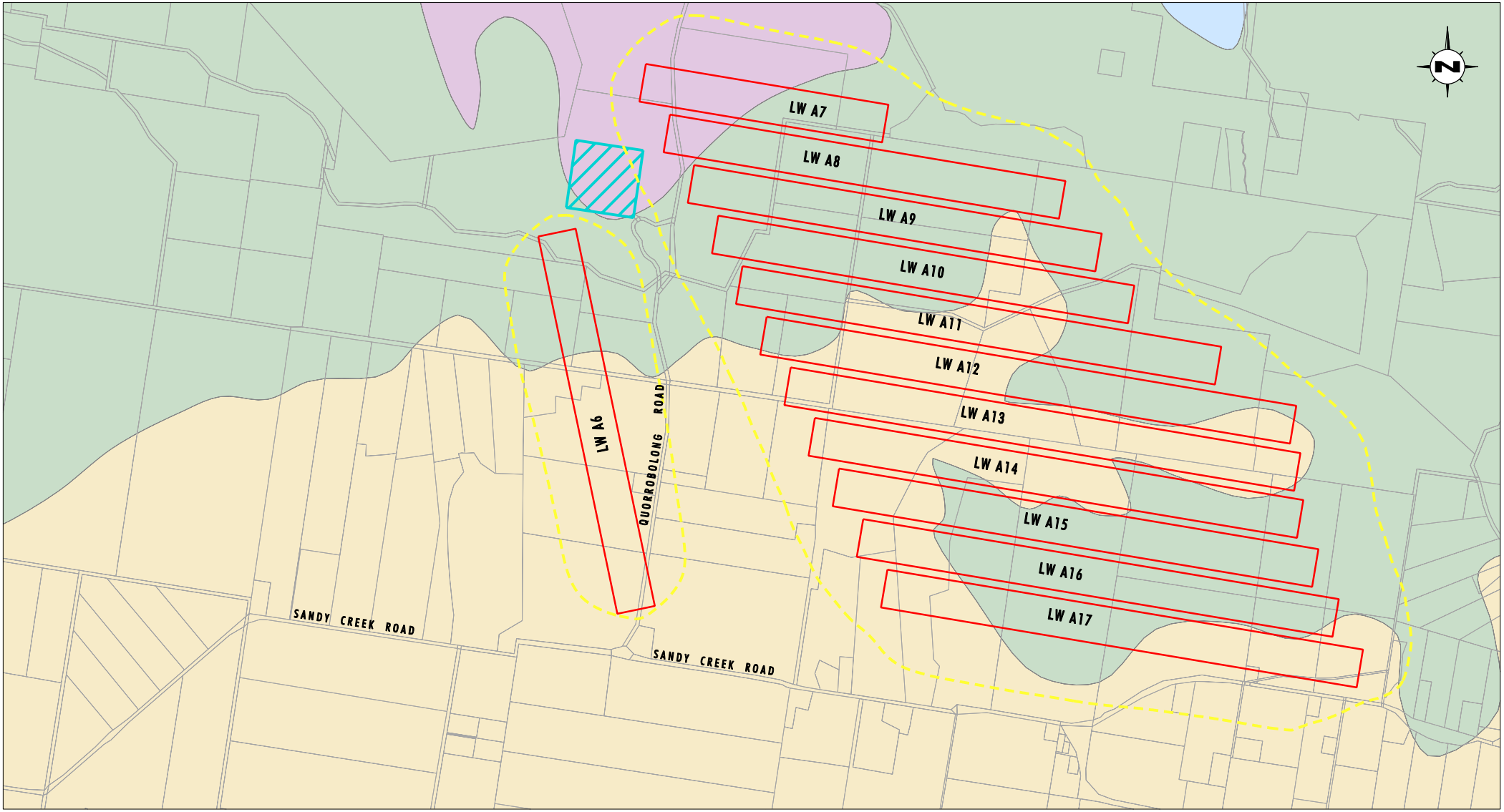
Conglomerates of the above geological units may contain raw materials suitable for stone tool manufacture, such as quartz. However, the dominant raw materials of the Hunter Valley – silcrete and indurated mudstone – are known to have been sourced from the Hunter River and are therefore unlikely to occur in the geological units of the Stage 3 assessment area.

5.1.2 Soils

Three soil landscapes occur within the Stage 3 assessment area: the Quarrabolong Soil Landscape; the Aberdare Soil Landscape; and the Branxton Soil Landscape (as illustrated in **Figure 5.2**). The key characteristics of each soil landscape are summarised in **Table 5.1**.

Table 5.1 - Soil Landscape Descriptions (from Kovac and Lawrie 1991)

Characteristics	Quarrabolong Soil Landscape (p315-317)	Aberdare Soil Landscape (p58-61)	Branxton Soil Landscape (p106-111)
Terrain	Undulating lowlands south of Cessnock. Elevation 40-20m. Slopes average 3-6%. Drainage lines common.	Rolling low hills to the south and south-east of Cessnock. Elevation 80-265m. Slopes average 12-15%.	Undulating rises to low hills and many small creek flats. Elevation 50-80m. Slopes average 3-5%.
Vegetation	Dry sclerophyll forest of gums, ironbark and stringybark including blood redwood and blackbutt. Much has been cleared for grazing on improved and unimproved pastures.	Woodland community of spotted gum, brown stringybark and some box. Some timber cleared, most retained for forestry.	Mainly cleared for grazing, with native pastures. Some uncleared bushland, mainly spotted gum, red ironbark, narrow-leaved red ironbark and swamp oak in drainage lines.
General Soil Profile	Prairie soils on lower slopes and in drainage lines, with Wiesenboden in some locations. Yellow podzolic soils and soloths on higher slopes (possibly on lower slopes), with brown soloths on some crests.	Yellow (orange) podzolic soils on mid-upper hillslopes. Red and brown podzolic soils on steeper slopes. Some alluvial sands in drainage lines.	Yellow podzolic soils on mid-slopes and red podzolics on crests. Yellow soloths on lower slopes and in drainage lines. Alluvial sands in some creeks with Siliceous sands. Some acid topsoil problems encountered within area.



Source: Cadastre: LPI NSW, Soils: Department of Natural Resources 2005, Longwall Layout: Austar Coal Mine

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Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Surface Infrastructure Site
- Quorrobolong Soil Landscape
- Aberdare Soil Landscape
- Neath Soil Landscape
- Branxton Soil Landscape

FIGURE 5.2

Soil Landscape Map

File Name (A4): R13_V1/2274_239.dgn

Table 5.1 - Soil Landscape Descriptions (from Kovac and Lawrie 1991) (cont)

Characteristics	Quarrabolong Soil Landscape (p315-317)	Aberdare Soil Landscape (p58-61)	Branxton Soil Landscape (p106-111)
Soil Erosion	Stream bank erosion along many creeklines. Minor sheet and rill erosion on slopes.	Minor to moderate sheet and rill erosion on slopes. Some gullying in drainage lines. Moderate to high erodibility topsoil.	Tunnel and gully erosion in yellow soloths due to high dispersibility. Little erosion of alluvial soils and siliceous sands.

The Quarrabolong Soil Landscape occupies a significant proportion of the Stage 3 assessment area, as it defines the creek lines and associated landforms (flats, lower hillslopes) of the Quorrobolong Creek, Cony Creek and Sandy Creek systems. The A horizon consists of dark brown loamy sand, overlying a bleached yellow/orange A_2 horizon. Topsoil pH ranges between 5 and 6.5. The B horizon is characterised by brown sandy clay (Kovac and Lawrie 1991:316). These soils have an abrupt A/B texture boundary, very low permeability and having very high strength when dry, leading to a 'porridge' appearance of the B horizon on vertical exposed cuttings (Charman and Murphy 1991). The coarse sandy nature of the upper soil horizons can result in accelerated erosion if disturbed (HLA 1995). Most soils of the unit have moderate erodibility, excluding the Wiesenboden Prairie Soils found along creeks and lower hillslopes which are low to moderate.

The Aberdare Soil Landscape extends along the crests and hillslopes of the Stage 3 assessment area to the south (approximately) of the Werakata State Conservation Area. These yellow, brown and red podzolic soils are characterised by poorly structured dark loamy sand to clayey sand A horizons overlying a light clay B horizon (HLA 1995:4.6). Alluvial soils (sand) are also found along drainage lines. Topsoil pH ranges between 5 and 6.5 (Kovac and Lawrie 1991:109). The topsoil and subsoil of some soils of this unit are moderately erodible, and yellow podzolic soils can be highly erodible. The red podzolics found in upper slope contexts are of moderate to low erodibility.

The Branxton Soil Landscape occurs only in the northern section of the Stage 3 assessment area, within the Werakata State Conservation Area. The soils of this landscape include yellow podzolic, red podzolic, yellow soloth soils, alluvial sands and siliceous sands. Excluding alluvial soils, the topsoil of all units is moderately erodible, and the subsoil of yellow soloths (which occur on slopes) is moderately to highly erodible. Tunnel and gully erosion is likely in yellow soloth soils due to high dispersibility. Topsoil pH ranges between 5.5 and 6.5, and acid topsoil problems are encountered throughout the area (Kovac and Lawrie 1991:109). Salt scalds may also occur in yellow soloth soils.

The development of stone layers between topsoils (A horizon) and subsoils (B horizon) is a common feature of duplex profiles, such as those found within the Stage 3 assessment area, resulting from rainwash and bioturbation processes. These actions can result in the thickening of the topsoil and burial of larger fragments at the level where bioturbation agents usually cease operating (Dean-Jones and Mitchell 1993:43). In general, stones larger than the diameter of burrowing agents will 'sink' through the soil over time, creating an artificial layer of archaeological material that originally was deposited throughout the A horizon. The one major exception to this trend is stone movement towards the surface resulting from tree removal (but this obviously does not apply when the trunk remains in the ground). Dean-Jones and Mitchell (1993:67) also found that surface layers of duplex soils (A horizons) may be quite young, and are more likely to be about 200-300 years old rather than 3000-20000 years old.

As noted above, the soil pH throughout the assessment area varies from slightly acidic to alkaline (pH 5 to 6.5). Those areas with neutral soils (pH 7) will have greater potential for the

preservation of organic materials than those of an acidic or highly alkaline nature. Given this, skeletal and organic materials are unlikely to be preserved within the soils of the Stage 3 assessment area.

5.1.3 Landforms and Creek Systems

The topography of the Stage 3 assessment area comprises three main morphological units, being: the Broken Back Range; alluvial flats and associated creeks; and the intervening, undulating hillslope.

The northern portion of the Stage 3 mining area is contained within the Broken Back Range, a major landform extending from west of Pokolbin to Mulbring, reaching a height of RL 236 metres within the assessment area. This unit is characterised by the steep slopes, narrow ridges and deep gullies. The majority of these landforms within the Stage 3 assessment area are contained within the Werakata State Conservation Area.

The majority of the central and southern portions of the Stage 3 area are classified as undulating hillslope, which extends from the Broken Back Range to the alluvial landforms of the Cony and Sandy Creek systems. These hillslopes average in gradient between one and five per cent, but do extend up to 18 per cent in the eastern slopes of the Broken Back Range, and in the southern crest near Sandy Creek Road. Hillslopes are up to 500 metres wide, and elevation in this unit ranges between 130 and 200 metres above sea level within the assessment area.

Cony Creek and Sandy Creek are the major creeks within the Stage 3 assessment area, which also contains numerous tributaries of these systems. Cony Creek flows from east to west across the study area, joining Quorrobolong Creek approximately 650 metres west of LWA6. The headwaters of the creek system are to the east of the assessment area, where the Broken Back Range turns sharply to the south, and also within the assessment area. The channel of Cony Creek within the project area is approximately two metres wide, with steep banks up to two metres in height. Where the understorey vegetation is sparse and where grazing occurs along the creek line, there is considerable erosion of the banks. There is generally very low flow within Cony Creek, however several small to moderate-sized pools of standing water were present at the time of survey.

Sandy Creek originates to the south of the assessment area in the slopes of the Myall Range, and joins Cony Creek in the southern section of the Stage 3 area. The channel of Sandy Creek is typically two to three metres wide with steep banks up to two metres high. At the time of survey there was a moderate flow of water within Sandy Creek, with water depth up to one metre in some locations.

Numerous streams of the Cony Creek and Sandy Creek systems occur within the assessment area. The length of these streams equal approximately 46 kilometres, and occur as first order (23.6 kilometres), second order (10.4 kilometres), third order (5.2 kilometres), fourth order streams (5.9 kilometres) and fifth order streams (1.3 kilometres). First and second order streams do not have associated alluvial flats, but alluvial flats and floodplains do occur along sections of third, fourth and fifth order streams. Flats of up to 500 metres extend from both Cony and Sandy Creeks. The majority of all creeks within the Stage 3 assessment area have been dammed at least once along their length.

The Cony and Sandy Creek systems run into the Ellalong Lagoon approximately seven kilometres to the west of the Stage 3 assessment area. The recognised natural and cultural heritage values of the Ellalong Lagoon – being a significant freshwater wetland of the lower Hunter and was one of five cultural landscapes in the Cessnock local government

area (LGA) (Pike, Walter and Associates 1994) – have led to its inclusion within a recently declared 500 hectare conservation area.

Black Creek also flows through the Stage 3 project area, passing through the surface infrastructure site. This creek line is ephemeral, and at the time of survey, there was very little water in the channel. However, there is evidence of high flows in the past, and there are often several small pools of standing water (Umwelt 2008a).

Figure 5.3 illustrates the extent of flooding of creek systems within the Stage 3 project area during the 100 year average recurrence interval (ARI) flood event. As illustrated, the alignment of Sandy Creek and the alignment of Cony Creek west of the Sandy Creek confluence can experience significant flooding, with the 100 year ARI extending approximately 200 metres from Sandy Creek and approximately 400 metres from Cony Creek. During the time of survey, the low lying land surrounding Cony Creek and the eastern section of Sandy Creek was waterlogged from previous flooding events.

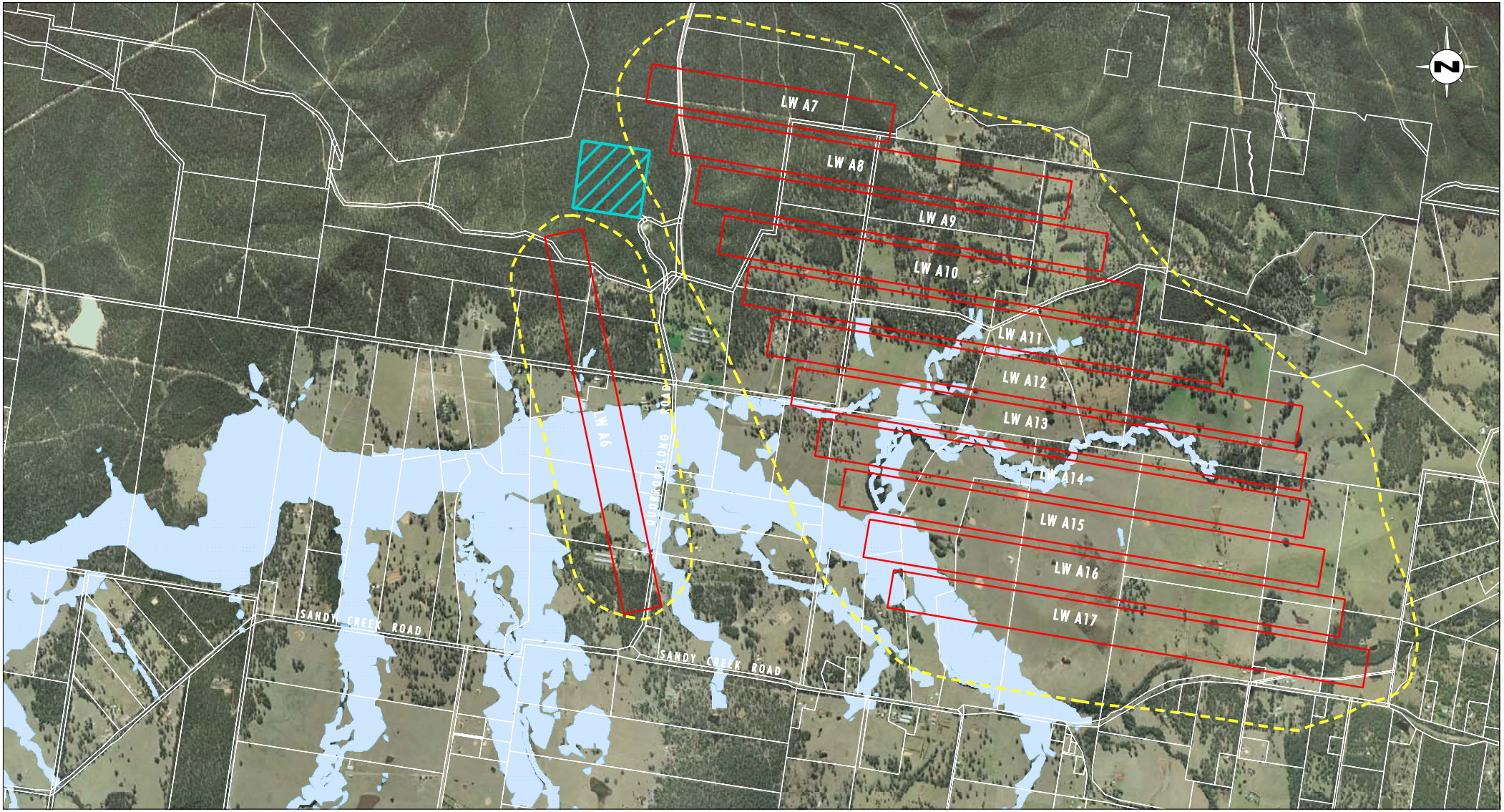
5.1.4 Flora and Fauna

A recent ecological assessment of the Stage 3 project (Umwelt 2008a) identified nine vegetation communities within the assessment area, including: Spotted Gum Ironbark Forest, Hunter Lowland Red Gum Forest, Swamp Oak Riparian Forest, Quorrobolong Scribbly Gum Woodland, Woollybutt Open Forest Remnant, Derived Grassland or Derived Grassland with scattered mature canopy trees. The distribution of these communities is illustrated on **Figure 5.4**. Within these communities, a total of 309 flora species were recorded during recent fieldwork, of which 267 are native.

Table 5.2 lists those flora species within the assessment area that have a known Aboriginal use in Australia's south-east, from review of ethnohistoric literature and from discussions with Aboriginal stakeholders.

Table 5.2 - Flora Species and Known Aboriginal Use

Scientific Name	Name	Known Aboriginal Use	Reference
Acacia sp.	Wattle	Food and economic plant	Australian National Botanic Gardens Education Services 2000
Acacia deanei subsp. *deanei*	Green wattle, Deane's wattle	Food, economic and medicine plant	Gott 1995
Acianthus pusillus	Gnat orchid	Food plant	Flood 1980:94
Allocasuarina sp.	Sheoak	Food and economic plant	Australian National Botanic Gardens 2007
Amyema sp.	Mistletoe	Food and medicinal plant	Flood 1980:94, Zola and Gott 1992:54
Astroloma humifusum	Native cranberry	Food plant	Flood 1980:96
Banksia sp.	Various banksias	Food and economic plant	Australian National Botanic Gardens 2007
Billardiera scandens var. *scandens*	Apple berry	Food plant	Flood 1980:95
Brachychiton populneus subsp. *populneus*	Kurrajong	Food and economic plant	Low 1989: 27; MacDonald and Davidson 1998; Zola & Gott 1992:36
Bulbine bulbosa	Bulbine lily	Food plant	Flood 1980:94. Zola and Gott 1992:43



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW, Aerial Photography: AAM Hatch 2006

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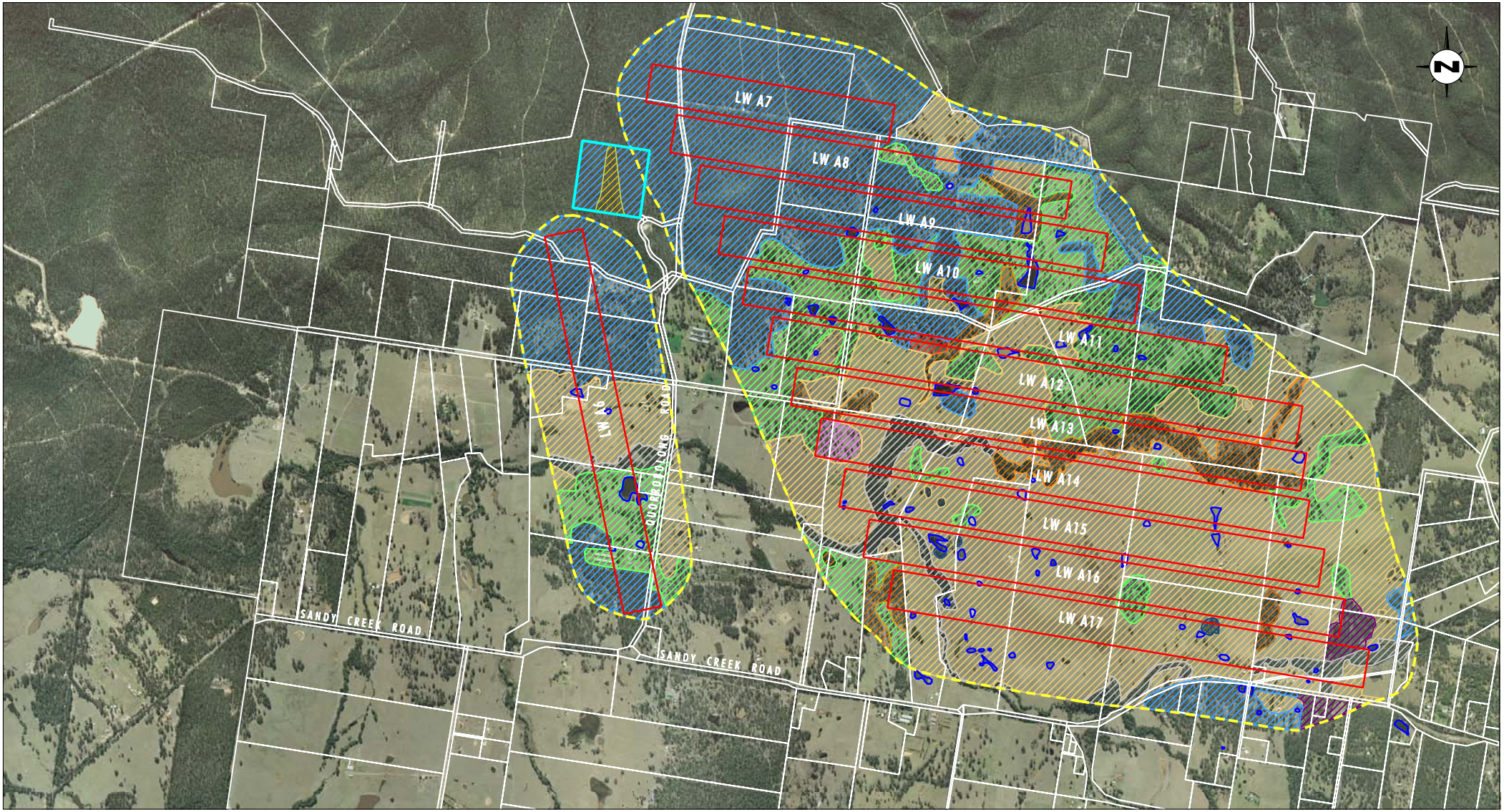
Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Surface Infrastructure Site
- 1 in 100 Year Flood Extent

FIGURE 5.3

1 in 100 Year Flood Event

Umwelt
Environmental Consultants



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW,
Aerial Photography: AAM Hatch 2006

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Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Surface Infrastructure Site
- Spotted Gum - Ironbark Forest
- Red Gum - Grey Box Forest on Drainage Flats
- Quorrobolong Scribbly Gum Woodland
- Swamp Oak Riparian Forest
- Derived Grassland with Scattered Canopy Trees
- Derived Grassland
- Woolybutt Open Forest
- Riparian Red Gum Forest
- Dam

FIGURE 5.4

Vegetation Communities

File Name (A4): R13_V1/2274_286.dgn

Table 5.2 - Flora Species and Known Aboriginal Use (cont)

Scientific Name	Name	Known Aboriginal Use	Reference
Bursaria spinosa var. *spinosa*	Blackthorn	Food and economic plant	Flood 1980:95, Gott 1995
Caladenia sp.	Orchid	Food plant	Zola and Gott 1992:44
Callistemon linearis	Narrow-leaved bottlebrush	Food plant	Australian National Botanic Gardens Education Services 2000
Clematis glycinoides	Headache vine	Food, economic and medicine plant	Zola and Gott 1992:47, Gott 1995, Fraser & McJannett, 1993
Dianella caerulea	Blue flax-lily	Food and Economic Plant	Low 1989: 8
Dianella sp.	Flax lily	Food plant	Australian National Botanic Gardens 2007
Dioscorea sp.	Giant yams	Food plant	Brayshaw 1986:74-75
Dioscorea transversa	Native yam	Food plant	Botanic Gardens Trust 2007
Einadia hastata	Berry saltbush	Food plant	Low 1989: 129
Elaeocarpus obovatus	Hard quandong	Economic plant	Australian National Botanic Gardens Education Services 2000
Eremophila debilis	Amulla	Food plant	MacDonald and Davidson 1998
E. fibrosa spp. *Nubile*	Blue-leafed ironbarks	Economic Plant	MacDonald and Davidson 1998
Eucalypt sp.	Eucalypts	Economic plant	MacDonald and Davidson 1998
		Medicine plant	Australian National Botanic Gardens Education Services 2000
Eucalyptus crebra	Narrow-leaved ironbark	Economic plant	pers. comm. various Aboriginal people from the Dubbo Region (2000) and from AHIMS site card review
Eustrephus latifolius	Wombat berry	Food plant	MacDonald and Davidson 1998
Eucalyptus moluccana	Grey box	Economic plant	MacDonald and Davidson 1998
Eucalyptus resinifera	Red mahogany	Economic plant	
Exocarpos cupressiformis	Native cherry	Food and economic plant	Brayshaw 1986:74-75. Zola and Gott 1992:48
		Medicinal plant	Watson 2007
Filicopsida sp.	Fern roots	Food plant	Brayshaw 1986:74-75
Gahnia aspera	Rough saw-sedge	Food and economic plant	Low 1989:105; Zola & Gott 1992:60
Geranium solanderi var. *solanderi*	Native geranium	Food and medicinal plant	Flood 1980:95. Zola & Gott 1992:47, 56
Glossodia major	Waxlip orchid	Food plant	Gott 1995
Glossodia minor	Small waxlip orchid	Food plant	Gott 1995
Grevillea montana	Mountain grevillea	Food plant	Low 1989: 171
Hardenbergia violacea	False sarsaparilla	Food plant	Cribb & Cribb 1986:207
Hovea sp.	Hovea	Food plant	Flood 1980:95

Table 5.2 - Flora Species and Known Aboriginal Use (cont)

Scientific Name	Name	Known Aboriginal Use	Reference
Indigofera australis	Australian indigo	Economic plant	Australian National Botanic Gardens 2007
Juncus &Cyperus sp.	Rushes and sedges	Food and/or economic plants	Low 1989:105; Zola & Gott 1992:60
Lomandra sp.	Mat-rush	Food and economic plant	Low 1989: 131, 174; MacDonald and Davidson 1998 Zola & Gott 1992:59
Macrozamia sp.	Macrozamia nuts/seeds	Food plant	Brayshaw 1986:74-75
Macrozamia communis	Burrawang	Food plant	MacDonald and Davidson 1998
Marsilea mutica	Nardoo	Food plant	Flood 1980. Cribb & Cribb 1986 83
Melaleuca sp.	Melaleuca	Food, economic and medicine plant	ERM 2004:34. Royal Botanic Gardens 2007. Australian National Botanic Gardens Education Services 2000
Ottelia ovalifolia	Swamp lily	Medicinal plant	NSW Department of Education and Training 2007
Pandorea pandorana subsp. *pandorana*	Wonga wonga vine	Economic Plant	Cunningham et al. 1992: 602
Panicum sp.	Grass	Food plant	MacDonald and Davidson 1998
Persoonia linearis	Narrow-leaved geebung	Food plant	Low 1989: 43-44
Pimelea linifolia	Riceflower	Economic plant	Australian National Botanic Gardens 2007
Pterostylis nutans	Nodding greenhood	Food plant	Gott 1995
Rubus parvifolius	Native raspberry	Food plant	Flood 1980:95
Rumex brownii	Swamp dock	Food plant	Low 1989: 28, 30, 153-154
Styphelia triflora	Pink five-corners	Food plant	Low 1989: 43
Themeda australis	Kangaroo grass	Food and medicinal plant	Greenway 1910:16 MacDonald and Davidson 1998 Zola & Gott 1992:58
Triglochin procerum	Water ribbons	Bullet-shaped tubers roasted and eaten	Zola & Gott 1992: 12
Typha sp.	Cumbungi/ bullrush	Economic plant	Australian National Botanic Gardens 2007
Typha orientalis	Broad-leaved cumbungi	Food plant	Gott 2007
Wahlenbergia sp.	Bluebell	Food plant	Fraser and McJannett 1993:65
Xanthorrhoea sp.	Grass tree	Food and economic plant	MacDonald and Davidson 1998

Umwelt (2008a) notes the differences in existing flora of the surface infrastructure site and Stage 3 mining area. In summary, the surface infrastructure site has been logged in the past and is now predominantly comprised of relatively young native vegetation (estimated to be

younger than fifty years old). The vegetation within the Stage 3 mining area is dominated by open grassland and pastures, with much of the area being logged in the past for grazing, which continues to be the dominant land use.

Umwelt (2008a) also identified a number of fauna species within the assessment area during survey work in winter and spring (of 2007). **Table 5.3** lists those native species within the assessment area that have a known Aboriginal use, from review of ethnohistoric literature and from discussions with Aboriginal stakeholders.

Table 5.3 - Fauna Species and Known Aboriginal Use

Botanic Name	Name
Acrobates pygmaeus	Feathertail glider
Anas gracilis	Grey teal
Anas superciliosa	Pacific black duck
Chelodina longicollis	Snake-necked turtle
Chenonetta jubata	Australian wood duck
Cygnus atratus	Black swan
Fulica atra	Eurasian coot
Gallinula tenebrosa	Dusky moorhen
Macropus giganteus	Eastern grey kangaroo
Macropus robustus	Common wallaroo
Macropus rufogriseus	Red-necked wallaby
Ocyphaps lophotes	Crested pigeon
Petaurus breviceps	Sugar glider
Petaurus norfolcensis	Squirrel glider
Pseudechis porphyriacus	Red-bellied black snake
Tachybaptus novaehollandiae	Australasian grebe
Trichosurus vulpecula	Common brushtail possum
Vanellus miles	Masked lapwing
Vombatus ursinus	Common wombat
Wallabia bicolor	Swamp wallaby

Umwelt (2008a) also discusses the aquatic resources of the Stage 3 assessment area, noting that sampling failed to identify any freshwater vertebrates along Cony Creek and Black Creek although the potential for some to occur (such as the mosquito fish) was noted. Sandy Creek was not inspected due to lack of access, but Umwelt (2008a) noted that it is likely to support a diversity of freshwater fish and macroinvertebrate taxa.

5.1.5 Climate

The climate of the Lower Hunter Valley is classified as warm temperate, characterised by seasonal variations from hot wet summers to mild dry winters. Rainfall is summer dominant, often occurring as short duration high intensity storms, with an average of 800 to 950 millimetres of rain falling in the region per annum (Grugeon 2007). On average, Cessnock receives approximately 750 millimetres of rain per year, which falls in 66 days of the year (BoM 2007). The Hunter Valley has approximately 30 to 40 thunderstorm days per year, most of which occur between October and April. At times, these storms can be very severe, and can produce large hail, strong winds and heavy rain (Grugeon 2007).

Analysis of historical daily rainfall data (conducted by Umwelt 2008b) indicates that major storm events have occurred in the region in 1927, 1930, 1949, 1990 and most recently in

2007. All these storm events equal the 100 year ARI or greater, resulting in overland flow flooding and backwater flooding within the Stage 3 assessment area. In the 1990 storm event, for example, 311 millimetres fell in 48 hours at Mulbring and 296 millimetres fell at Congewai, the two closest stations near Quorrobolong at the time.

5.2 Ethnohistoric Records

Historical records, such as official records and personal observations recorded in diaries or publications, can provide information on Aboriginal history of a region since European contact. Although a valuable source of information, the limitations of these documents must be recognised as colonial observers generally tended to record unusual rather than everyday events, religious and social life rather than economic activity, and men's behavior rather than that of women and children. Further, early observations of the Hunter Valley tended to focus on coastal regions rather than inland areas. As such, ethnohistoric records are neither unbiased nor complete, and they cannot provide a complete understanding of Aboriginal beliefs and practices at the time of contact.

Published ethnohistoric sources for the Central Lowlands of the Hunter Valley region are relatively rare, although information can be found in sources such as Breton (1833), Cunningham (1827), Curr (1887), Dawson (1830), Ebsworth (1826), Eyre (1859), Grant (1803), Howe (1819), Ridley (1864) and Sturt (1833). Secondary sources such as Blyton et al (2004), Brayshaw (1966; 1986), Davidson and Lovell-Jones (1993), Miller (1985), Needham (1981) and Wood (1972) form the basis of the following discussion of the Aboriginal history of the Central Lowlands and the Cessnock-Wollombi area, with specific reference to locations and material culture utilised to provide context for the Stage 3 archaeological assessment.

5.2.1 Hunter Valley Region

The Central Lowlands of the Hunter Valley is the country of the Wonnarua[1] people. Early European observers recorded the lives of the Wonnarua as intensely religious and constrained by strictly enforced laws (Ridley 1864 in Brayshaw 1986). The traditional lives of the ancestral Wonnarua focused on the Hunter Valley and were structured around a schedule of social interactions designed to take advantage of seasonal availability of resources; meaning that people moved often, but not at random. Before the arrival of the Europeans the Wonnarua was a large grouping of individual family units and bands which occasionally came together for religious and ceremonial functions (Davidson and Lovell-Jones, 1993:3). People travelled freely within the broad area of responsibility of their own group. Social responsibilities and obligations meant that people also travelled beyond their own territories to attend ceremonies with neighbours, to trade and to develop social networks that linked people across extensive areas. The Wonnarua are recorded as having had social links from the coast to the western plains of NSW (Brayshaw 1986: 38-41).

Ancestral Aboriginal people often lived and travelled in small groups of less than twenty people, but regularly met relations and neighbours for ceremonies where hundreds and sometimes thousands of people gathered for weeks at a time. Events like this were scheduled when and where seasonal resources were plentiful. Successive gatherings were rotated between a number of sites to allow the local environment to fully recover from periods of intensive exploitation. These gatherings were an opportunity to trade a wide range of goods from ceremonial songs and dances to stone axes, spears and native tobacco (Mulvaney 1986). Different groups sometimes specialised in producing high quality trade goods.

[1] The Wonnarua have variously been called: Wanaruah, Wonaruah, Wanarua and Wonnah-Ruah. Wonnarua is the spelling which will be used in this report except where a direct quote from another source is cited.

Most of the time, Aboriginal people were recorded as living in small groups moving regularly from camp site to camp site, living on local resources. There is little ethnographic evidence about where Aboriginal people camped; however, there is mention of the importance of fresh water. Also of importance when determining the location of camp sites, was the suitability of a site as a vantage ground in the case of enemy attack (Fawcett 1898:152 in Brayshaw 1986:42). While camping at a particular site, people would travel each day through the surrounding country to gather plant foods and to hunt or to visit areas that provided other required resources (for example stone, ochre, bark and resin). The daily foraging area was generally within a day's walk of camp (usually within about five kilometres).

Brayshaw (1986:59) notes that of all raw materials available, bark appears to have been the most widely used and the most adaptable. Use of bark for huts, or 'gunyers' as they are frequently referred to, is well documented, with descriptions by Caswell (1841) and Threlkeld (in Gunson 1974:45). Breton (1833) and Eyre (1859) noted suitable trees were also available to provide bark for wooden implements such as shields.

Early historic reports describe the Hunter Valley as having extensive grasslands and floodplains with few trees (Breton 1833, Cunningham 1827, Howe 1819). These grasslands are thought to be the result of Aboriginal fire stick farming techniques, which involved continually burning the countryside as part of their responsibility to look after the land and as a hunting strategy (Davidson and Lovell-Jones, 1993:5). Burning also cleared the undergrowth and fresh growth produced green shoots that attracted prey animals. Fawcett (1898) refers to the use of fire by the Wonnarua; and other early accounts (Cunningham 1827) also report the use of fire in the area.

Kangaroos, emus, possums and fish were recorded as plentiful (Breton 1833, Cunningham 1827, Dawson 1830), and mention was made of an abundance of food on the flatter ridges and plains that supported large populations of kangaroos (Cunningham 1827: 157). Early observations refer to hunted animal species, including kangaroos, wallabies and emus (Fawcett 1898:153), echidna (Fitzpatrick 1914:43 from Brayshaw 1986), goanna and native dogs (Dawson 1830:203), bandicoot (Ebsworth 1826:80), snakes (Threlkeld (in Gunson 1974:55), flying foxes (Dawson 1830:309), possums (Dawson 1830:68) and larvae (Grant 1803:162-3). There is very little evidence regarding the place of birds in the Aboriginal diet, although there are references to the mutton bird hunted on Nobbys Island, and ducks, geese, swans and pigeons (Threlkeld in Gunson 1974:55). Hunting was frequently a group exercise, although animals were sometimes speared by individual hunters.

Weirs, or fish traps, were observed by early colonial observers, such as one observed by Grant (1803:154-155 in Brayshaw 1986:42) along the lower Hunter in 1801. The construction of a weir was also described by Threlkeld (in Gunson 1974:190) as:

> …planting sprigs of bushes in a zig-zag form across the streams, leaving an interval at the point of every angle where the men stand with their nets to catch what others frighten towards them by splashing in the water.

Brayshaw (1986:83) describes initiation ceremonies of the Hunter, which are described as using one or two cleared circles, which were often 350 metres apart. Around the circles, the trees were carved and in some cases, figures of raised earth were created on the ground. Threlkeld (in Gunson 1974:63-66) described that red ochre was used on important ceremonial occasions, as well as for other purposes. Threlkeld further describes that Aborigines got red ochre that was used on important ceremonial locations, being from a volcano 'up the River Hunter'. Reddish earth was sourced from this location, which was transformed into red ochre through a process involving wetting the earth, molding it into balls and burning them in a strong fire.

Several forms of burial have been recorded in the Hunter Valley. Burial in the earth is the most commonly recorded, although the placement of the body could be varied and could be extended or flexed, face down or on its side or up (Brayshaw 1986:86). The use of bark as a burial shroud was widespread. There is some indication that burial practices varied between coastal and inland areas, with Threlkeld (in Gunson 1974:47,89,100) indicating that coastal burials were deliberately smoothed and scattered with branches to leave little indication of the burial on the surface. This contrasts with descriptions of inland burials (Breton 1833, Howitt 1904:446, Sturt 1833:14), where burials were usually marked with carved trees. A description of the burial of four men and two women of the Kamilaroi tribe by Breton (1833:203-204) involves the individuals being covered with mounds of earth (instead of being placed in a hole) in the centre of a circle approximately thirty feet in diameter cleared of vegetation. Breton further notes that the trees for some distance were carved with figures representing kangaroos, emus, possums and weapons, some of which extended twenty feet above ground.

Most of the evidence for Aboriginal occupation in the Hunter Valley comes from stone implements, although there is little ethnography concerning the production and use of stone implements. The only known mention is in regard to the use of quartz as a barb on spears and of the use of stone hatchets (Brayshaw 1986: 66, 68).

European arrival in the Hunter Valley began with the discovery of coal at Newcastle in 1797. By 1801 the Valley was reserved by the Crown as both a new convict settlement (a penal settlement was established in the Newcastle area in 1804) and for its resources in coal and timber (Davidson and Lovell-Jones, 1993:8). This reservation placed on the region by the Crown effectively restricted free settlement of the area; however, by 1819 the demand for grazing land and land for rural settlement increased beyond the current bounds of the colony's free settlement area and in 1821 Henry Dangar was commissioned to undertake a survey of the Hunter area to assess its suitability for settlement and farming.

Davidson and Lovell-Jones state that within months of Dangar reporting the Hunter Valley as suitable for settlement, claims for purchase and leasehold were being made from selectors in Sydney and by 1825 '…both sides of the Hunter River and associated brooks had been claimed' (Davidson and Lovell-Jones, 1993:8). The rapid settlement in the area disrupted the Aboriginal economy and, in a very short time, the Aboriginal population was substantially affected by a combination of starvation, introduced diseases and massacres.

First contact between the Wonnarua and the settlers may have been cordial (see citations in Davidson and Lovell-Jones, 1993:10) but rapidly turned hostile and violent with the Aboriginal community actively resisting the colonisation and appropriation of their land and resources, and the European landholders and their stockmen implementing 'widespread and indiscriminate' violence against Aboriginal people. This violence escalated significantly after 1826 and was fuelled in particular by the institutionalised violence by the Mounted Police (MacDonald and Davidson, 1998:60).

Documentary evidence suggests that by 1830 (only nineteen years after the first European settlers arrived in the Hunter) 'all armed resistance by local Aborigines' had ceased (Davidson and Lovell-Jones, 1993:17) and the traditional use of the land by the Wonnarua and their social structure and interactions had dramatically been affected – all within one generation. On the other hand, there are also some accounts of cultural ceremonies being conducted decades later, such as a ceremony held at Bulga in 1852, noted by Blyton et al. (2004:9); and a ceremony held at the junction of the Page and Isis Rivers at Gundy reported in the 1870s (McDonald 1878:255-258).

Since European settlement the Hunter Valley landscape has undergone radical changes. European colonisation saw the establishment of pastoral holdings, small towns and villages. Blyton et al. (2004:9) argue that the European pattern of settlement and land use rapidly

became the normative occupation pattern 'replacing traditional Aboriginal communities' (Blyton et al., 2004:9). Davidson and Lovell-Jones (1993:17) also argue that shortly after European settlement all that remained were isolated family groups of Wonnarua existing 'on the fringes of towns and on properties trying as best they could to survive in a European modified environment'.

The material culture of Aboriginal people also changed dramatically following contact, with the rapid influx of new technologies and materials. For example, Threlkeld (in Gunson 1974:54, 67) provides two examples of new technologies being utilised by Aboriginal people within the Lake Macquarie area, noting that bottle glass was replacing stone ('fragments of quartz') in Aboriginal weapons and that iron and glass were being used for fish hooks.

European settlement and encroachment on resources and traditional camping groups restricted Aboriginal occupation and dramatically affected Aboriginal communities, but it did not completely destroy connections to traditional camping grounds. There is a continuation of cultural connection and in some cases occupation of these places that date well into the twentieth century.

5.2.2 Cessnock and Wollombi

In addition to the above, there are a number of specific references to the Aboriginal history of the Cessnock and Wollombi areas.

Aboriginal camp sites were recorded by early observers, such as Felton Mathew's recording (as late as 1830) of Aborigines camped in a 'romantic spot' on the bank of the Wollombi River near Broke (Brayshaw 1986:42). Another observation from this early period relates to local Aboriginal tribal groups, with Breton (1833:90-92 in Brayshaw 1986:57) stating:

> Some miles from the inn we fell in with several of the aborigines, and the farther we rode the more we saw, until at length there were not less than sixty with us… These people consisted of the two tribes, one from Illarong, the other belonging to the Wallombi [sic] and were on their way to wage war with another tribe. Some of them were diligently employed in painting their sable bodies in a most fantastic manner, with a substance that resembled pipe clay.

Needham (1981) discusses the Aboriginal history of the Cessnock and Wollombi region, based on review of primary sources and from discussions with local residents and Percy Haslam (University of Newcastle lecturer), and the Aboriginal meaning of several locations within the Quorrobolong Valley, as listed in **Table 5.4**.

Table 5.4 - Aboriginal Place Names (Needham 1981:8)

Aboriginal Place Name	Location	Meaning	Reference
Quorrobolong	Region several kilometres south of Cessnock	A line of low hills	P. Haslam (*pers. comm.*)
Barraba	Name of a mountain on the NW corner of the Watagan Mountains, overlooking Ellalong	Place of Descent	P. Haslam (*pers. comm.*)
Congewai	Valley which dissects the Watagan Mountains near Paxton	Valley of the Lily	E. Crawford (*pers. comm.*)
Ellalong	Swamp near Paxton	Low swampy ground	*NA*
Coorabare	Mountainous region near Millfield	Derivation of the word: corroboree	P. Haslam (*pers. comm.*)

Table 5.4 - Aboriginal Place Names (Needham 1981:8) (cont)

Aboriginal Place Name	Location	Meaning	Reference
Watagan	Mountain Range south of Cessnock	Place of Many Ridges	P. Haslam (*pers. comm.*)
Wollombi	Township 20km west of Cessnock	Place where the waters meet	*NA*

Needham identifies a number of Aboriginal sites within the Cessnock and Wollombi region, including one ceremonial ground (1981:35.) and two burial sites (1981:38) at Quorrobolong, based on information from Percy Haslam and local residents.

The ceremonial location at Quorrobolong is described as a small ring with an apparent corridor leading away from it, therefore exhibiting bora characteristics (Needham 1981:36 from Haslam *pers. comm.*). The description further states there is no evidence of a larger ring, which is known on several other Hunter Valley bora grounds. A second ceremonial site is also described as being near Payne's Crossing (to the west of Millfield), and this site is described as consisting of a triplet of rings.

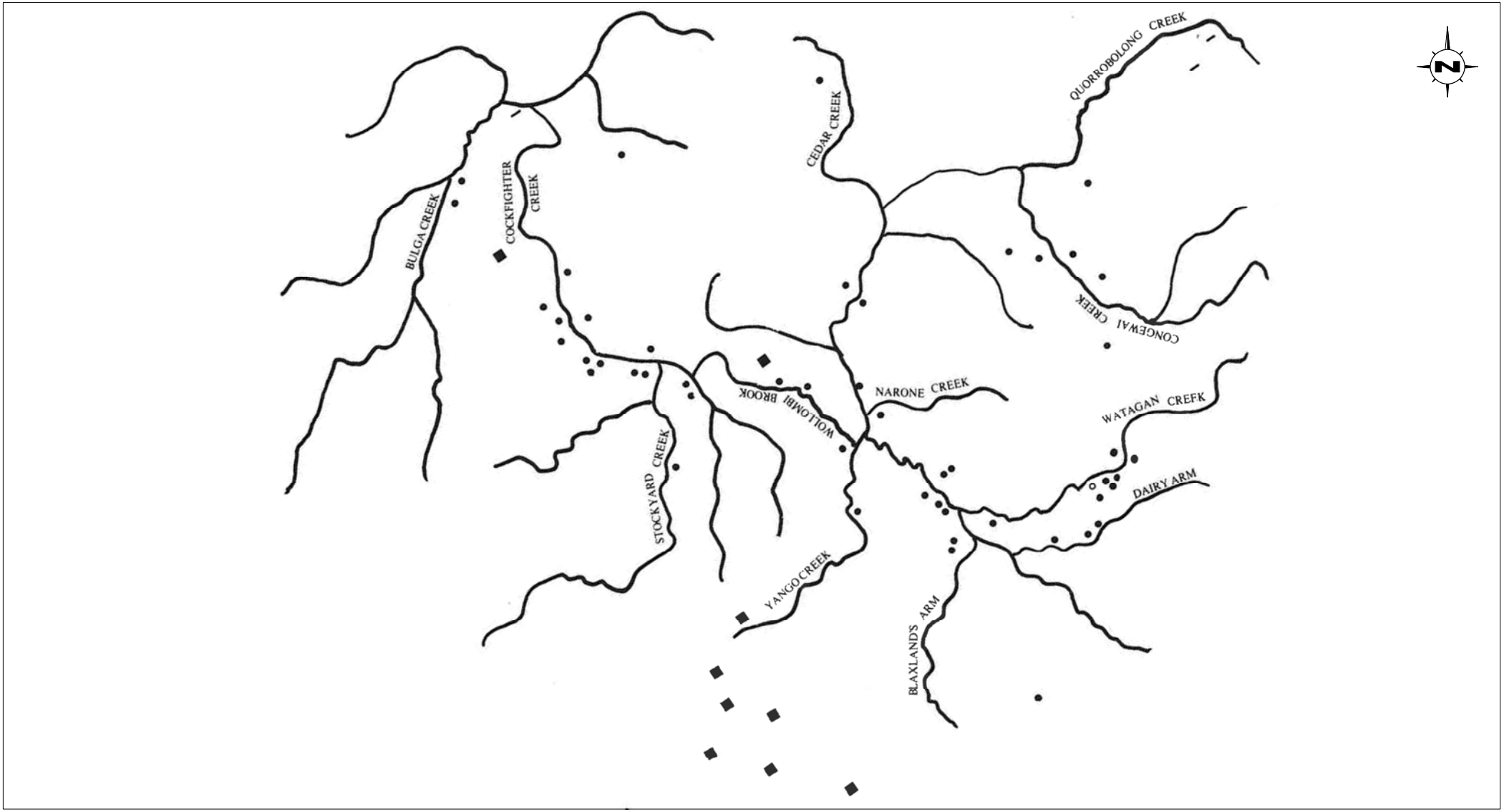
The burial sites at Quorrobolong are reported to be two of three known in the Wollombi region (1981:38 from Reynolds *pers. comm.*). All three burial sites are described as being under a tree or trees. As outlined in Needham (1981:35 from Reynolds *pers. comm.*):

> The positioning and detail at one Quorrobolong site would suggest that the deceased was a person of some importance within the tribe. This rectangular plot measures three metres in length by two metres wide. There is a raised mound at the site…At each corner of the plot there stood an ironbark tree. However, only two of these trees now remain. One was chopped down, and the other was struck by lightening. The site faces north.

Needham (1981:38) further states the second burial at Quorrobolong was reportedly of a young boy.

A map of the Aboriginal sites along the major creek systems of the Cessnock-Wollombi area is presented in Needham (1981:37), and this map illustrates two burial sites near Quorrobolong Creek (**Figure 5.5**). To determine the locations of these two areas more accurately, an attempt to overlay Needham's map on a topographic map for analysis was made; however, this was unsuccessful as the Needham map is unsealed and the creek systems illustrated do not match the actual creek line configuration of the area. Although the map cannot be used to identify any exact burial locations, it does depict both burials in a large southern bend of Quorrobolong Creek. The southern turn of Quorrobolong Creek is located to the west of the Stage 3 assessment area, approximately 800 metres west of Quorrobolong Road. Should the burial locations recorded by Needham be found in this area, it is most likely that they are located outside of the Stage 3 project area, on private property to the north of Sandy Creek Road.

Although the above discusses the potential occurrence of two burials and a ceremonial site within the Quorrobolong Valley, it is critical to note that the information is unprovenanced and it is not clear whether these sites are or were actually found in the area.



Source: Needham, W.J. 1981. Burragurra, Where the Spirit Walked, The Aboriginal Relics of the Cessnock-Wollombi Region in the Hunter Valley of NSW

0 5 10 20km
1:400 000

Legend

- ● Rock Painting
- ■ Rock Carving
- ○ Ceremonial Ground
- — Burial Ground

FIGURE 5.5

Needham (1981) Aboriginal Site Map

5.3 Land Use History

Table 5.5 presents a chronological overview of the development of the Central Lowlands of the Hunter Valley, with specific reference to the Cessnock LGA.

Table 5.5 - Timeline of Local and Regional History

Date	Historical Development	Reference
1819	First recorded journey into the Wollombi Valley, by John Howe.	Needham 1981:67
1820	The Hunter Valley was opened for free settlement.	Heritage Office & DUAP, 1996
1821	First land grant in the Cessnock area, with Benjamin Blackburn receiving 400 acres near Kurri Kurri.	Parkes et al 1979:23
1822 to 1823	A route (roughly in alignment with the present Old Bulga Road) from Windsor was found by Benjamin Singleton, John Howe and others which made possible the overland movement of stock from the Cumberland Plain to the Hunter Valley.	Crago 1979:38
1822 to 1826	Henry Dangar conducted a detailed survey of the lower Hunter between 1822 and 1826.	Brayshaw 1984:1.2
1826	'Cessnock' estate established on 2560 acres of land by John Campbell.	Parkes et al 1979:24
1826-1836	Great North Road built by convict labour. Line between Wollombi and Maitland built by 1831.	
1830s	Australia's first soldiers settlement was established at Wollombi, with discharged members of the NSW regiments receiving (from 1830) grants of 100 acres along the Wollombi Brook.	Crago 1979:38
1834	Two thousand acre grant granted to B Jacob Josephson on 15 August, forming the Barraba Estate (which contained much of the current Stage 3 assessment area).	Umwelt 2008c
1850	Population of Wollombi c.1500, while the residents of Cessnock only numbered between 7 and 11.	Crago 1979:38
1853-1855	Cessnock estate subdivided and sold as individual lots, basis of future Cessnock township.	Parkes et al 1979:166
1880s	South Maitland Coalfields developed. By this time, Cessnock was a farming area on the margins of the Hunter Valley.	HLA 1995b:5
1892	Coal discovered at Cessnock, by George Brown while excavating in the SW corner of the old Cessnock estate.	Crago 1979:41
1906	Mines established in the Cessnock area by this year. Shire of Cessnock established.	HLA 1995b:5
1916	Underground mining of Pelton/Ellalong commences.	Umwelt 2008c
1926	Cessnock defined as a municipality, with population of 12,000 people.	Crago 1979:41
1956	Cessnock municipality merged with the Shire of Kearsley, into the Municipality of Greater Cessnock.	Parkes et al 1979:273
1958	Municipality of Greater Cessnock proclaimed the City of Greater Cessnock.	Parkes et al 1979:273

As detailed above, the history of the Cessnock region is characterised by pastoral estates and a slow intensification of residential development prior to 1892, with mining then becoming increasingly significant to the region's economy and development particularly from the 1910s. The history of the Stage 3 assessment area reflects this, with land first taken up as part of a pastoral estate in 1834, then being progressively subdivided for pastoral use (Umwelt 2008c). Mining infrastructure in the Quorrobolong area – for the Pelton, Ellalong,

Bellbird and Southland Collieries – dates to the 1910s, resulting in the rapid intensification of use of the local region.

The history of the Stage 3 assessment area is discussed by Umwelt (2008c). In summary, parish maps dating to the 1880s show the area is controlled under several land grants including Jacob Josephson (2000 acres), George Thomas Palmer (1200-1280 acres), Edward Charles Close (2841/2 acres), William Tacon (100 acres) and Edward Blackwell (103 acres), and smaller land grants of 30 to 40 acres to George Hall, Sara Hall, Joseph Hall, R. Palmer, H. Kerr, and R H Jordan. The Josephson estate was the largest of these, and is referred to in historical records as the 'Barraba Estate' or 'Abbotsford'. George Thomas Palmer's estate is also later referred to as the Barraba Estate and the northern lands as Coney Creek Paddock. The homestead for the Barraba Estate is believed to be outside the study area approximately a kilometre south-west of Barraba Lane. As in other regions, it is likely that these early homesteads were placed in areas that were previously Aboriginal camp sites, with permanency of water valued as a resource by both Aboriginal groups and European settlers.

Earlier land grants were made under a system of quit rent or 'free grants' implemented between 1821 and 1831. The free grant system operated by an immigrant presenting a letter to the Secretary of State for the Colonies which stated that they required 'a grant of land in proportion to his means of cultivating it' (Parkes et al. 1979:25). The resulting grants were conditional title and the land holder had to fulfil certain conditions over a period of seven years such as 'provide fencing and buildings and general improvements', at the end of the first seven years of their occupation of the land, the landholder had to pay a quit rent sum which was related to the productivity and assets built on the land (Parkes et al. 1979:25). This system was abandoned after 1831 as it lead to landholders dispersed over too great an area and encouraged 'many members of the labouring classes to become landed proprietors and hence too deprive capitalist farmers of an adequate workforce' (Parkes et al. 1979:26). In 1831 Alexander McLeay, then Colonial Secretary passed legislation which ensured that 'no land will be sold below the rate of 5 shillings an acre….a deposit of 10 per cent upon the value of the purchase must be paid at the time of the sale, and the remainder must be paid within one calendar month' (cited from Parkes et al. 1979:26). This legislation backfired and only encouraged members of working class to become 'landed proprietors and lead to the acquisition of small 40 and 60 acre portions of Crown land which is a pattern that is reflected in the north-west and south-east of the study area by small grants held by the Jordan, Chapman, Palmer and Kerr families. This legislation also led to larger land holders who were based in Sydney, such as George Thomas Palmer, to extend their larger empires of land into the Cessnock region which included the study area.

The history of the Barraba Estate dates to 1834, when it is believed that George Thomas Palmer acquired the property with a 'ready made homestead and farm buildings' and 'little more than 100 acres had been cleared' (Parkes et al. 1979:75). Palmer also acquired 'a narrow 40-acre block on the verge of the road on the north side of the *Barraba'* and approximately a mile north-east of *Barraba '*a 1200 acre portion against the Broken Back, adjacent to a 284 ½ acre portion which E.C. Close acquired later' (Parkes et al. 1979:75). The review of parish maps dating from 1888 to 1952 indicates that these grants are within the eastern portion of the study area.

As a result of the land use history described above, the landscape of the Stage 3 assessment area has undergone modification through extensive pastoral grazing and residential development, with native vegetation cleared, foreign grasses introduced, localised areas of excavation and earthworks for infrastructure, and changes to stream morphology and hydrology. Throughout the Hunter Valley, these changes have resulted in incision of tributary streams and extension of gullies, erosion and sedimentation during major floods, and in some places, increases in water salinity (Dean-Jones and Mitchell 1993:4).

5.4 Archaeological Context

This section presents the archaeological context of the evaluation of the Stage 3 assessment area, specifically known archaeological sites identified by previous archaeological surveys of the area, and the understanding of Aboriginal heritage developed by previous work.

5.4.1 Site Types

Aboriginal archaeological sites can be divided roughly into secular (concerned with worldly things) and non-secular (concerned with secret, sacred, ceremonial and ritual things) site types. This division is not made by archaeologists; it is strictly drawn from Aboriginal ideologies (manners of thinking, systems of belief). The division is not always clear cut as some site types may be secular in some circumstances and non-secular in others. The secular or non-secular nature of each of the site types is indicated below. Sites that are non-secular in nature generally have much higher Aboriginal cultural heritage significance than sites of a secular nature. In accordance with the professional guidelines for archaeological report writing (NPWS 1997), site types that could be found throughout the region are defined below, with comment on their secular/non-secular nature.

Open Camp Sites

An artefact scatter or open camp site refers to areas (in the open landscape, not in a rockshelter or cave), that contain two or more stone artefacts, generally located within 100 metres of each other. Stone artefacts are pieces of stone modified for, or by, human use. Stone artefacts are robust and preserve well in the archaeological record when other forms of evidence of Aboriginal exploitation are lost due to preservation biases (wooden implements, food remains). Artefact scatters may result from the activities of a single person or a group of people. They may reflect a single occupation episode, or multiple episodes of occupation of a single place. In general, artefact scatters are secular in nature.

Isolated Finds

The site type described as an ‘isolated find’ or ‘isolated artefact’ consists of a single stone artefact. The vast majority of stone artefacts were tools used in day to day activities and were therefore secular in nature. There are some stone artefacts, however, that were used in special rituals/ceremonies that were non-secular in nature (that is, ceremonial axes, tjuringa [engraved or decorated stones], stone knives used in cicatrisation). Isolated finds may represent lost or discarded artefacts, but may also be the surface expression of a larger scatter of artefacts in a subsurface context.

Scarred Trees

Aboriginal people often removed the bark from the trunks of trees to make toe holds (to aid in climbing to extract honey or possums from tree hollows), bowls, shields, spearthrowers, coolamons, canoes and/or for roofing material for shelters. The bark removal leaves scars on the tree trunk which indicates the Aboriginal use of an area. Scarred trees are generally secular in nature.

Carved Trees

Other trees were carved with designs, which were used to mark ceremonial grounds and burials (Etheridge 1918:84; McBryde 1974:126). Designs were often carved on the wood of the trunk exposed by the removal of the bark, and designs could include geometric or linear patterns or animal representations. Carved trees are always non-secular.

Rockshelter Sites

The term 'rockshelter site' refers to rockshelters/rock overhangs that contain evidence such as stone artefacts and/or bones and/or plant remains (from meals eaten at the site) and/or hearths (fireplaces). Most rockshelter sites are secular in nature, however, those that also contain rock art or engravings are often believed to be non-secular in nature.

Engraving Site

The term 'engraving site' refers to places where Aboriginal people have incised (using techniques such as pecking or abrasion) some form of motif into rock. The engravings may be on a rock outcrop, rock slab, boulder, cliff-face, rock overhang, or in a cave or rockshelter. Engraving sites are not necessarily located in sheltered positions, but are most often located on softer rock types (like sandstone). Engraving sites are generally believed to be non-secular in nature.

Grinding Grooves

Grinding grooves are grooves on rock surfaces that have been manufactured by the sharpening of stone axe heads, stone chisels or fire hardened wooden spear points. Grinding grooves are commonly located on sandstone ledges that outcrop in creek and river beds, as the availability of water enhances the speed with which grinding proceeds. Less commonly, grinding grooves are located on rock surfaces away from water and on stone types other than sandstone. Grinding grooves appear to be secular in nature.

Grinding Bowls

Grinding bowls are rounded depressions on rock surfaces that have been manufactured by the grinding of ochre, seeds, nuts and other plant resources. Grinding bowls are commonly located on sandstone ledges that outcrop in creek and river beds, as water is often added during the grinding process to form a paste. Less commonly, grinding bowls are located on rock surfaces away from water and on stone types other than sandstone. Grinding bowls appear to be secular in nature.

Waterholes/Wells

These are generally natural rock waterholes that contain water used for drinking or for special ritual purposes. Sometimes these holes are made larger by grinding out the sides and base and sometimes they are protected by placing large stones over the hole to keep out animals and to prevent the water from evaporating. These may be either secular or non-secular in nature.

Pot Holes

Pot holes are deep (arm's length), steep sided, generally rounded depressions located on sandstone ledges that outcrop in creek and river beds. The pot holes have been ground out by Aboriginal people to store water. They are generally natural depressions that have been enlarged and deepened by grinding. Pot holes often have grinding grooves radiating from them; or may have a rock placed over them to keep the water safe from animals and clear of debris. Pot holes appear to be secular in nature.

Stone Arrangements

Locations where Aboriginal people deliberately positioned stones to form shapes or patterns, ranging from simple stone mounds to complex circles and pathways. The purpose of stone arrangements is generally unknown in modern society, but they probably relate to ceremonial

activities. Stone arrangements are found throughout inland New South Wales as well as the coast.

Fish Traps

In some inland areas, stone pens were built in waterways using river rocks to form a maze of weirs and pens of varying size and shape. As soon as an adequate amount of fish entered the trap, the openings were blocked, and fish could then be harvested over subsequent weeks. In areas where little rock occurs naturally, traps were constructed using earthen banks and wooden stakes, with wooden grills constructed at the mouth of drainage channels to trap fish. Particularly elaborate systems stretched up to 500 metres in length.

Stone Quarries

Stone quarries are places where Aboriginal people have sourced raw material for the manufacture of tools. Quarries may be cobble beds in rivers or on beaches, or they may be rock outcrops. When outcrops are exploited the quarrying activity may take the form of the flaking of rock from the outcrop, or scree from below the outcrop may be used instead. In some areas the stone may be dug from beneath the earth as Aboriginal stone knappers often preferred rock which had not been dried out by exposure to the elements (Tindale 1965: 140; Jones and White 1988:61-62). Stone quarries can be either secular or non-secular in nature depending on the Dreaming with which they are associated (Jones and White 1988).

Ochre Quarries

Ochre quarries are places where Aboriginal people sourced ochre (hydrated iron oxides and iron hydroxides - Whitten and Brooks 1972:269) which they used for body decoration, implement decoration and rock art. Ochre quarries can be either secular or non-secular in nature depending on local belief systems.

Ceremonial Grounds

In the Hunter region the main type of ceremonial ground recorded was the Bora. Bora grounds generally consisted of two earthen rings or two rings outlined with stones. The Bora ground was used during male initiation ceremonies (Fife 1995). Bora grounds are believed by many contemporary Aboriginal people to be non-secular in nature, however, the literature suggests that generally only the viewing of the smaller of the two rings was restricted to initiated males (for a summary of the data recorded about Bora grounds see Fife 1995).

Missions/Reserves/Contact Sites

These are places where Aboriginal people lived in the period following European settlement. They are often documented in historical literature as being places of a shared history of interaction between Aboriginal people and non-Aboriginal people.

Burial Sites

Burial sites can be classified as pre- or post-contact. Pre-contact burial sites refer to Aboriginal skeletal material dating to a time before white settlement. The skeletal material may be buried, interred in a cave/rockshelter/under a ledge, in a tree hollow, or exposed on a platform in a tree. Burial sites are generally believed to be non-secular in nature by contemporary Aboriginal people. Post-contact burial sites refer to burials/interments that have taken place since European settlement and that are not located in a recognised cemetery and are not documented. If they are documented then they are considered Aboriginal historic sites and not Aboriginal archaeological sites. They may be secular or non-secular depending on the status/position of the deceased.

Massacre Sites

This term refers to an area known from the Aboriginal oral history, or from local history, to have been the location of an Aboriginal massacre. Most Aboriginal massacres occurred during the early European settlement period.

5.4.2 DECC Aboriginal Heritage Information Management System (AHIMS) Site Search

A search of the AHIMS register in October 2007 identified 117 archaeological sites within an area bounded by the Myall Range to the south, the Bow Wow Creek Gorge to the east, Abermain to the north and Bellbird to the west (refer to **Figure 5.6**). These sites consist of 31 artefact scatters, 13 isolated finds, seven shelter sites (art and/or deposit and/or engraving), two burials, two potential archaeological deposits, two axe grinding grooves, one carved tree, one mythological (natural) site and one ceremonial site (bora). Remaining site types are not specified.

No sites registered in the AHIMS database are located within the Stage 3 assessment area. However, it is noted that two registered archaeological sites occur in the CML2 lease area managed by Austar, as listed in **Table 5.6** and illustrated on **Figure 5.7**

Table 5.6 - Archaeological Sites Registered within the CML2 Lease

AHIMS #	Site Name	Site Type	AMGE	AMGN
37-6-0422	Quorrobolong	Artefact Scatter	345700	6357400
37-6-0114	Quorrobolong	Carved Tree	349567	6355577

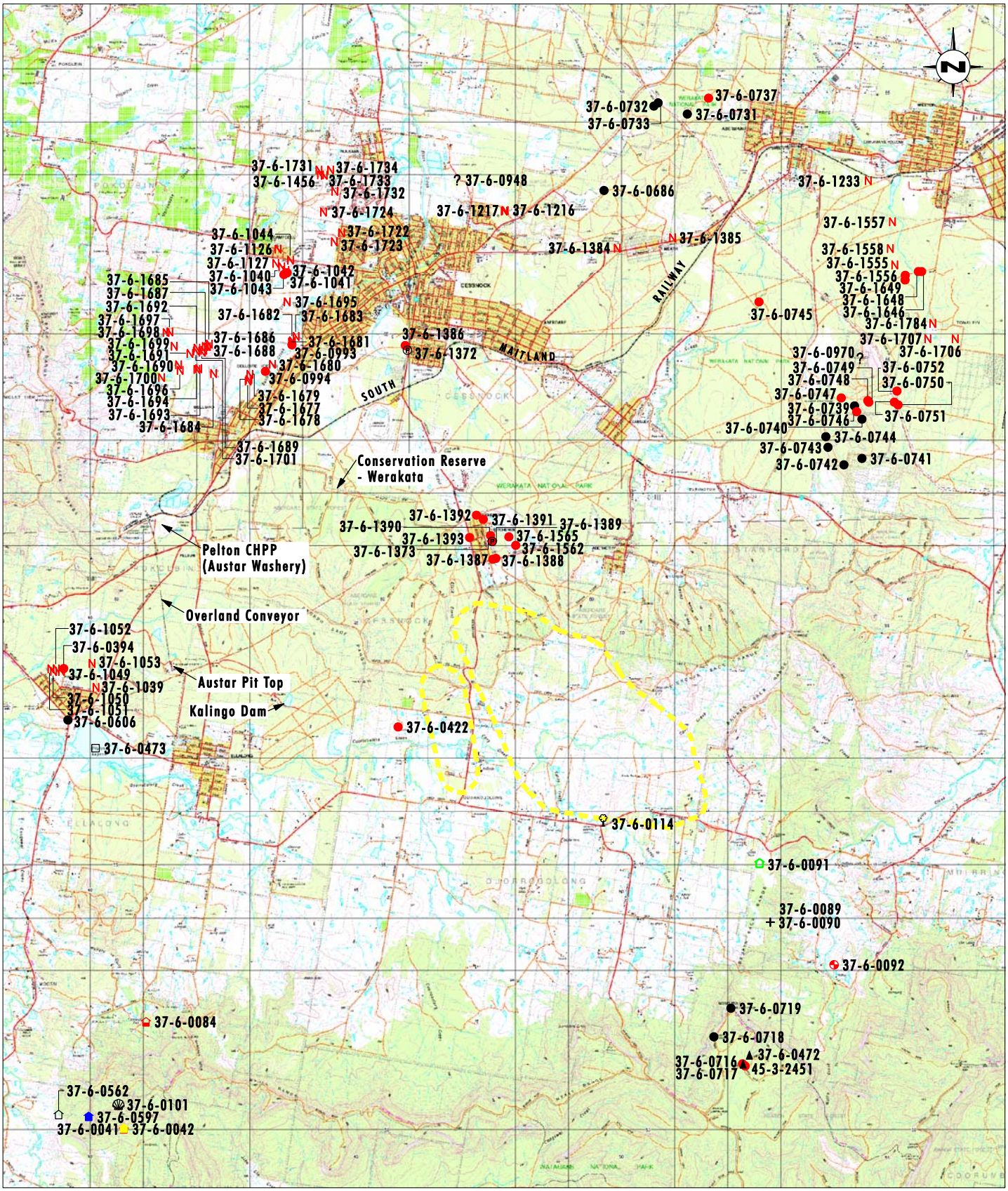
Of the above site locations, one – Quorrobolong (#37-6-0114), a carved tree – is positioned approximately 100 metres to the south of the assessment area (**Figure 5.6**). This site was registered by D. Bell in 1980, but the site cards notes that the site was first reported by B.T. McCarthy in 1959. The tree is described as destroyed on the AHIMS site card. No other information is provided in the site card.

In addition to the above, three archaeological sites have been recorded within the CML2 lease area managed by Austar, but are not yet registered on the AHIMS sites database as site cards have not been submitted to DECC. These sites are listed in **Table 5.7**.

Table 5.7 - Archaeological Sites known to occur within the CML2 Lease

AHIMS #	Site Name	Site Type	AMGE	AMGN
NA	EL-1	Isolated Find	340780	6359840
NA	BC1	Isolated Find	346867	6359255
NA	BC2	Isolated Find	346889	6359162

None of the above sites are located within the Stage 3 assessment area, although it is noted that sites BC1 and BC2 are located within the Werakata State Conservation Area within 40 metres of the surface infrastructure site.



Source: Topo Maps: LPI NSW, Archaeological Sites: DECC AHIMS Site Register, Accessed 30 October 2007

0 1.0 2.0 4km
1:100 000

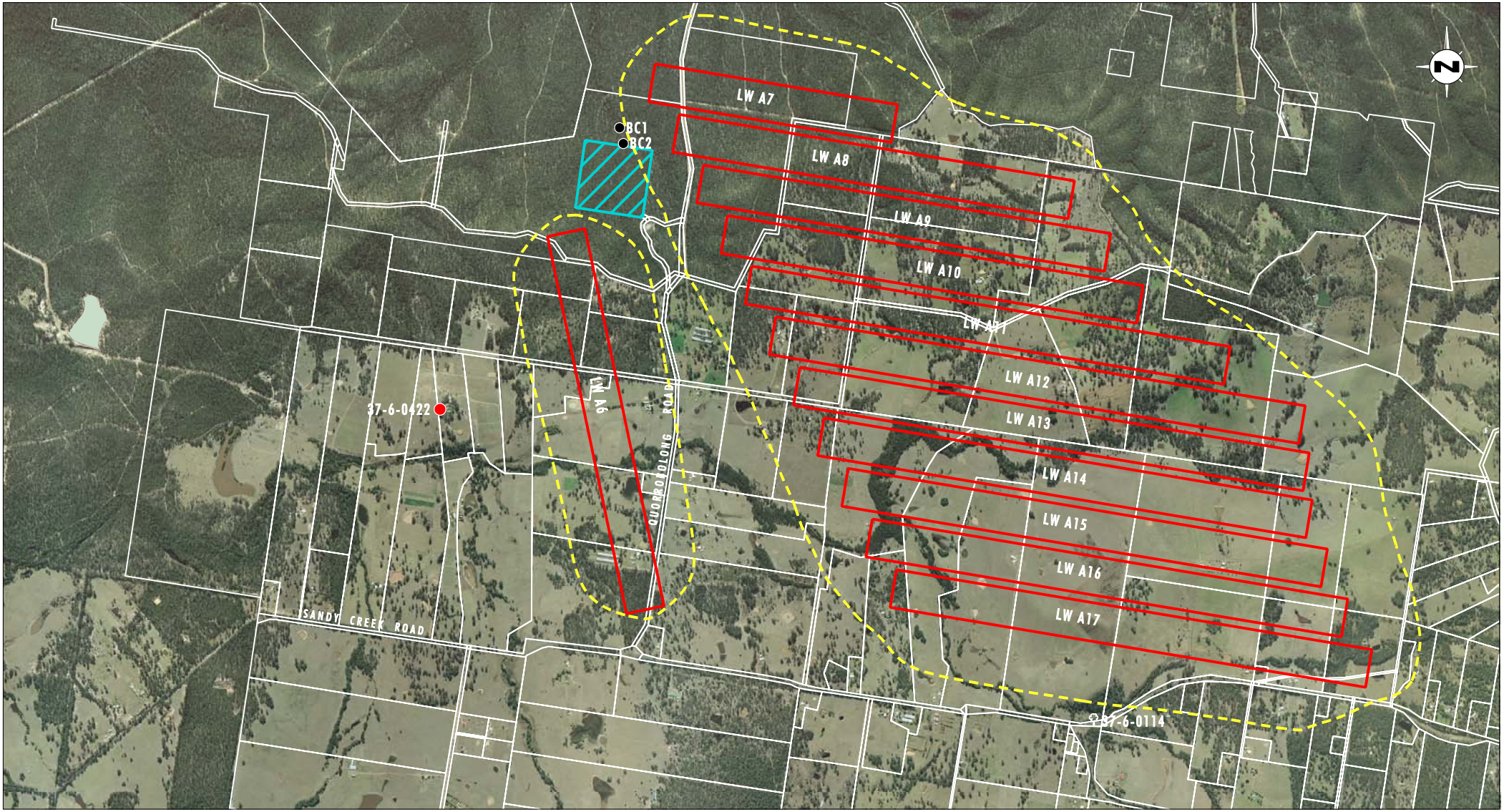
Legend

- 20mm Subsidence Contour
- Artefact Scatter
- Isolated Find
- Burial/s
- ? Unknown Site Type
- Bora / Ceremonial
- N Unidentified Site Type
- Scarred Tree
- Axe Grinding Groove
- Potential Archaeological Deposit
- Natural Mythological (Ritual)
- Shelter with Art
- Shelter with Deposit
- Shelter with Art & Deposit
- Shelter
- Shelter with Art & Deposit, Axe Grinding Groove, Engraving
- Midden

FIGURE 5.6

AHIMS Sites (Regional)

File Name (A4): R13_V1/2274_241.dgn



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW,
Aerial Photography: AAM Hatch 2006

0 0.5 1 1.5km
1:32 000

Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Artefact Scatter
- Isolated Find
- Carved Tree

FIGURE 5.7

AHIMS Sites (Stage 3)

File Name (A4): R13_V1/2274_242.dgn

5.4.3 Previous Research

Review of previous archaeological research is critical to the understanding of Aboriginal heritage within the local region, specifically archaeological site patterning. The following sections discuss previous archaeological research within or adjacent to the Austar Coal Mine, and then provide a review of archaeological research for the broader Central Lowlands of the Hunter Valley.

5.4.3.1 Austar, Ellalong and Southland Collieries

Two archaeological assessments have been conducted within or adjacent to the Austar Coal Mine, as listed in **Table 5.8**.

Table 5.8 - Previous Archaeological Research

Author	Date	Assessment Type	Assessment Area	Results
Brayshaw	1987	Survey	Southland Colliery	Survey of <100ha. Two sites recorded: a small artefact scatter (7 artefacts) and one isolated find.
HLA-Envirosciences	1995b	Survey	Ellalong Colliery (Austar Stage 1)	Survey of 16ha area, within 95 ha surface infrastructure areas. One site recorded: an isolated find.

Both studies were commissioned to identify and manage any Aboriginal heritage constraints affecting mining in the area, with Brayshaw (1987) surveying the Southland Colliery lease area and HLA-Envirosciences (1995) surveying the Ellalong Colliery lease area. Both lease areas extend into the Stage 3 assessment area, with the Southland Colliery lease area extending into the north-west portion of the Stage 3 area (including the surface infrastructure location) and the Ellalong Colliery lease extending to the east of Sandy Creek.

The above studies identified three archaeological sites:

- Quorrobolong-1: an artefact scatter located on a spur of Broken Back Range approximately 300 metres north of Quorrobolong Creek. Seven stone artefacts were located in an erosion scour approximately 80 metres by 25 metres. Maximum artefact density was four artefacts per m^2. Artefacts included three mudstone flakes (one with retouch), one silcrete flake, one quartzite flake, one quartzite flaked piece and one silcrete core;

- IF-1: an isolated find located on Pelton Road, along a fire trail within the Werakata State Conservation Area. The find was located 1.6 kilometres to the north of Quorrobolong-1, found on range saddle. The site contained one silcrete core; and

- EL-1: an isolated find located to the north of Paxton. No detailed site information is available for this find. The significance of the site was assessed as low, but it was noted that representatives of Mindaribba Local Aboriginal Land Council considered the site important but not of major significance (1995:11).

Following review of relevant literature, HLA-Envirosciences (1995:3-4) generated a general predictive model for the Ellalong Colliery, which concluded:

- open camp sites and isolated finds are the only known sites within the region, and are predicted to occur within the Austar Coal Mine area;

- scarred trees could possibly be found within the area provided that post-contact vegetation clearance was not too intensive;

- site density and complexity increases close to water and wetlands, probably due to increased biodiversity. More complex sites could therefore occur within 100 metres of major watercourses and wetlands. Site density and complexity would decrease away from major watercourses and wetlands;

- sites are expected adjacent to Quorrobolong Creek, and artefacts found at these sites may indicate a complex range of functions; and

- away from major streams and wetlands, sites would become less dense and more specialised, evidenced by small stone artefact scatters and isolated finds.

5.4.3.2 Cessnock LGA

A significant number of archaeological studies have been conducted in the Central Lowlands of the Hunter Valley, and these further our understanding of the age of Aboriginal occupation of the region, and archaeological site patterning and significance throughout the region.

A search of the AHIMS report database in October 2007 using the keywords Quorrobolong, Kitchener, Cessnock, Ellalong, Bellbird and Paxton identified a total of 26 previous archaeological studies. Of these, 18 were conducted in Cessnock, three in Rothbury, two in the Paxton-Bellbird area, one in Bellbird and one in Nulkaba. These studies consist of 21 archaeological surveys, four test excavations and one monitoring program.

Table 5.9 lists a number of these relevant archaeological studies conducted in the Cessnock LGA

Table 5.9 - Previous Archaeological Research, Cessnock LGA

Author	Date	Assessment Type	Assessment Area	Results
Appleton, J.	1993	Survey	Paxton to Bellbird via Ellalong	Survey of 8km cable route. One site recorded: an isolated find.
Besant, Angela	*undated*	Survey	Lot 4 DP 867713, Cessnock	Surveyed an area for proposed residential units. One site recorded: an isolated find, 2 heat shatter (non-artefactual) also noted with artefact.
Besant, Angela	2002a	Survey	Allandale (Lot 156 DP 755252) and Nulkaba (Lot 101 DP 803192)	Surveyed an area outlined for substation infrastructure. One site recorded in Allandale: an isolated find.
Besant, Angela	2002b	Survey	Vineyard Grove, Cessnock	Surveyed 17 ha for urban residential subdivision. One site recorded: artefact scatter of 3 silcrete flakes located on a broad ridge.

Table 5.9 - Previous Archaeological Research, Cessnock LGA (cont)

Author	Date	Assessment Type	Assessment Area	Results
Brayshaw, Helen	1981	Survey	Cessnock	Surveyed an area for urban expansion. One site recorded: an isolated find (quartzite flake).
Brayshaw, Helen	1982	Survey	Weston	Surveyed an area for residential development. No sites were recorded.
ERM	2003	Excavation	Cessnock	Test excavation for employment zone development. Excavation of 138m^2 in three areas, each with two transects. Total of 132 artefacts recovered. Six discrete sites defined by results.
Gay, Louise	1999	Survey	George Booth Drive, Cessnock	Survey of small area (0.475 ha) near two bridges. No Aboriginal sites were recorded.
McCardle, Cultural Heritage	2005	Desktop	Ellalong to Millfield	Evaluation of pipeline alignment. Footslopes and valley floors with duplex soils may be archaeologically important – interaction between colluvial and alluvial soils can result in the formation of sealed deposits. Site density predicted to be greatest in undisturbed areas with access to concentrated water resources.
Stedinger Associates	2003	Survey	Mt View Road, Cessnock	Survey of 29 ha for residential development. Eight sites recorded: five artefacts and three isolated finds. Total of 51 artefacts recorded. Test excavation recommended.
Stedinger Associates	2004	Test Excavation	Mt View Road, Cessnock	Testing consisted of grader scrapes and collection of surface artefact finds. Testing identified Mount View 8, a large site. Permit varied to allow open area excavation.
Stedinger Associates	2005	Excavation	Mt View Road, Cessnock	Open area excavation of Mount View 8 site. 3777 artefact fragments recovered from 365 squares within 650m^2. Minimum number artefacts calculated as 2686. Distribution and nature of assemblage indicates artefact manufacture occurring on site. Large number of non-artefactual fragments found (40% of artefact weight), may represent concentrations of heat shattered artefacts.

As identified above, archaeological surveys have dominated previous investigations of the region, with eight of the above 12 listed studies being survey and assessments. The remaining studies consist of three excavations and one desktop study. Assessment areas have generally been small, with only one of eight surveys evaluating an area greater than 20 hectares. Surveys have generally identified a small number of sites, with five of the eight identifying only one site and two identifying no sites. The remaining survey identified eight sites within a 29 hectare survey area. Recorded sites have generally contained low artefact numbers, with the majority containing no more than three artefacts.

Larger, more complex sites have been infrequently found in the Cessnock LGA, and those found have been identified by excavations at Cessnock by ERM (2003) and Stedinger Associates (2004, 2005). The largest excavation in the region was conducted by Stedinger Associates (2005) on Mount View Road in Cessnock, in advance of a residential development. The project involved archaeological survey in 2003, subsurface testing (grader scrape monitoring) in 2004, and open area excavation in 2005 of Mount View 8, a site identified by the 2004 testing program. Open area excavation consisted of excavation of 365 squares within the site area (650 m^2). Of these, 270 test pits contained artefacts and a total of 3,777 artefactual pieces were recovered. Artefacts recovered per square metre were highly variable, with artefact weights ranging from 0.1g to 262.2g per square metre.

Of the recovered artefacts, 3,302 were flakes, 265 were retouched flakes, 92 were cores, and 118 were flaked pieces. Raw materials utilised included silcrete (3152), fine grained siliceous (468), chert (66), volcanic (41), quartzite (25), quartz (19), petrified wood (5), and unidentifiable (1). In addition, three hammerstones were collected, being unflaked water worn pebbles with evidence of pitting or crushing (Stendinger Associates 2005:92).

Breakage was high within the assemblage, with 50.8 per cent of all recovered artefacts broken. Following analysis of the assemblage, the minimum number of artefacts was calculated at 2686, indicating that the total find number of 3,777 is misleading regarding actual artefact numbers (Stendinger Associates 2005:87). Evidence from conjoined artefacts, flake size and breakage during manufacture indicates that artefact production was undertaken at the Mount View site. There is also evidence for the production of backed artefacts (Stendinger Associates 2005:99). Marked concentrations of artefacts at several points in the excavation area may relate to knapping locations characterised by large numbers of small unretouched flakes of the same material and conjoined flakes (Stendinger Associates 2005:115).

A large amount of non-artefactual fragments were also identified – 3499.5 grams, which is 40 per cent by weight of artefacts (Stendinger Associates 2005:99). Following artefact analysis, it was concluded that these clusters of non-artefactual fragments may represent concentrations of heat shattered artefacts (Stendinger Associates 2005:154).

The only other excavation in the Cessnock area was conducted by ERM (2003) in advance of the Hunter Employment Zone development. This test excavation targeted three landform areas of 138 m^2 in three areas, with individual test pits measuring 2 m^2 in size. A total of 132 artefacts were recovered, defined as six discrete sites by the results.

Although excavations have been limited in number in the Cessnock LGA, they have provided valuable information regarding subsurface archaeological deposits that can be used to inform our understanding of the local area. Further, the larger body of archaeological investigation within the Central Lowlands of the Hunter Valley provides a framework for the archaeological assessment.

5.4.4 Age of Occupation

Very few archaeological sites within the Lower Hunter region have been directly dated by radiocarbon or thermoluminescence dating, as there are limitations in applying this technology to the open sites that dominate the archaeological resource of the region. Dean-Jones and Mitchell (1993) noted that one of the main problems in applying radio-carbon dating to open sites is the association between the dated sample and cultural materials may not be provable, unless the sample comprises an intact hearth.

Although the above constraints are noted, previous archaeological investigations within the Hunter Valley have provided dates of occupation for several sites that inform our understanding of the age of occupation of the region, including:

- Glennies Creek (Falbrook) north of Singleton, where a hearth located on a buried alluvial terrace provided radiocarbon dates of between 13020±360 and 34580 ±650 BP (Koettig 1986, 1987);

- Wollombi Brook (west of Singleton), where artefacts identified on a terrace in a clay horizon were dated to the late Pleistocene (between 18,000 and 30,000 years) by a geomorphologist (Kuskie 2002);

- Moffats Swamp near Medowie (close to Port Stephens), where radiocarbon dating of a charcoal fragment recovered from the base of a dune provided an uncalibrated date of 14,750 BP (Baker 1994); and

- Bobadeen (Moore 1970) near Cassilis, where excavation of a rockshelter provided a date of 7750±120BP (Moore 1970).

Other Pleistocene dates in neighbouring regions include Lime Springs on the Liverpool Plains, Capertee in the Blue Mountains and Mangrove Swamp, south-east of the Hunter Valley. All of these sites indicate that Aboriginal occupation was present during the Pleistocene and spans a period of at least 20,000 years (ERM 2004:73).

Consideration of technological attributes of stone artefacts also provides an indication of the age of occupation, and is most beneficial in excavations of open sites where there is no chronological stratigraphy and datable material. Excavations throughout south-east Australia provide evidence for the appearance of backed artefacts during the Early Holocene period and their proliferation ca 3,000 BP (Hiscock and Attenbrow 2004). These artefacts have therefore been used as a distinguishing feature of Holocene occupation deposits, and on this basis, many sites are considered to be Holocene in age. However, it is recognised that the use of artefact types to date surface assemblages is limited in its usefulness as the time periods involved span thousands of years and therefore cannot be used to make confident assessments of age and site connectedness.

Other material culture also appears in south-east Australia the mid-late Holocene period, such as edge ground axes, hatchets and adzes. Edge grinding has been present in the archaeological record of northern Australia since the late Pleistocene; however, the antiquity of edge grinding in south-eastern Australia appears limited to the mid-Holocene to recent period. The earliest accepted date for a flake from the cutting edge of an edge ground axe in south-eastern Australia comes from a rockshelter excavation at Graman near Inverell. McBryde and Binns (1972: 65) report that the flake had an antiquity of around 4000 years.

5.4.5 Models for Aboriginal Occupation

Developing occupation models for past Aboriginal use of the landscape is a key research theme in past archaeological investigations throughout the Hunter Valley, given its relevance to the identification of archaeological sites in the modern landscape.

A large body of research has investigated patterns of hunter-gatherer occupation and strategies for survival, which can be used to provide basic principles for Aboriginal occupation and use of the landscape. One key model used by archaeologists in past research in the Hunter region was developed by Foley (1981), whose model assumes that human behaviour occurred continuously across the landscape, and settlements are points where higher frequency of activity occurred. This model draws heavily on ecological theories to discuss the relationship between population and subsistence resources, and defines the landscape as having core areas, seasonal ranges, annual ranges and lifetime ranges (Foley 1981:2). Foley (1981:5) outlines the variable archaeological characteristics of areas within the home range based on behavioural patterns, specifically:

- home base: primary focus for behaviour and discard. High artefact density expected;
- home base periphery: area adjacent to home base as focus for many activities and discard. Discard (loss) during transit, and as a function of extended living areas and peripheral working areas;
- secondary home range foci: beyond the home base and periphery discard relating to specific activities which occur at repeatedly visited points in the landscape (such as hunting and transitory camps);
- occasional home range foci: discard at points visited occasionally as part of subsistence activities (particularly hunting); and
- extra home range loci: discard beyond the routine home range boundary (particularly for raw material procurement, exchange or ceremonial activities).

Foley (1981:4-7) argues that behaviour and discard within the home range is influenced by the following five environmental factors:

- topography: in areas of low relief, home ranges will be larger, resources more evenly distributed, less chance of secondary home range development, and more chance of occasional discard;
- productivity: the availability of resources;
- climate: seasonal effects of climate change on resources and water supply;
- habitat: where habitats are irregular, artefact distribution may be clustered and discontinuous. On the boundaries between habitats (ecotones), there often occur areas of high resource potential, and consequent frequent activity and discard; and
- diet and subsistence strategy: effects of human behaviour.

The implication of this theory for archaeological studies is that the archaeological record is assumed to be spatially continuous, but artefact density will vary according to the pattern of resource utilisation (Kuskie and Kamminga 2000:255).

Foley's model has been used by archaeologists in the Hunter Valley, such as by Effenberger and Baker (1996) as a model of occupation for the Black Hill locality, to explain the assemblages identified at the Black Hill 2 and Woods Gully sites. Although recognised to provide valuable concepts applicable to hunter gatherer models of occupation, several models specific to Aboriginal occupation in NSW (with particular reference to the Hunter Valley) have been developed by past studies. These include:

- Dean-Jones and Mitchell (1993) suggest that various landforms were used to avoid climatic extremes and associated problems, to take advantage of resource-rich areas, and for ease of travel through the landscape. They also suggest that the saline groundwater associated with Permian Coal Measures may have influenced the seasonality of occupation in some areas and so the pattern of archaeological evidence (as summarised by Kuskie 2000:33-34);
- Koettig (1994) argues that the location of camps and the patterning within them was determined by rules based on the location of water sources, the demographics of the group and length of stay. The number of occupational episodes may therefore be interpreted through the spacing and distribution of features within a camp. The frequency

of these episodes was probably influenced by the availability of resources (as summarised by Kuskie 2000:33-34);

- Rich (1995) argues that technological strategies enabled people to manage resources in the landscape and social strategies enabled management of the uncertainty and risk involved in hunting and gathering. Within the Bayswater catchment, Rich (1992) established a model of archaeological site location which states that the major evidence of Aboriginal occupation of the area, are stone artefact scatters which are most densely identified along major stream valleys. Site densities decrease uphill away from the streams, in minor tributaries and other terrain units including slopes, crests and hilltops. Additionally, sites close to major watercourses contain a greater number of functionally specific features such as knapping floors and heat treatment areas compared to other terrain units (as summarised by Kuskie 2000:33-34);

- Witter (1995) argues that the long-term base camps were located on the Hunter River and its major tributaries, and other open campsites in the region were peripheral to these (as summarised by Kuskie 2000:33-34); and

- Kuskie and Kamminga (2004) argued that occupation focused where multiple resource zones were present (primary zones), and that the larger and more reliable the resource base was, the more frequent and longer the occupation episodes became (2004:604). In areas outside of primary resource zones (secondary zones), occupation became more sporadic and focused within 50 metres of higher order watercourses and associated level to very gently inclined valley flats (2004:605). These areas were more likely to be utilised seasonally and camp sites were occupied by small groups of people for varying lengths of time (but of typically short duration). In areas outside of primary and secondary zones, Aboriginal use tended to involve hunting and gathering activities by small parties of men and/or women and children, along with transitory movement between locations and procurement of stone materials (2004:605).

These models reflect the key influences on occupation identified by Foley (1981), but identify that Aboriginal occupation of the Hunter Valley is more likely to be characterised by large numbers of small short term camp sites utilised by small groups of hunter-gatherers (usually families). Long-term base camps or camps used by large groups of hunter-gatherers could only be situated at places of high resource diversity and permanent water and thus would be much rarer in the landscape.

5.5 Implications for Archaeological Patterning and Site Survival

This section discusses the implications of the environmental, ethnohistoric and archaeological research presented in the above sections for the Stage 3 assessment area, with specific reference to pre- and post-contact Aboriginal land use and occupation, archaeological site patterning, site survival and detection.

Review of geological information indicates that:

- a significant portion of the assessment area is contained within sandstone geological units, excluding the narrow band of shale beneath the steep slopes of the Broken Back Range and the alluvium of the Sandy and Cony Creeks. Surface outcrops of sandstone may occur within the Branxton Formation and the Muree Sandstone geological units, occurring as either horizontal platforms in creeklines or as shelters or overhangs in steep terrain areas. Archaeological site types such as axe grinding grooves, engraving sites, and shelters (with art and/or deposit) may therefore be found within the assessment area;

- sources of ochre or fine grained siliceous rock are not known within the assessment area, so quarry sites are considered unlikely to occur;

- conglomerates occur in all bedrock geological units of the assessment area, and surface outcrops of conglomerate may contain a range of fine grained stone materials, such as chert and quartz. Raw material may therefore have been opportunistically sourced and utilised within the assessment area; and

- Cony and Sandy Creeks are unlikely to contain suitable raw materials for artefact manufacture, as the only known location for silcrete and mudstone – the dominant raw materials of the region – sourcing is the Hunter River.

Review of soil information indicates that:

- duplex soils occur throughout the assessment area, and surface layers of duplex soils (A horizons) may be quite young, and are more likely to be about 200-300 years old rather than 3000-20000 years old (Dean-Jones and Mitchell 1993:67). Artefacts recorded in surface deposits are therefore unlikely to be of significant age;

- geomorphic and archaeological studies (such as Dean-Jones 1993) have demonstrated that the development of stone layers between A and B horizons is a common feature of duplex soils as a result of rainwash and bioturbation. Stone artefacts are therefore most likely to be buried in the subsoil, rather than occur on the surface, but the downward movement of artefacts indicates that open sites will have limited stratigraphic integrity;

- soils of the assessment area are dominantly classified as highly dispersible and erodible and are highly susceptible to sheet and gully erosion. This is particularly relevant for the steep slopes of the Broken Back Range, where slopes of up to 30 per cent in gradient experience high levels of sheetwash and erosion. In these areas, post-depositional movement of stone artefacts is likely to occur, with artefacts moved to lower landform contexts. In the valley lowlands, post-depositional movement of artefacts is likely to be less, given the gentler slope;

- the floodplains of Cony and Sandy Creeks are aggrading soil landscapes, so there is potential for artefacts to be found in subsurface deposits, although geomorphic processes suggest that the stratigraphic and spatial integrity of such deposits may be limited;

- the soil pH throughout the assessment area varies from slightly acidic to alkaline (pH 5 to 6.5). Those areas with neutral soils (pH 7) will have greater potential for the preservation of organic materials, including bone, than those of an acidic or highly alkaline nature. Given this, the potential for organic and skeletal material to survive within assessment area is low; and

- archaeological materials are more likely to be detected when the colour of the artefact contrasts against background soil colours, which in the assessment area are dominantly yellow, red and brown. Artefact detection may therefore be variable by soil landscape and raw material.

Review of landform and creek order information indicates that:

- the landscape of the assessment area is diverse, ranging from gently undulating alluvial landforms to steep slopes of the Broken Back Range. Flora and fauna species vary between landscape areas, therefore providing a diversity of resources within the area;

- the Stage 3 assessment area has numerous watercourses, of relevance as previous archaeological investigations have strongly correlated availability of water and Aboriginal

camp locations. Low-gradient landforms (such as flats and lower slopes) surrounding these watercourses would provide suitable camping locations, particularly when associated with creek confluences. However, the majority of watercourses are ephemeral, so would periodically but not permanently provide sufficient fresh water to support temporary campsites. Cony and Sandy Creeks would have provided the more permanent water sources within the Stage 3 assessment area, and therefore may have been more intensively used, which could be evidenced by higher site and artefact densities;

- natural ponds within ephemeral creek systems, such as those recorded along Black Creek, would retain water in drier times, thereby forming focal points for camping, and through attracting local fauna, may have provided a focus for hunting;

- Sandy Creek and the eastern section of Cony Creek (to the east of its junction with Sandy Creek) contain areas classified as floodplain and swamps (wetlands). Wetland areas are characterised by increased biodiversity, and are likely to have been subject to more intensive and frequent use than other landscape areas, which is expected to be reflected in the archaeological record of the surrounding landforms (the high terraces and hillslopes that provide camp locations in proximity to wetland resources);

- higher landforms such as spurs and ridge crests offer broad outlooks over the landscape, particularly in the Broken Back Range to the north. These landforms may have been used as travel routes or camp sites when there is a requirement to watch out for approaching allies/enemies; or to plan a hunt or take advantage of a cooling breeze. Archaeological sites may be found in these landforms reflecting such transient land use; and

- the steep slopes adjoining crests in the Broken Back Range are not suitable for Aboriginal camp site locations due to their gradient, so use of these landforms, and therefore deposition of archaeological materials, was most probably limited to transient hunting and gathering. Further, some downslope movement of artefactual material is expected given the gradient of the landforms.

Little information is available on the likely flora and fauna resources of the Quorrobolong valley prior to contact, so it is difficult to reconstruct Aboriginal use patterns within the region. However, review of contemporary flora and fauna resources of the area indicates that:

- a variety of animals hunted and plants utilised in the past (as food, economic and medicine) do occur within the area, which could have supported past Aboriginal use. However, these resources are not significant and would therefore not have supported a larger, more permanent Aboriginal population;

- areas with higher diversity of flora and fauna resources are likely to have been subject to more intensive and/or repeated use. Within the assessment area, this suggests that Cony Creek and Sandy Creek would have been subject to greater resource exploitation than surrounding landscape areas. This increased use is likely to be reflected in the archaeological record; and

- aquatic resources are limited within the project area due to the dominance of ephemeral drainage lines, indicating minimal opportunities for aquatic resource exploitation. To the east, Ellalong Lagoon would provide a key aquatic habitat and a permanent source of water, making it a likely regional focus for occupation.

Review of climate information indicates that:

- the region receives most of its annual rainfall in summer, including in a number of high intensity storms. Heavy rain within the assessment area will result in topsoil erosion, particularly in those areas that are highly erodible and dispersible, and possible post-depositional artefactual movement, especially following European land clearance and grazing;

- various forms of weathering may impact archaeological sites, including chemical, thermal and mechanical. Weathering affects archaeological materials in varying ways, and in particular, organic materials such as bone and shell will tend not to be preserved in open archaeological sites. Chemical weathering can also affect stone artefactual materials after deposition, such as unintentional heating and exfoliation causing shattering;

- flooding of landforms along Cony and Sandy Creeks may have affected archaeological sites, with discarded artefacts being subject to both spatial and stratigraphic post-depositional movement; and

- any weirs or rock fishtraps erected in streams are unlikely to have survived with time, particularly in flood prone areas.

Review of land use information indicates that:

- clearance of vegetation throughout the assessment area has been widespread, with little mature, native vegetation remaining. Vegetated areas in the modern landscape are predominantly regrowth, with few trees over 50 years in age observed within the assessment area. Clearance of vegetation can result in disturbance to the upper soil horizons through removal of tree stumps and roots. Archaeological sites are likely to survive in these areas, although their spatial and stratigraphic integrity may be affected;

- pastoralism has been the dominant land use of the assessment area, and has further resulted in introduction of foreign grasses and areas of localised earthworks for pastoral infrastructure. Dense, introduced grasses can obscure surface archaeological deposits in pastoral areas, and any archaeological sites within localised earthwork areas are likely to have been destroyed or highly disturbed. Grazing stock animals in pastoral areas may also create areas of exposure along creek banks and along stock trails, providing opportunities for archaeological detection;

- residential and primary industrial development within the Stage 3 assessment area, such as roads, houses and chicken sheds, has resulted in areas of high impact, and archaeological sites in these areas are likely to have been destroyed or highly disturbed;

- agriculturalism has been limited in the area, but it was and is present on a number of private properties. In these areas, archaeological sites are likely to have been affected by ploughing and cultivation, with these processes known to redistribute artefacts spatially and move stone to the surface (Dean-Jones and Mitchell 1993:47);

- stream morphology and hydrology throughout the Hunter Valley has changed significantly since European settlement, with common changes including incision of tributary streams, extension of gullies; and erosion and sedimentation during major floods (Dean-Jones and Mitchell 1993:4). As a result, modern stream alignments may not represent pre-contact alignments, particularly in low lying areas where streams could be easily redirected through such processes. Archaeological sites originally found near streams may therefore be removed by some distance within adjacent landforms; and

- construction of dams along the streams of the Stage 3 assessment area is common, and in these areas, sites are expected to be highly disturbed or destroyed.

Review of ethnohistoric information indicates that:

- the availability of fresh water was a determining factor in the location of Aboriginal camp sites, and that locations that provided good vantage points were also favoured as camp sites. This should be reflected in the archaeological record, with site density increasing near watercourses and on vantage points. Raised land adjacent a water course, fulfilling both criteria, is highly likely to have been utilised in the past;

- Aboriginal people utilised all landscape areas to take advantage of a range of resources. Larger, more permanent camp sites would have been found in places with a permanent water supply and a range of flora and fauna resources, such as along the Hunter River and at Ellalong Lagoon. Smaller camp sites would be found throughout the region reflecting transient hunter and gatherer movement, with the intensity of use influenced by the range and reliability of resources;

- Aboriginal people removed bark from trees to make containers and shields and evidence of bark removal may be exhibited by mature native trees if they survived natural death and European land clearance;

- camp sites are likely in the same areas initially targeted for homesteads by Europeans. These are usually where there is a good freshwater supply;

- post-contact sites (sites that contain evidence suggesting they were used after European settlement) are likely to be rare due to the rapid pace of European settlement in the Hunter Valley, with traditional Aboriginal groups being affected by disease and driven away from traditional lands by pastoralists; and

- ethnohistoric references to two burial sites and one ceremonial site in the Quorrobolong Valley indicate these site types may be found within the Stage 3 assessment area; however, it is likely that a ceremonial site would instead be associated with Ellalong Lagoon that could provide sufficient water and flora and fauna resources to support an influx of people to a ceremonial site. Carved trees – such as the registered carved tree once recorded along Sandy Creek (noted as destroyed on the AHIMS site card) – are commonly associated with burial or ceremonial sites and could indicate a culturally significant place.

Review of AHIMS archaeological site information indicates that:

- site types recorded within the area include artefact scatters, isolated finds, shelter sites (art and/or deposit and/or engraving), burials, potential archaeological deposits, axe grinding grooves, carved trees, mythological (natural) sites and ceremonial sites (bora). Dominant site types are artefact scatters and isolated finds, reflecting trends throughout the Hunter Valley; and

- two archaeological sites are known within the Stage 3 project area, being two isolated finds to the north of the surface infrastructure site. The lack of additional sites throughout the area is considered to represent lack of archaeological survey coverage rather than absence of archaeological sites.

Review of previous archaeological research indicates that:

- archaeological survey within the Stage 3 project area has been limited, with the vast majority of the area not subject to previous archaeological investigation;

- archaeological research in the region has predominantly consisted of surveys, with few excavations providing information on the subsurface deposits of the region. Archaeological excavation in the Cessnock area (ERM 2003, Stedinger Associates 2005) has identified subsurface deposits in areas containing few or no surface artefacts. One site identified through excavation alone – Mount View 8 – contained 3,777 artefacts;

- archaeological research in the Central Lowlands of the Hunter Valley has been extensive and provides the context for this assessment. Archaeological investigations have included both survey and excavation, and have identified sites in all landforms while identifying that site density and complexity increases close to water and wetlands, probably due to increased biodiversity. More complex sites could therefore occur within 100 metres of major watercourses and wetlands, on terraces, flats or lower hillslopes;

- artefact scatters and isolated finds are the dominant site types at both local and regional levels. Sandstone archaeological sites such as grinding grooves or rockshelter sites do occur in areas of suitable geology, and other site types such as scarred or carved trees would only occur in areas where mature, native vegetation survives;

- artefact assemblages generally consist of flakes, broken flakes, retouched flakes, flaked pieces and cores. The dominant raw material is generally indurated mudstone and silcrete with porcellanite, silicified sandstone, hornfels, basalt, quartz, quartzite and chert commonly making up a minor component of the assemblages; and

- longer term Aboriginal occupation results in the discard of more cultural material, making these areas more obvious archaeologically than areas subject to transient use, where few artefacts are discarded.

6.0 The Predictive Model: Stage 3 Assessment Area

Predictive models are developed to indicate which site types are likely to be found in an area, and examine their likely distribution, content and integrity. Importantly, predictive models also suggest what site types are not likely to be found in the landscape.

This section presents the predictive model developed for the Stage 3 assessment area, based on the understanding of Aboriginal land use, and archaeological site survival. The predictive model was used to develop an appropriate survey strategy for the Stage 3 assessment area, and following the survey, was evaluated against survey results to identify the extent to which the Stage 3 assessment area was consistent with or differed from the predictive model. This information was used to further the understanding of the Aboriginal cultural heritage values of the Stage 3 assessment area and to inform appropriate management strategies developed in **Section 11**.

6.1 Site Type Occurrence

Section 5.4.1 defined the range of site types that may be found in the region, identified by previous archaeological research (or as possible sites by Aboriginal stakeholders), with comment on their likely secular/non-secular status as identified by Umwelt. These site types include: artefact scatters (open camp sites); isolated finds; scarred trees; carved trees; rockshelter sites; engraving sites; grinding groove sites; grinding bowls; waterholes/wells; pot holes; stone arrangements; fish traps; stone quarries; ochre quarries; ceremonial grounds; burials; and post-contact sites such as missions, reserves and massacre sites.

The following statements about the probability of site types being found within the Stage 3 assessment area has been derived from the review of environmental, ethnohistoric and archaeological literature.

Site types that may occur within the Stage 3 assessment area include:

- artefact scatters and isolated finds are predicted to occur within the Stage 3 assessment area, being the dominant site type within the local region and identified in all landform contexts;
- scarred trees may occur within the Stage 3 assessment area, as they have been previously recorded in the region and may occur in all landform contexts retaining mature, native vegetation;
- rockshelter sites are known to occur in the landforms of the Broken Back Range, and may occur in the slopes of the Stage 3 assessment area should they be sufficiently steep to produce overhangs;
- grinding groove sites have been recorded in the lower Hunter Valley in sandstone geological areas, such as those found within the Stage 3 assessment area;
- ceremonial ground (bora), as the literature review identified one documented bora ground within the Quorrobolong Valley (although this information is unprovenanced); and
- burial sites, as the literature review identified two documented burials within the Quorrobolong Valley (although this information is unprovenanced).

Site types not predicted to occur within the Stage 3 assessment area include:

- sandstone sites such as engravings, grinding bowls, stone arrangements, water holes or wells and pot holes. These site types do occur in sandstone geological areas, but are relatively rare site types and therefore not expected;

- carved trees are highly visible Aboriginal sites and generally do not survive within areas with a long non-Aboriginal history (particularly in cleared agricultural or pastoral regions). The presence of a registered carved tree site to the south of the Stage 3 assessment area is noted, but as noted on the AHIMS site card, the tree was destroyed at the time of recording;

- ochre and stone quarries, as no source of these materials is known to occur within the assessment area;

- fish traps as Cony and Sandy Creeks (and their tributaries) are not key aquatic habitats, and the fabric of fish traps are unlikely to be conserved; and

- post contact sites such as missions, camp sites with knapped glass or massacre sites, as these are not indicated by the ethno-historical research in this area.

6.2 Site Type Content

Artefact scatters and isolated finds are composed of stone artefacts, and the following predictions are made regarding likely site composition:

- the majority of sites are likely to be small artefact scatters of less than 10 artefacts or isolated finds;

- artefact scatters of more than 50 artefacts are rare, but they could occur along Cony and Sandy Creeks, as these areas are predicted to have had higher levels of use;

- silcrete and indurated mudstone dominate the stone assemblages of the Hunter Valley, and are also expected to dominate the Stage 3 area assemblage. Other raw materials utilised in the Hunter include quartz, quartzite, petrified wood, porcellanite, crystalline tuff, chalcedony and volcanics, which may be present in the Stage 3 assessment area. Some of these materials, such as quartz and quartzite, may be locally sourced from conglomerates within the assessment area;

- the predominant artefact types are expected to be flakes (including broken flakes), followed by cores and retouched flakes. Evidence of retouch and use wear may be present in a small percentage of the assemblage. Microblade technology is rarer, and is most likely to be found in large assemblages; and

- ground artefacts (grindstones and axes) are not common artefact types, and may not be found within the Stage 3 assessment area (or found in very low frequencies).

Scarred trees result from the removal of bark (most common) or wood, which leaves distinctive shapes depending of the use of the removed bark or wood. Two primary uses include removal of bark or wood for a canoe or container (which would result in a symmetrical elliptical shape) or removal for use in a shelter (which would result in a rectangular sheet shape). Scars are generally recorded on the lower portion of the trunk near ground level, and should the tree survive the removal event (which many do), the original wounds are often obscured by bark regrowth. The majority of scarred trees exhibit only one scar, although multiple scars on a single tree have been recorded. Eucalypt

varieties most specifically box trees are the most common trees scarred. Should scarred trees occur in the Stage 3 assessment area, they are likely to be symmetrical, elliptical shapes, and are most likely to have only one occluded scar.

Rockshelter sites are natural shelters or overhangs that contain archaeological material, predominantly occupation deposit or art. Occupation deposit is frequently buried, as geomorphic processes within the shelter act to cover and protect the deposit, and therefore they can provide datable sequences of occupation. Paintings and engravings have been recorded at Quorrobolong, and a range of shelter sites have been recorded on Wollombi Brook (Stedinger Associates 2003:13).

Grinding grooves are grooves on rock surfaces that have been manufactured by the sharpening of stone axe heads, stone chisels or fire hardened wooden spear points. In the lower Hunter Valley, the majority of known axe grinding grooves are located in the Sugarloaf Range and in the Watagan Ranges, and these can be complex sites containing numerous grooves and be associated with features such as pot holes. In other areas of the Hunter Valley, for example at Loders Creek near Singleton, a grinding groove site with 55 grooves was recorded in association with a concentrated and extensive artefact scatter (AHIMS site card 37-6-0148).

Ceremonial sites are relatively rare sites in the Hunter Valley, but the literature review identified a possible ceremonial ground within the Quorrobolong Valley. As detailed in **Section 5.2.2**, Needham (1981:36 from Haslam *pers. comm.*) describes the Quorrobolong ceremonial sites as a small ring with an apparent corridor leading away from it. This is consistent with descriptions of bora sites in south-east Australia, which generally consist two mounded rings – one between 25 to 30 metres in diameter, and the second approximately 10 to 12 metres in diameter – which are connected by a path (Bowdler 1999). Most bora sites have also been found in association with carved trees.

Needham (1981:38 from Reynolds *pers. comm.*) also identified two burial sites in the Quorrobolong Valley. Both are described as being under a tree or trees, and one is described as being a raised earth rectangular plot. This is consistent with some historical descriptions of burials in the Hunter Valley, with some early observers (such as Breton 1833:203-204) observing the deceased being covered with mounds of earth (instead of being placed in a hole) in the centre of a circle approximately thirty feet in diameter cleared of vegetation. Breton further notes that the trees for some distance were carved with figures representing kangaroos, emus, possums and weapons, some of which extended twenty feet above ground.

6.3 Site Type Distribution

Within the Stage 3 assessment area, artefact scatters and isolated finds are predicted to occur:

- in all landform contexts, but with increased frequency within 100 metres of watercourses;
- low-gradient landscape areas in association with permanent or semi-permanent water are generally preferred for camp sites, and creek confluences are often the location of sites. Areas such as spur crests and ridge crests that offer broad outlooks may also be used for camp sites. Creeklines or spur crests may provide excellent travel routes between resources;
- Sandy and Cony Creeks are classified as wetland environments, and as such, would have provided increased resource diversity. Artefact scatters not isolated finds are expected to characterise these areas, reflecting increased intensity of Aboriginal use; and

- artefact scatters and isolated finds are expected to be found in exposed areas resulting from erosion and/or human action, as these areas often provide the only effective visibility within pastoral landscapes characterised by dense grasses.

Within the Stage 3 assessment area, rockshelter sites are predicted to occur only in the landforms of the Broken Back Range, and only where slopes are sufficiently steep to produce overhangs. Review of slope class mapping for the Stage 3 assessment area identified that slopes over 50 per cent in gradient only occur in four discrete locations along the ridge system defining the north of the project area. Any rockshelters to occur are most likely to be found in these areas.

Within the Stage 3 assessment area, grinding groove sites are predicted to occur on sandstone ledges that outcrop in or immediately adjacent to creek beds within sandstone geological areas. Further, grinding groove sites are most likely to occur in landforms with sufficient gradient (steep slopes) so that geomorphic processes expose rather than bury the sandstone ledges. Consequently, within the Stage 3 assessment area, grinding groove sites are most likely to occur in the landforms of the Broken Back Range, as any sandstone ledges within the valley lowlands are most likely to be buried by alluvial deposition along watercourses. The majority of grinding grooves recorded within the region are found in the Sugarloaf Range where the majority occur in areas of higher gradient (Umwelt 2003:4.6), where the sandstone conglomerate is generally of a higher quality (less coarse) and therefore more suitable for grinding. This pattern may be replicated in the Broken Back Range.

Within the Stage 3 assessment area, scarred trees may occur wherever mature, native vegetation remains intact. Regrowth dominates the vegetation of the assessment area, with only the occasional mature tree observed. Given this, no prediction can be made of exact locations of scarred trees, as they may occur in low numbers throughout regrowth vegetation areas.

Needham (1981) clearly identifies the two potential burial sites within the Quorrobolong Valley are in proximity to Quorrobolong Creek, with a map (refer to **Figure 5.4**) identifying the sites are to the south-west of a southern turn in the alignment of Quorrobolong Creek. This suggests that the burial sites may be located to the north of Sandy Creek Road, approximately one kilometre west of the Stage 3 assessment area. However, it is recognised that the Needham map is not scaled correctly and that the creeklines shown do not conform to the actual creek alignments in the modern landscape, meaning the exact locations cannot be projected with confidence.

Available information about the potential ceremonial site in the Quorrobolong Valley suggests it is likely to be a bora ground. Bora sites can occur in a range of environmental contexts, but many are found on sloping hills, the spurs of ridges or low-lying areas often close to swamps (Bowdler 1999). Needham (1981) does not provide any description of the location of the bora site, but review of AHIMS data for the area identifies that one ceremonial site is recorded in the Quorrobolong Valley, positioned approximately three kilometres south-east of the Stage 3 project area, on low lying land no more than 150 metres from Wallis Creek. If Needham (1981) did not refer to this known site, it is possible that a ceremonial site may have been located within the Stage 3 assessment area, possibly on the floodplains of Cony and Sandy Creeks. However, it is far more likely that a ceremonial site in the Quorrobolong Valley would be positioned in the vicinity of the Ellalong Lagoon, which would have provided a reliable water source and a range of flora and fauna resources that could support participants of the ceremony for the required period.

6.4 Site Type Integrity

The integrity of artefact scatters and isolated finds within the Stage 3 assessment area is predicted as:

- artefact scatters and isolated finds within most landforms of the valley lowlands are expected to have low to moderate integrity as a result of vegetative clearance and grazing;
- artefact scatters and isolated finds within areas subject to past and present cultivation (within the valley lowlands) are expected to be of low integrity, as ploughing will redistribute artefacts both spatially and stratigraphically. Where cultivation is undertaken on terraces and lower slopes (i.e. in soil profiles of some depth), sites may survive with some integrity beneath the plough zone;
- artefact scatters and isolated finds within areas of localised earthworks or excavation, including residential, pastoral, agricultural and industrial are expected to have very low integrity, and many sites in these areas may have been destroyed;
- artefact scatters and isolated finds associated with ephemeral creeks are unlikely to retain integrity due to erosion and stock trampling; and
- artefact scatters on slopes are expected to have been affected by the downslope movement of soils causing the redistribution of the artefacts down the slope and their remixing and reburial downslope.

Sandstone archaeological sites are predicted to occur within the landforms of the Broken Back Range, and consequently, these site types are predicted to have high integrity as the area is included within the Werakata State Conservation Area. Sites may be subject to ongoing erosion from water action, particularly any grinding groove sites as these are expected to be located within or adjacent to watercourses, and therefore may be affected by stream flow and over bank erosion.

Scarred trees may occur in all landforms of the Stage 3 assessment area, wherever mature, native vegetation is retained. The vast majority of existing vegetation within the area is regrowth, evidencing widespread clearance in the past. Such clearance would require the use of large machinery, and it is possible that any remnant mature vegetation may have been affected by the movement of such machinery throughout significant portions of the landscape. As a result, the integrity of any remaining scarred trees may be affected.

Needham (1981) indicates that the two burials within the Quorrobolong Valley are positioned on alluvial flats in proximity to Quorrobolong Creek, although the possible occurrence of burials along Cony and/or Sandy Creek is recognised. Survival of burials in such alluvial contexts is limited by geomorphic processes, with these landforms being subject to ongoing alluvial deposition and flood action, and the natural pH of the alluvial flats. As previously noted, the pH of soils within the assessment area ranges between pH 5 and pH 6.5, and it is recognised that there is limited potential for organic and skeletal material to survive in soils with a pH lower than 7.

Needham (1981) does not provide any information on the location of the ceremonial site in the Quorrobolong Valley, but this reference may possibly be to the known ceremonial site near Wallis Creek to the south-east of the Stage 3 area. If the reference is to another, as yet unregistered ceremonial site, the survival of the site would be dependent on the land use history of the context. Low-lying areas, such as along Cony and Sandy Creeks, have had a long history of European land use, and it is unlikely that the earthen mounds of the bora site

would survive in this context. However, survival of a bora site is higher within the designated conservation areas and state forests surrounding the Quorrobolong Valley.

7.0 Archaeological Survey

This section provides details of the fieldwork carried out as part of the Aboriginal heritage assessment, spanning research design, effective coverage, additional sites recorded, and areas of archaeological potential identified. The interpretation of these results is also discussed, with survey results cross referenced to the predictive model developed in **Section 6**. The likely Aboriginal archaeological values of properties that were not accessible are also addressed, on the basis of the refined understanding of Aboriginal heritage of the area.

7.1 Research Design

The primary aim of the archaeological survey was to identify any visible surface archaeological deposits within the Stage 3 assessment area, and to evaluate the likely occurrence of undetected archaeological sites. Further, the survey aimed to document sufficient information on identified sites to inform the scientific significance assessment and the impact assessment, both of which are fundamental in determining appropriate management strategies for the Stage 3 project.

Umwelt formulated a draft survey strategy following consideration of predicted archaeological site patterning, the nature of the Stage 3 proposal and likely impacts, access to the Stage 3 assessment area, and Aboriginal stakeholder comment. This strategy consisted of:

- the locations of all Stage 3 surface infrastructure will be surveyed, being the surface infrastructure site and associated access road and electricity distribution line;
- within Werakata State Conservation Area, areas likely to contain sandstone archaeological sites will be surveyed, approximately defined by the 20 millimetre subsidence contour. This will include survey of all creeklines to identify grinding grooves, and a targeted (sample) survey of steep slopes within sandstone geological areas to identify rockshelters or overhangs;
- throughout the valley lowlands (mid and southern sections of the Stage 3 assessment area), all creeklines and associated terraces and floodplain areas within accessible properties will be surveyed. Survey will focus on an area approximately defined by the 20 millimetre subsidence contour. Artefact scatters and isolated finds are more likely to be found within these landforms, and creek channels will also be inspected for sandstone outcrops that may be associated with grinding groove sites;
- throughout the valley lowlands, all crests within accessible properties will be surveyed, as artefact scatters and isolated finds may occur in these high terrain areas between creek catchments. Survey will focus on an area approximately defined by the 20 millimetre subsidence contour;
- throughout the valley lowlands, a sample of hillslopes areas within accessible properties will be surveyed to develop an understanding of site distribution throughout this landform. Survey will focus on an area approximately defined by the 20 millimetre subsidence contour; and
- mature, native vegetation observed within accessible properties areas during archaeological survey will be inspected to identify any cultural scarring.

As noted above, survey was only proposed for and conducted within accessible properties. At the time of Stage 3 survey, approval was obtained to Austar owned properties, Werakata State Conservation Area and five private properties (illustrated on **Figure 7.1**).

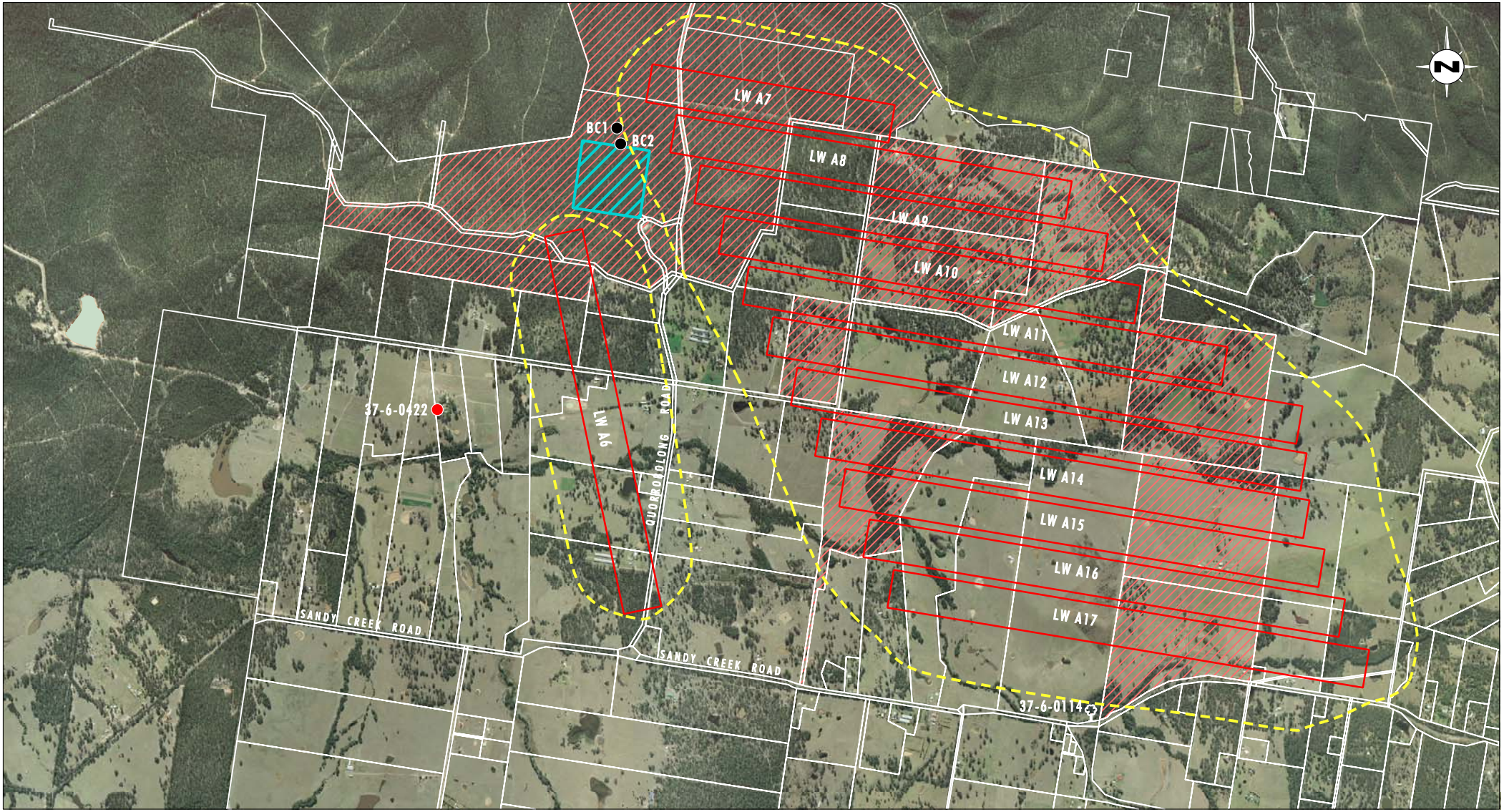
The survey strategy also proposed a standardised methodology for all areas surveyed. All pedestrian survey transects were to be linear transects, inspected by a survey team of up to five individuals (one archaeologist and up to four Aboriginal stakeholder representatives). Each member of the survey team was to walk approximately two to five metres apart to ensure thorough coverage of each transect to an average width of 20 to 25 metres. A minimum level of information was to be recorded by the archaeologist for each transect, including location, landform element, slope, geomorphic activity and agent, human action, exposure, soil profile exposed and the presence or absence of archaeological materials. All stone artefacts identified were to be flagged using high visibility survey markers, and the survey team inspected the surrounding area to determine the visible extent of the deposit. All sites were recorded to document information on environmental context, site type, artefact type and raw material. Photography was also to be an important element of the survey, and all survey areas and additional find locations were to be photographed and documented.

Aboriginal stakeholders were provided with the above methodology on 22 August 2008, with a request to return any comments by 11 September 2008. An Aboriginal stakeholder meeting was held at Austar Coal Mine on 10 September 2007 to discuss the draft survey strategy, and the larger Stage 3 project. **Table 7.1** lists all Aboriginal stakeholders who attended the Austar project meeting on 10 September 2007 and participated in the following discussion.

Table 7.1 - Aboriginal Stakeholder Meeting Attendance, 10 September 2007

Stakeholder	Representative
Aboriginal Native Title Consultants	John Matthews, Margaret Matthews
Arthur Fletcher	Arthur Fletcher
Giwiirr Consultants	Michele Stair
Hunter Valley Cultural Consultants	Colleen Stair
Hunter Valley Cultural Surveying	Luke Hickey
Lower Hunter Wonnarua Council	Tracey Skene
Mindaribba Local Aboriginal Land Council	Tom Miller
Mingga Consultants	Clifford Matthews
Tracey Skene	Tracey Skene *(also representing LHWC)*
Upper Hunter Heritage Consultants	Justin Matthews
Wattaka Wonnarua Cultural Consultants Services	Des Hickey
Wonnarua Culture Heritage	Gordon Griffiths
Yarrawalk	Barry French

During the meeting, Austar representative Keren Halliday described the Stage 3 project and Umwelt representative Peter Jamieson discussed the early results of the MSEC report on predicted subsidence resulting from Stage 3 works. Meaghan Russell (Umwelt) then presented an overview of the Aboriginal heritage assessment process, and led a discussion on the proposed draft survey strategy. During the meeting, the following comments were provided by Aboriginal stakeholders on the draft survey strategy:



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW,
Aerial Photography: AAM Hatch 2006

0 0.5 1 1.5km
1:32 000

Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Surface Infrastructure Site
- Accessible Properties/Survey Areas
- Artefact Scatter
- Isolated Find
- Carved Tree

FIGURE 7.1

Stage 3 Survey Areas

File Name (A4): R13_V1/2274_243.dgn

- a concern regarding water management and future water quality was noted, with Arthur Fletcher questioning the precise impact to any creeks and aquifers on site;

- the impact to areas not surveyed due to lack of access, with Luke Hickey noting that sites in those areas may be disturbed by subsidence; and

- proposed coverage of the survey strategy, with Arthur Fletcher requesting hillslopes to be surveyed on foot, not just with vehicle transects.

Several Aboriginal stakeholders provided Umwelt with statements on the draft survey strategy during or immediately following the formal review period, which ended on 12 September 2007. **Table 7.2** provides a summary of all comments received, all of which are attached as **Appendix 1**.

Table 7.2 - Aboriginal Stakeholder Comments on Survey Strategy

Stakeholder	Date Received	Comment
Aboriginal Native Title Consultants	12-09-07	Agrees with draft survey strategy. No further comment provided.
Arthur Fletcher	10-09-07	Agrees with draft survey strategy. Further comment provided – that he would have liked to visit previously mined areas containing water courses during the site visit on 10-09-07. Further notes that 'all country that we belong to is highly significant to our peoples'. Requested Stage 1 and 2 archaeological reports.
Giwiirr Consultants	10-09-07	Agrees with draft survey strategy. No further comment provided.
Hunter Valley Cultural Consultants	12-09-07	Agrees with draft survey strategy. No further comment provided.
Hunter Valley Cultural Surveying	11-09-07	Agrees in principal with the draft survey strategy, but notes that surveying should extend across a variety of landforms that may be impacted, and that all infrastructure should be surveyed. If sites have been recorded within the area previously, they should be inspected to confirm the locations on the ground. Issues that should be included in the assessment: shelters with art or deposit; axe grinding grooves; bora/ceremonial sites; rock engravings; scarred and carved trees; quarry sites (stone and ochre); fish traps; stone arrangements; and waterholes/wells.
Mingga Consultants	10-09-07	Agrees with draft survey strategy. No further comment provided.
Upper Hunter Heritage Consultants	11-09-07	Agrees with draft survey strategy. Further comment provided – UHHC would like to be involved with project from start to finish.
Wattaka Wonnarua Cultural Consultants Service	11-09-07	Agrees with draft survey strategy. Further comment provided – WWCCS requests that the entire accessible properties be surveyed, as no significant Aboriginal sites should be overlooked.
Wonnarua Culture Heritage	13-09-07	Agrees with the draft survey strategy. Further comment provided – that all groups that have an interest in the project should be involved in works.

In response to the above comments, the draft survey strategy was amended to include pedestrian survey of hillslopes in addition to vehicular transects. With the combination of pedestrian and vehicular transects, coverage of all accessible properties would be extensive and provide a sample of all landforms within the Stage 3 assessment area.

7.1.1 Landform Classification

Prior to archaeological survey, the landscape of the Stage 3 assessment area was delineated into a series of landform elements and stream orders, based on definitions outlined in McDonald et al (1990) and Strahler (1964).

McDonald et al (1990) define the landscape by landform patterns and landform elements, with the fundamental difference between the two being size – with patterns defined as more than 600 metres across, and elements defined as 40 metres or more across. Landform elements provide the necessary level of detail for describing and analysing archaeological site distribution, and are therefore used in this assessment to describe the Stage 3 assessment area. **Table 7.3** lists the landform elements defined by McDonald et al (1990) used in this assessment.

Table 7.3 - Landform Element Definition (from McDonald et al 1990:13-19)

Landform Element	Description
Crest	Landform element that stands above all, or almost all, points in the adjacent terrain. Characteristically smooth convex. Margin of the crest should be drawn at the observed curvature. Relevant element types include: • Hillcrest: very gently inclined to steep crest, smoothly convex. Typical element of hills and rises. • Summit surface: very wide level to gently inclined crest with abrupt margins, commonly eroded by sheet wash or water-aided mass movement.
Hillock	Compound landform element comprising a narrow crest and short adjoining slopes, the crest length being less than the width of the landform element. Relevant element types include: • Tor: steep to precipitous hillock with a surface of mainly bare rock, eroded by sheet wash or water aided mass movement. • Mound: Hillock built by human activity.
Ridge	Compound landform element comprising a narrow crest and short adjoining slopes, the crest length being greater than the width of the landform element. Relevant element types include: • Embankment: ridge or slope built up by human activity. • Levee: long, low sinuous ridge adjacent a stream channel, built up by over bank flow. Usually either side of a stream channel, at the level reached by frequent floods.
Slope	Planar landform element that is neither a crest nor a depression and has a greater inclination than 1%. Can be further subdivided into simple slope, upper slope, mid-slope and lower slope based on gradient, and relationship between slope breaks. Relevant element types include: • Scarp: wide maximal slope eroded by gravity, sheet flow or water aided mass movement. • Footslope: waning lower slope resulting from aggradation or erosion by sheet flow, earth flow or creep. • Bench: short gently or very gently inclined minimal midslope element, eroded or aggraded by any agent.

Table 7.3 - Landform Element Definition (from McDonald et al 1990:13-19) (cont)

Landform Element	Description
Flat	Planar landform element that is neither a crest nor a depression and is level or very gently inclines (less than 3% tangent approximately). Relevant element types include: • Plain: large gently inclined to level element of unspecified geomorphic agent. • Fan: large gently inclined to level element resulting from aggradation or erosion from channelled stream flow, or possible sheet flow. • Terrace flat: small flat eroded or aggraded by over bank stream flow and no longer frequently inundated (part of a former flood plain).
Open Depression	Landform element that stands below all, or almost all, points in the adjacent terrain. Open depressions extend at the same elevation or lower beyond the observed locality. Relevant element types include: • Gully: open depression with short precipitous walls, small stream channel, eroded by channelled water flow. • Stream channel: linear generally sinuous open depression, comprising stream banks and stream beds.
Closed Depression	Landform element that stands below all points in the adjacent terrain. Relevant element types include: • Swamp: almost level closed (or almost closed) depression with a seasonal water table at or above the surface. • Lagoon: closed depression with water, typically salt or brackish.

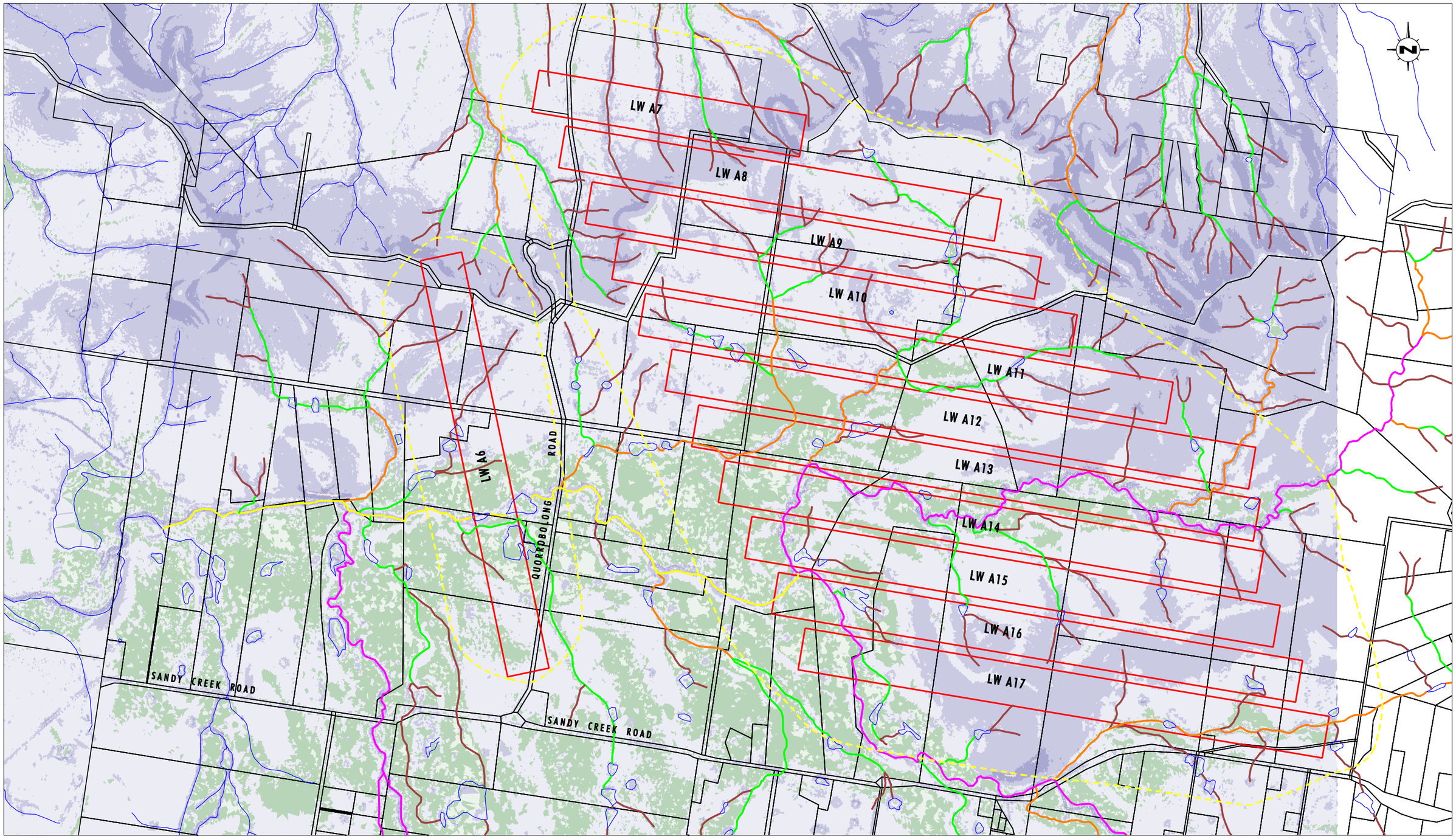
The slope landform element defined above describes a significant proportion of the Stage 3 assessment area, and can be further subdivided by slope class, as presented in **Table 7.4**.

Table 7.4 - Slope Class (from McDonald et al 1990:12)

Slope Description	Slope Class	Approximate Slope (%)	
		Boundary	Average
Slope (VG)	Very gently inclined	1-3	1
Slope (G)	Gently inclined	3-10	6
Slope (MO)	Moderately inclined	10-32	20
Slope (ST)	Steep	32-56	40
Slope (VS)	Very steep	56-100	70
Slope (PR)	Precipitous	100-300	170
Slope (C)	Cliffed	300-	500

Figure 7.2 presents the slope class mapping conducted for this project, based on aerial laser scanning (ALS) survey data collected by AAM Hatch during August 2006. This survey captured approximately 80 million survey points within the Quorrobolong Valley describing the land and channel systems, each with an average horizontal accuracy of less than 0.55 metres (AAM Hatch 2006). This level of topographic information far exceeds the usual sources for landscape analysis, being review of contour information on NSW topographic maps.

McDonald et al (1990) also identify slope by four morphological units that relate to changes in slope class within the slope. These are:



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW

Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Boundary

Slope (Degrees)

- Range [0.000 : 1.000]
- Range [1.000 : 3.000]
- Range [3.000 : 10.000]
- Range [10.000 : 32.000]
- Range [32.000 : 56.000]
- Range [56.000 : 100.000]
- Range [100.000 : 300.000]
- Range [300.000 : 10000.000]

Stream Order

- Stream Order 1
- Stream Order 2
- Stream Order 3
- Stream Order 4
- Stream Order 5

FIGURE 7.2

Slope Class and Stream Order Mapping

- simple slope, which is a slope element adjacent below a crest or flat and adjacent above a flat or depression;
- upper slope, which is a slope element adjacent below a crest or flat but not adjacent above a flat or depression;
- mid slope, which is a slope element not adjacent below a crest or flat and not adjacent above a flat or depression; and
- lower slope, which is a slope element not adjacent below a crest or flat but adjacent above a flat or depression.

In addition to slope class, the above units will be used by the archaeological field team to describe landform of survey transects and recorded site locations.

The open depressions defined in **Table 7.3** are further classified by stream order for the purposes of this archaeological assessment. Strahler (1964) defined a simple method of stream order classification based on the number of upstream tributaries, and in summary, a stream with no tributaries is considered a first order stream, then two first order streams join to become a second order stream, two second order streams join to become a third order stream, and so on. **Figure 7.2** also illustrates all creek lines within the project area by stream order.

7.1.2 Archaeological Site Classification

The term archaeological site is used to define a location where a relic occurs in the landscape. 'Relics' are defined under the NPW Act as:

> ….any deposit, object or material evidence (not being a handicraft made 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.

The majority of sites predicted to occur within the Stage 3 assessment area are artefact scatters or isolated finds, and the difficulty in defining the limits of these site types is well recognised as archaeological survey alone can only determine the visible extent of the surface deposit. The extent of the subsurface deposit, and obscured surface deposit, can only be determined through archaeological excavation. Given this, site boundaries are often defined based on the visible extent of the artefactual deposit observed within surface exposures, or the predicted site extent based on an understanding of archaeological potential.

During the field survey, all identified artefacts were recorded as individual find locations to ensure sufficient detail on location and environmental context was documented for each. Where individual find locations were found in association, these have been grouped together as archaeological sites. For example, 24 artefacts recorded along 700 metres of the southern bank of Cony Creek have been recorded as a single archaeological site, as find locations are connected by the shared landform and proximity to Cony Creek, all are considered to reflect the archaeological potential of the Cony Creek southern terrace. Site descriptions provided in **Section 7.3** identify the boundary of each additional site recorded in the Stage 3 assessment area.

7.1.3 Areas of Archaeological Potential

In this report, the term 'archaeological potential' is used to refer to the likelihood of subsurface artefacts being present at a specific locale. The evaluation of archaeological

potential is based on two primary criteria: the probability of artefactual deposition resulting from past Aboriginal land use; and the terrain integrity of the locale following consideration of geomorphic processes and human action. Following consideration of these criteria, the following terms will be employed to classify the archaeological potential of specific locations:

- **no archaeological potential**: areas where the natural soil profile has been removed through geomorphic processes or human action, thereby removing any archaeological resource of the location. Examples of this category would include a landslide or industrial quarry sites;

- **low archaeological potential**: landscape areas that may have been utilised by Aboriginal people in the past, but at a lower intensity than all surrounding landforms. The density of artefacts deposited within these areas would therefore be low. This category also includes landscape areas of low terrain integrity, where geomorphic processes or human action may have redistributed artefacts from their deposited locations, resulting in site disturbance or destruction;

- **moderate archaeological potential**: landscape areas that are predicted to have been utilised by Aboriginal people in the past, but not intensively or repeatedly. There is therefore potential for artefactual deposition, but at a lower frequency and density than in areas of high archaeological potential. Terrain integrity in these areas may be variable, but the majority of open camp sites are expected to be of low to moderate integrity only, with geomorphic processes not acting to bury deposits *in situ*;

- **high archaeological potential**: landscape areas predicted to have been intensively or repeatedly utilised by Aboriginal people in the past, such as creek confluences or elevated terraces above major watercourses. Terrain integrity in these areas may be variable, but the majority of open camp sites are expected to be of low to moderate integrity only, with geomorphic processes not acting to bury deposits *in situ*; and

- **very high archaeological potential**: landscape areas predicted to have been more intensively or repeatedly utilised than all surrounding landforms by Aboriginal people in the past, such as major creek confluences or lagoons. Terrain integrity in these areas may be variable, but these landforms may include areas of high terrain integrity, where geomorphic processes may act to bury deposits *in situ*. Sites may therefore be of high archaeological research potential.

7.2 Aboriginal Fieldwork Participation

All Aboriginal stakeholders who registered an interest in the Austar Coal Mine project at its outset were invited to be involved in the archaeological survey, with six paid fieldwork positions available each day. The fieldwork submission form requested that stakeholders nominate representatives for fieldwork, and identify the experience of each, and respond to each of the following criteria:

- representatives must have appropriate experience, ability and reliability;

- the group must demonstrate they have appropriate insurance;

- the group must be able to provide each of their representatives with appropriate Personal Protective Equipment and Clothing (PPE&C) including boots, long trousers and hat;

- representatives must be physically fit, capable of walking over steep slopes and have no serious medical conditions which are likely to inhibit fitness during fieldwork;

- representatives must have demonstrated ability to work effectively in a team environment; and

- individuals can only be represented by a single head organisation for the purpose of fieldwork.

Eleven Aboriginal stakeholders wished to be involved in the survey and provided Umwelt with submissions for field positions, including: Aboriginal Native Title Consultants; Giwiirr Consultants; Arthur Fletcher; Hunter Valley Cultural Consultants; Hunter Valley Cultural Surveying; Lower Hunter Wonnarua Council; Mindaribba Local Aboriginal Land Council; Upper Hunter Heritage Consultants; Wattaka Wonnarua Cultural Consultants Service; Wonnarua Culture Heritage; and Yarrawalk. To ensure that each interested stakeholder was able to participate in the survey, a rotational system was developed for Aboriginal fieldworkers. In summary, six Aboriginal fieldworkers were needed each day of survey, with each stakeholder providing one representative every second day. This theoretically provided stakeholders with as equal involvement as possible, and ensured that stakeholders had maximum exposure to fieldwork progress, being present at least every second day. In practice, this system was modified in response to individual availability of fieldworkers as required, and this was resolved by field archaeologists prior to and during the survey.

Table 7.5 lists the participation of Aboriginal stakeholders in the Stage 3 archaeological survey.

Table 7.5 - Aboriginal Stakeholder Fieldwork Representation

Date	Stakeholder	Field Representative
19/09/07	Giwiirr Consultants	Barry Stair
	Hunter Valley Cultural Consultants	Colleen Stair
	Hunter Valley Cultural Surveying	Luke Hickey
	Mindaribba Local Aboriginal Land Council	Steven Talbot
	Wattaka Wonnarua Cultural Consultants Services	Des Hickey
	Wonnarua Culture Heritage	Shannon Griffiths
20/09/07	Aboriginal Native Title Consultants	Margaret Matthews
	Giwiirr Consultants	John Matthews
	Hunter Valley Cultural Consultants	Colleen Stair
	Christine Dever	Mindaribba Local
	Upper Hunter Heritage Consultants	Justin Matthews
	Wonnarua Culture Heritage	Shannon Griffiths
21/09/07	Aboriginal Native Title Consultants	Margaret Matthews
	Aboriginal Native Title Consultants (Volunteer)	John Matthews
	Barry Stair	Giwiirr Consultants
	Hunter Valley Cultural Consultants	Colleen Stair
	Mindaribba Local Aboriginal Land Council	Christine Dever
	Upper Hunter Heritage Consultants	Justin Matthews
	Wonnarua Culture Heritage	Gordon Griffiths

Table 7.5 - Aboriginal Stakeholder Fieldwork Representation (con't)

Date	Stakeholder	Field Representative
03/10/07	Aboriginal Native Title Consultants	Margaret Matthews
	Arthur Fletcher	Arthur Fletcher
	Giwiirr Consultants	Colleen Stair
	Lower Hunter Wonnarua Council	Tracey Skene
	Upper Hunter Heritage Consultants	John Matthews
	Wattaka Wonnarua Cultural Consultants Services	Des Hickey
	Yarrawalk	Barry French
04/10/07	Aboriginal Native Title Consultants	Margaret Matthews
	Arthur Fletcher	Arthur Fletcher
	Hunter Valley Cultural Surveying	Luke Hickey
	Lower Hunter Wonnarua Council	Tracey Skene
	Upper Hunter Heritage Consultants	John Matthews
	Wattaka Wonnarua Cultural Consultants Services	Des Hickey
	Yarrawalk	Barry French
05/10/07	Arthur Fletcher	Arthur Fletcher
	Hunter Valley Cultural Surveying	Luke Hickey
	Lower Hunter Wonnarua Council	Tracey Skene
	Mindaribba Local Aboriginal Land Council	Christine Dever
	Wattaka Wonnarua Cultural Consultants Services	Des Hickey
	Wonnarua Culture Heritage	Shannon Griffiths
	Yarrawalk	Barry French

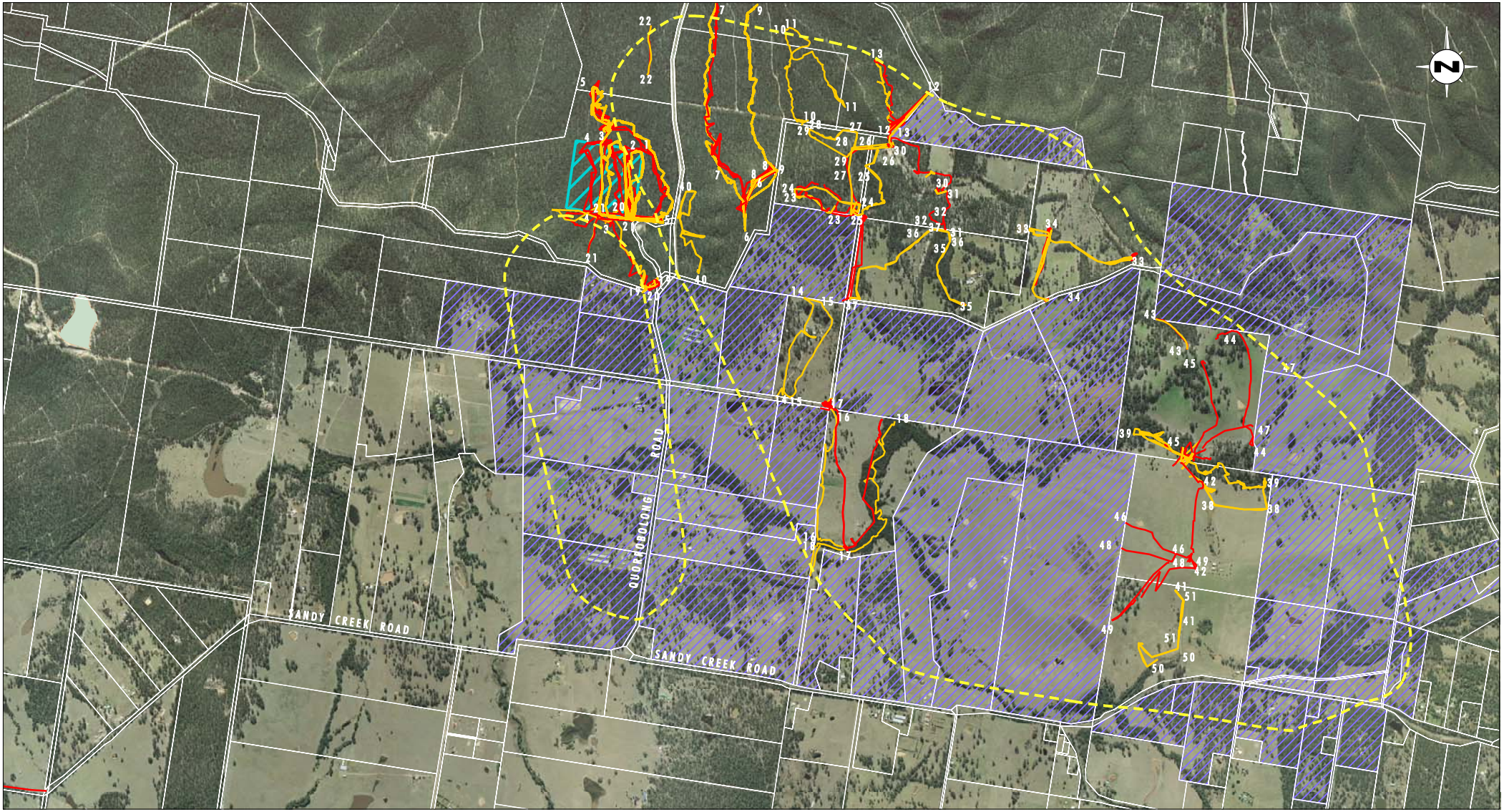
7.3 Survey Transects and Effective Coverage

A total of 51 survey transects were conducted within the Stage 3 assessment area, consisting of 47 pedestrian survey transects and four vehicular transects. **Table 7.6** provides the location of each transect (MGA and environmental context), all of which are illustrated in **Figure 7.3**. **Table 7.6** also presents key information on survey method, location and environmental context for each survey transect, and **Table 7.7** summarises detailed information recorded for each transect, including length, width, ground surface exposure, visibility and archaeological sites recorded.

Table 7.6 - Archaeological Survey Transects

Transect		Start	End	Environmental Context		
#	Method			Geology	Soil	Landform
1	Pedestrian	346976 6358740	347066 6359122	Branxton	Branxton, Fenestella	Hillslope (mid)
2	Pedestrian	346997 6359103	346975 6358733	Branxton	Branxton, Fenestella	Hillslope (mid)

Umwelt
Environmental Consultants



Source: Cadastre: LPI NSW, Aerial Photography: AAM Hatch 2006

0 0.5 1 1.5km
1:32 000

Legend

- 20mm Subsidence Contour
- Surface Infrastructure Site
- Unaccessible Properties
- JT Tracks
- KM Tracks

FIGURE 7.3

Archaeological Survey Transects

File Name (A4): R13_V1/2274_245.dgn

Table 7.6 - Archaeological Survey Transects (cont)

3	Pedestrian	346850 6358750	346838 6359150	Branxton	Branxton, Fenestella	Hillslope (mid)
4	Pedestrian	346750 6359175	346725 6358763	Branxton	Branxton	Hillslope (mid)
5	Pedestrian	347190 6358739	346725 6359525	Branxton	Branxton, Fenestella	Stream (Order 2)
6	Pedestrian	347625 6358750	347650 6358625	Aberdare	Branxton	Ridge
7	Pedestrian	347509 6359007	347507 6360053	Branxton, Aberdare	Branxton, Fenestella	Stream (Order 1)
8	Pedestrian	347625 6358750	347848 6359008	Aberdare	Branxton	Ridge
9	Pedestrian	347848 6359008	347724 6359995	Branxton, Aberdare	Branxton, Fenestella	Stream (Order 1)
10	Pedestrian	348008 6359291	347910 6359836	Branxton, Aberdare	Branxton	Stream (Order 2)
11	Pedestrian	347910 6359836	348256 6359378	Branxton, Aberdare	Branxton, Fenestella	Stream (Order 1)
12	Pedestrian	348750 6359475	348525 6359263	Aberdare	Branxton, Fenestella	Ridge
13	Pedestrian	348564 6359276	348439 6359665	Branxton, Fenestella	Branxton, Fenestella	Stream (Order 1 and 2)
14	Pedestrian	347886 6357697	348000 6358250	Aberdare, Quarrabolong	Branxton	Hillslope (lower)
15	Pedestrian	348100 6358238	347923 6357667	Aberdare, Quarrabolong	Branxton	Hillslope (lower)
16	Pedestrian	348193 6357565	348095 6356825	Quarrabolong	Branxton, Alluvium	Flat
17	Pedestrian	348186 6357594	348259 6356770	Quarrabolong	Branxton, Alluvium	Flat
18	Pedestrian	348095 6356825	348565 6357541	Quarrabolong	Branxton, Alluvium	Stream (Order 5 and 4)
19	Pedestrian	347150 6358338	347038 6358300	Aberdare	Branxton	Ridge
20	Pedestrian	347084 6358320	346889 6358763	Branxton, Aberdare	Branxton	Stream (Order 1)
21	Pedestrian	346793 6358750	346750 6358525	Branxton, Aberdare	Branxton, Fenestella	Stream (Order 1 and 2)
22	Pedestrian	347125 6359875	347125 6359550	Branxton	Branxton	Stream (Order 1)
23	Pedestrian	348163 6358759	347988 6358842	Aberdare	Branxton	Stream (Order 1)
24	Pedestrian	347960 6358896	348347 6358804	Aberdare	Branxton	Hillslope (mid)

Table 7.6 - Archaeological Survey Transects (cont)

Transect		Start	End	Environmental Context		
#	Method			Geology	Soil	Landform
25	Pedestrian	348337 6358740	348365 6358940	Aberdare	Branxton	Stream (Order 1 and 2)
26	Pedestrian	348525 6359100	348375 6359150	Aberdare	Branxton	Crest
27	Pedestrian	348300 6359213	348275 6359000	Aberdare	Branxton, Fenestella	Ridge
28	Pedestrian	348195 6359187	348046 6359243	Aberdare	Branxton, Fenestella	Stream (Order 1)
29	Pedestrian	348046 6359243	348260 6359091	Aberdare	Branxton, Fenestella	Stream (Order 1)
30	Pedestrian	348523 6359113	348840 6358835	Aberdare	Branxton	Stream (Order 1 and 2)
31	Pedestrian	348840 6358878	348865 6358657	Aberdare	Branxton	Hillslope (upper)
32	Pedestrian	348760 6358732	348780 6358762	Aberdare	Branxton	Crest
33	Pedestrian	349931 6358473	349346 6358658	Aberdare	Branxton	Stream (Order 1)
34	Pedestrian	349471 6358641	349575 6358288	Aberdare, Quarrabolong	Branxton	Hillslope (lower)
35	Pedestrian	348938 6358226	348875 6358583	Aberdare	Branxton	Stream (Order 1)
36	Pedestrian	348875 6358583	348719 6358624	Aberdare	Branxton	Crest
37	Pedestrian	348719 6358624	348341 6358245	Aberdare	Branxton	Stream (Order 1, 2, 3)
38	Pedestrian	350448 6357027	350750 6357004	Aberdare	Branxton	Hillslope (lower)
39	Pedestrian	350738 6357166	349961 6357445	Quarrabolong	Branxton	Stream (Order 4)
40	Pedestrian	347383 6358403	347314 6358879	Aberdare	Branxton, Fenestella	Stream (Order 1 and 2)
41	Pedestrian	350201 6356530	350240 6356354	Aberdare	Branxton	Stream (Order 1)
42	Pedestrian	350323 6356659	350369 6357162	Aberdare	Branxton	Hillslope (upper)
43	Pedestrian	350175 6357963	350075 6358125	Aberdare	Branxton	Stream (Order 1 and 2)
44	Pedestrian	350488 6358000	350675 6357363	Aberdare, Quarrabolong	Branxton	Stream (Order 1 and 2)
45	Pedestrian	350275 6357838	350150 6357400	Aberdare, Quarrabolong	Branxton	Stream (Order 1)
46	Pedestrian	349925 6356950	350150 6356700	Aberdare	Branxton	Stream (Order 1)

Table 7.6 - Archaeological Survey Transects (cont)

Transect		Start	End	Environmental Context		
#	Method			Geology	Soil	Landform
47	Pedestrian	350675 6357500	350825 6357800	Aberdare, Quarrabolong	Branxton	Hillslope (mid)
48	Vehicular	350675 6356675	349925 6356650	Aberdare	Branxton	Ridge
49	Vehicular	350325 6356675	349850 6356288	Aberdare	Branxton	Ridge
50	Vehicular	350250 6356125	350075 6356113	Quarrabolong	Branxton	Stream (Order 3)
51	Vehicular	350225 6356250	350225 6356475	Aberdare, Quarrabolong	Branxton	Hillslope (mid)

Table 7.7 - Effective Coverage Analysis

Transect		Length (m)	Width (m)	Area (m^2)	General Visibility		Exposures		Total Visibility		Archaeological Sites Recorded
#	Method				%	Area (m^2)	%	Area (m^2)	%	Area (m^2)	
1	Pedestrian	410	40	16400	3	492	0	0	3	492	
2	Pedestrian	410	40	16400	5	820	0.8	130	5.8	950	
3	Pedestrian	410	40	16400	5	820	0.4	70	5.4	890	
4	Pedestrian	410	40	16400	3	492	0.1	20	3.1	512	
5	Pedestrian	640	40	25600	2	512	0.4	101	2.4	613	ACM1 ACM2
6	Pedestrian	300	40	12000	12	1440	1.1	135	13.1	1575	
7	Pedestrian	1040	40	41600	2	832	0.6	264	2.6	1096	ACM5 ACM6
8	Pedestrian	113	40	4520	10	452	2.9	135	12.9	587	
9	Pedestrian	840	40	33600	2	672	0.2	69	2.2	741	
10	Pedestrian	520	35	18200	5	910	0.8	150	5.8	1060	ACM8
11	Pedestrian	560	35	19600	5	980	0.2	50	5.2	1030	
12	Pedestrian	300	30	9000	15	1350	6.6	600	21.6	1950	
13	Pedestrian	340	45	15300	3	459	1.1	160	4.1	619	ACM7
14	Pedestrian	617	25	15425	2	308.5	0.1	8	2.1	316.5	
15	Pedestrian	617	25	15425	2	308.5	8.4	1300	10.4	1608.5	
16	Pedestrian	800	25	20000	5	1000	0	0	5	1000	
17	Pedestrian	800	20	16000	5	800	0	0	5	800	
18	Pedestrian	1140	45	51300	2	1026	0.1	70	2.1	1096	ACM9 ACM10
19	Pedestrian	150	40	6000	6	360	7.5	450	13.5	810	
20	Pedestrian	360	45	16200	2	324	0.8	135	2.8	459	
21	Pedestrian	170	45	7650	2	153	1.7	135	3.7	288	

Table 7.7 - Effective Coverage Analysis (cont)

Transect		Length (m)	Width (m)	Area (m^2)	General Visibility		Exposures		Total Visibility		Archaeological Sites Recorded
#	Method				%	Area (m^2)	%	Area (m^2)	%	Area (m^2)	
22	Pedestrian	300	25	7500	0	0	0	0	0	0	
23	Pedestrian	300	45	13500	5	675	0.9	120	5.9	795	
24	Pedestrian	420	45	18900	8	1512	1.2	225	9.2	1737	
25	Pedestrian	320	45	14400	5	720	0.2	25	5.2	745	
26	Pedestrian	163	35	5705	13	741.6	0	0	5	285.2	
27	Pedestrian	238	15	3570	2	71.4	0	0	2	71.4	
28	Pedestrian	240	15	3600	10	360	10	360	20	720	
29	Pedestrian	200	15	3000	10	300	13.6	408	23.6	708	
30	Pedestrian	1250	30	37500	6	2250	0.2	68	6.2	2318	
31	Pedestrian	215	30	6450	5	322.5	0.5	30	5.4	352.5	
32	Pedestrian	30	30	900	7	63	11.1	100	18.1	163	
33	Pedestrian	520	25	13000	5	650	0.9	128	5.9	778	
34	Pedestrian	400	45	18000	2	360	6.6	1200	8.6	1560	ACM12
35	Pedestrian	500	25	12500	5	625	0.2	30	5.2	655	
36	Pedestrian	250	25	6250	2	125	0	0	2	125	
37	Pedestrian	720	25	18000	8	1440	0	0	8	1440	
38	Pedestrian	480	40	19200	5	960	0	0	5	960	
39	Pedestrian	1260	45	56700	15	8505	15.5	8820	30.5	17325	ACM14 ACM15 ACM16
40	Pedestrian	1240	20	24800	3	744	0	0	3	744	
41	Pedestrian	500	20	10000	2	200	0	0	2	200	
42	Pedestrian	500	45	22500	5	1125	0.2	40	5.2	1165	
43	Pedestrian	300	10	3000	5	150	0.066667	2	5.066667	152	
44	Pedestrian	550	25	13750	7	962.5	0.218182	30	7.218182	992.5	ACM17

Table 7.7 - Effective Coverage Analysis (cont)

Transect		Length (m)	Width (m)	Area (m^2)	General Visibility		Exposures		Total Visibility		Archaeological Sites Recorded
#	Method				%	Area (m^2)	%	Area (m^2)	%	Area (m^2)	
45	Pedestrian	450	5	2250	5	112.5	0.533333	12	5.533333	124.5	
46	Pedestrian	350	25	8750	7	612.5	0.228571	20	7.228571	632.5	
47	Pedestrian	325	25	8125	2	162.5	0.307692	25	2.307692	187.5	
48	Vehicular	750	10	7500	3	225	0	0	3	225	
49	Vehicular	800	10	8000	3	240	0	0	3	240	
50	Vehicular	175	10	1750	5	87.5	0	0	5	87.5	
51	Vehicular	225	10	2250	5	112.5	0	0	5	112.5	

As detailed above, total survey coverage of the Stage 3 assessment area was 76.4 hectares, 13.5 per cent of the accessible properties (which totals 567.2 hectares) and 5.6 per cent of the total assessment area (which totals 1354 hectares). Effective coverage ranged between 0 per cent and 30.5 per cent, with the majority of transects (42 of 51) having less than 10 per cent effective coverage. Following analysis of ground surface exposure, effective coverage within Stage 3 survey transects has been calculated as 5.4 hectares, 7.1 per cent of the total survey area.

The vast majority of transects (47 of 51) were pedestrian transects, with only 1.95 hectares (2.5 per cent of the total survey area) inspected using vehicles. Effective coverage varies between the two, with effective coverage totalling 7.17 per cent (5.34 hectares) for pedestrian transects and 3.14 per cent (0.06 hectares) for vehicular transects. This can be explained by two factors: that vehicular transects were only employed in areas of very low visibility; and that small exposures within vehicular transects may not have been detected by the survey team. These results further demonstrate that no large exposures were present within vehicular survey transects.

Survey inspected all landforms, with 26 transects along streams, 13 on hillslopes (seven transects on mid hillslopes, four transects on lower hillslopes, two transects on upper hillslopes), 10 transects on crests, and two transects on flats. Survey coverage and effective coverage by landform is outlined in **Table 7.8.**

Table 7.8 - Survey Coverage by Landform

Landform	Survey Coverage			Effective Coverage	
	No. Transects	Total Area, ha	% Survey Area	Total Area, ha	% Survey Area
Stream	26	47.3	61.9	3.5	7.5
Flat	2	3.6	4.7	0.2	5
Hillslope (lower)	4	6.8	8.9	0.4	6.5
Hillslope (mid)	7	9.5	12.4	0.5	5.1
Hillslope (upper)	2	2.9	3.8	0.2	5.2
Crest	10	6.3	8.3	0.6	9.5
Totals	**51**	**76.4**	**100**	**5.4**	**--**

Effective coverage ranged between five and ten per cent in all landforms, which is considered low and reflects the dense vegetation cover characterising pastoral landscapes. Effective coverage was highest in crests (9.5 per cent) and along streams (7.5 per cent). The majority of accessible crests within the Stage 3 project area were located within the Werakata State Conservation Area, and the infrastructure of the State Forest (dirt access tracks, fire breaks and transmission line easements) cross these landforms. These uses have reduced vegetation cover and increased erosion, resulting in generally higher levels of ground surface visibility. All streams surveyed were generally affected by some level of sheetwash erosion, and in the steeper landforms of the Werakata State Conservation Area, stream bank erosion was also common. The resulting exposures allowed greater ground surface visibility along streams than in surrounding landforms.

Effective coverage was lower on flats and hillslopes of the valley lowlands due to dense vegetation coverage. These areas are predominantly used for pastoral grazing and are therefore characterised by dense, introduced grasses, with ground surface visibility generally limited to vehicle tracks, stock tracks and minor areas of wind and sheetwash erosion.

Archaeological sites were found in eight survey transects, in stream, flat, hillslope (lower and mid) and crest landforms. Effective coverage within transects where surface archaeological material was detected ranged between 2.1 per cent and 30.5 per cent, with the majority (seven of eight) having less than 10 per cent effective visibility.

Surface archaeological site distribution is a key factor to the understanding of the Aboriginal heritage values of a location; however, the above results indicate that effective visibility throughout the Stage 3 assessment area is generally low, meaning that artefact scatters and isolated finds may go undetected throughout all landforms. These results further indicate that archaeological sites are more likely to be found in landforms or areas with higher visibility, such as stream banks and crests.

7.4 Sites Recorded

Survey identified an additional 17 archaeological sites within the Stage 3 assessment area, with each described below. AHIMS cards and plates for each recorded site are attached as **Appendix 2**. **Table 7.7** provides a summary of key information for each site, including location, environmental content and site condition at the time of recording. The location of all recorded sites is illustrated on **Figure 7.4**.

7.4.1 ACM1 (Artefact Scatter)

ACM1 is located to the west of Quorrobolong Road in the Werakata State Conservation Area, on the west bank of Black Creek. The site consists of one silcrete broken core and two silcrete broken flakes, separated by approximately 15 metres. Both artefacts are located on a vehicle access track on the west bank of the creek, less than 15 metres from the creek channel. The site maintains a northern aspect with a slope of less than two per cent, and is surrounded by ironbark, spotted gum and heavy leaf litter.

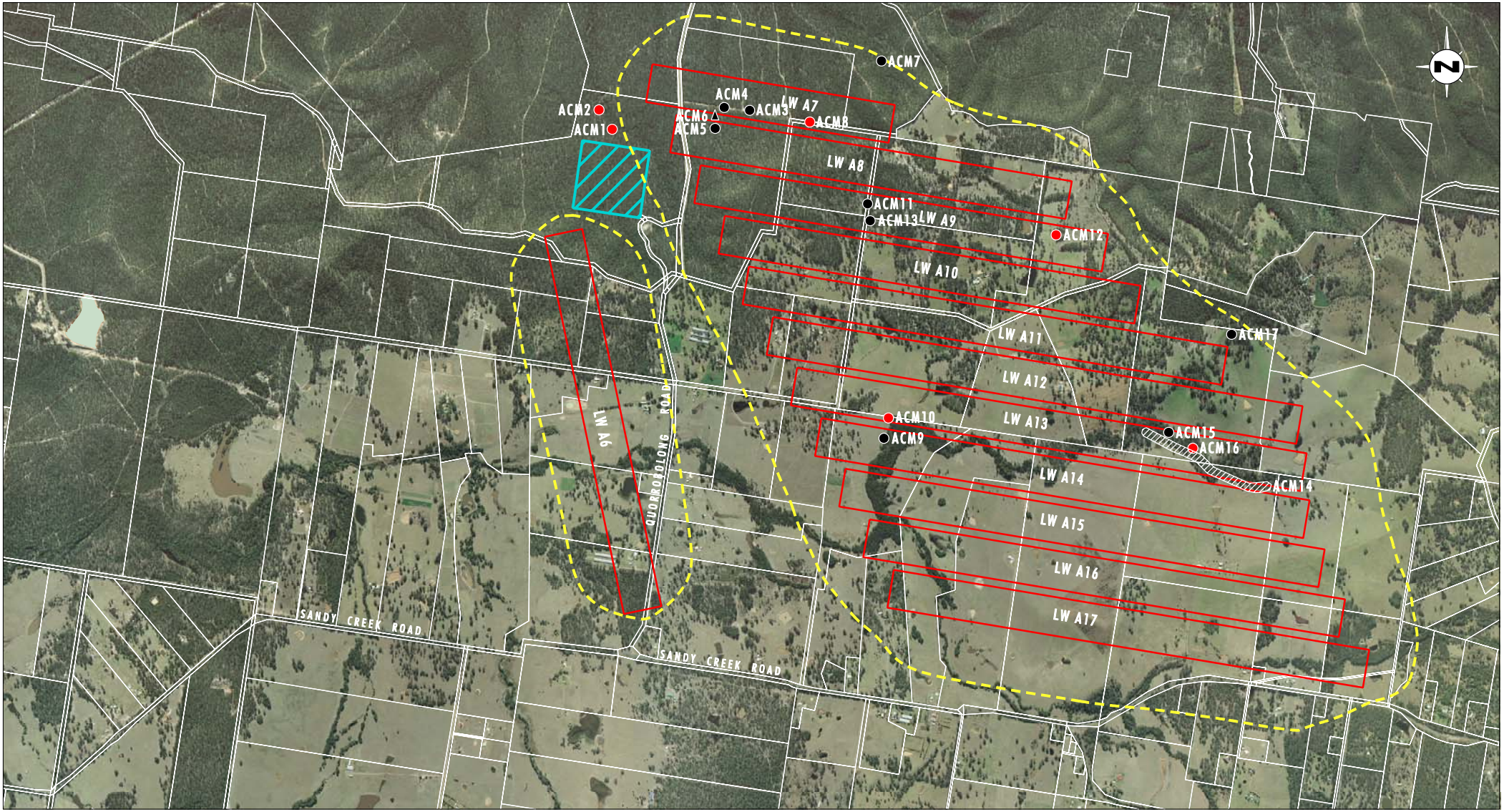
The site boundary is defined by limits of an exposure along the vehicle access track, which measures approximately 16 metres by three metres. The track has been graded and is heavily eroded, and tyre marks suggest that the track continues to be used by recreational motorbike riders.

The site is considered to be highly disturbed, and has minimal stratigraphic or spatial integrity due to excavation, erosion and recreational use. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.2 ACM2 (Artefact Scatter)

ACM2 is located to the west of Quorrobolong Road in the Werakata State Conservation Area, on the west bank of Black Creek. The site consists of one mudstone flake and one mudstone broken flake, both of which were identified on a vehicle access track on the west bank of the stream. The site is less than 10 metres south-east of Black Creek, and the artefacts are approximately 15 metres apart. The site maintains a northern aspect with a slope of less than two per cent and is surrounded by ironbark, spotted gum, Eucalypt, native grasses and heavy leaf litter.



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW,
Aerial Photography: AAM Hatch 2006

0 0.5 1 1.5km
1:32 000

Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Surface Infrastructure Site
- Artefact Scatter
- Isolated Find
- Grinding Groove & Isolated Find

FIGURE 7.4

Additional Sites Recorded

File Name (A4): R13_V1/2274_246.dgn

Table 7.9 - Additional Archaeological Sites

Site #	Site Type	MGA		Artefacts Recorded		Site Area[2], m^2	Geology	Soil	Landform	Distance to Water	Site Condition
		Easting	Northing	#	Type/Material						
ACM 1	Artefact Scatter	346839	6359248	3	2 silcrete broken flakes. 1 silcrete core	48	Branxton Formation	Branxton	Stream bank	15m (2nd order)	Site on track, disturbed by excavation, erosion, vehicle use.
ACM 2	Artefact Scatter	346773	6359341	2	1 mudstone flake	40	Branxton Formation	Branxton	Stream bank	10m (2nd order)	Site on track, disturbed by excavation, erosion, vehicle use.
		346761	6359363		1 mudstone broken flake						
ACM 3	Isolated Find	347652	6359360	1	1 mudstone broken flake	1 (15)	Branxton Formation	Branxton	Hillslope (mid)	25m (1st order)	Site in power easement, disturbed by excavation, erosion, vehicle use.
ACM 4	Isolated Find	347502	6359377	1	1 silcrete broken flake	1 (15)	Branxton Formation	Branxton	Hillslope (lower)	100m (1st order)	Site in power easement, disturbed by excavation, erosion, vehicle use.
ACM 5	Isolated Find	347448	6359253	1	1 silcrete broken flake	1 (4)	Branxton Formation	Branxton	Stream bed	0m (1st order)	Site in stream bed, artefact deposited by alluvial action.
ACM 6	Grinding Groove & Isolated Find	347447	6359320	1	1 grinding groove	90	Branxton Formation	Branxton	Stream bed.	0m (1st order)	Grinding groove in good condition. Isolated find deposited by alluvial action.
		347444	6359333		1 mudstone broken flake						
ACM 7	Isolated Find	348432	6359652	1	1 mudstone flake	1 (9)	Branxton Formation	Branxton	Hillslope (mid)	17m (2nd order)	Site on track, disturbed by excavation, erosion, vehicle use.
ACM 8	Artefact Scatter	348008	6359291	4	3 mudstone flakes. 1 mudstone broken flake	60	Fenestella Shale	Aberdare	Hillslope (lower)	5m (2nd order)	Site on track, disturbed by excavation, erosion, vehicle use.

[2] The site area for all isolated finds is $1m^2$ based on archaeological distribution. Where the isolated find occurs within an exposure, the exposed area is listed in brackets.

Table 7.9 - Additional Archaeological Sites (cont)

Site #	Site Type	MGA		Artefacts Recorded		Site Area[3], m^2	Geology	Soil	Landform	Distance to Water	Site Condition
		Easting	Northing	#	Type/Material						
ACM 9	Isolated Find	348446	6357420	1	1 mudstone flake	1 (3)	Branxton Formation	Quorro-bolong	Flat	15m (4th order)	Site exposed by ant nest.
ACM 10	Artefact Scatter	348473	6357540	2	1 mudstone flake. 1 mudstone flaked piece.	28	Branxton Formation	Quorro-bolong	Stream bank	10m (4th order)	Site exposed by ant nest.
ACM 11	Isolated Find	348350	6358807	1	1 quartzite flake	1 (100)	Branxton Formation	Aberdare	Hillslope (lower)	7m (1st order)	Site on track, disturbed by erosion and vehicle use.
ACM 12	Artefact Scatter	349465	6358623	2	1 retouched chert flake. 1 silcrete core	54	Branxton Formation	Aberdare	Hillslope (lower)	5m (1st order)	Site associated with fill, on/adjacent vehicle access track.
ACM 13	Isolated Find	348365	6358707	1	1 mudstone flake used as a core	1 (6)	Branxton Formation	Aberdare	Hillslope (mid)	20m (2nd order)	Site exposed by ant nest.
ACM 14	Artefact Scatter	350706	6357134	24	3 silcrete broken flakes. 2 mudstone flakes	7000	Branxton Formation	Quorro-bolong	Stream bank	Up to 10m (4th order)	Site subject to erosion, and areas disturbed by vehicle use and livestock action.
		350655	6357124		1 mudstone broken flake						
		350611	6357127		2 silcrete flakes. 1 mudstone flaked piece						
		350387	6357224		3 silcrete flakes. 1 silcrete core. 1 silcrete broken flake. 1 mudstone broken flake						

[3] The site area for all isolated finds is $1m^2$ based on archaeological distribution. Where the isolated find occurs within an exposure, the exposed area is listed in brackets.

Table 7.9 - Additional Archaeological Sites (cont)

Site #	Site Type	MGA		Artefacts Recorded		Site Area[4], m^2	Geology	Soil	Landform	Distance to Water	Site Condition
		Easting	Northing	#	Type/Material						
		350274	6357361		1 mudstone broken flake. 1 mudstone flake. 1 silcrete flake						
		350160	6357371		1 silcrete flake. 1 silcrete core						
		349999	6357454		4 quartzite broken flakes						
ACM 15	Isolated Find	350131	6357455	1	1 mudstone broken flake	1 (16)	Branxton Formation	Quorro-bolong	Stream bank	5m (4th order)	Site subject to erosion and livestock trampling.
ACM 16	Artefact Scatter	350308	6357302	2	1 mudstone flake. 1 chert core	10	Branxton Formation	Quorro-bolong	Stream bank	5m (4th order)	Site on track, disturbed by excavation, erosion, vehicle use.
ACM 17	Isolated Find	350503	6358035	1	1 quartz flake	1 (24)	Branxton Formation	Aberdare	Crest	30m (1st order)	Site in erosion scour.

[4] The site area for all isolated finds is $1m^2$ based on archaeological distribution. Where the isolated find occurs within an exposure, the exposed area is listed in brackets.

The site boundary is defined by limits of an exposure on the vehicle access track, which measures approximately 20 metres by two metres. The vehicle access track has been graded and is heavily eroded, with tyre marks suggesting the track is subject to ongoing use by recreational motorbike riders.

The site is considered to be highly disturbed, and has minimal stratigraphic or spatial integrity due to excavation, erosion and recreational use. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.3 ACM3 (Isolated Find)

ACM3 is located east of Quorrobolong Road in the Werakata State Conservation Area, within a power line easement on a mid hillslope that is also utilised as a vehicle track. The site consists of one mudstone broken flake. The site is situated between two first order streams and is less than 25 metres from a watercourse, with Black Creek approximately 900 metres to the west. The site maintains an eastern outlook with a slope of less than three per cent and is surrounded by heavy vegetation; including, revegetated Eucalypts, spotted gums, grass trees (Xanthorrhoea) and heavy leaf litter.

The site boundary is defined by exposure limits within the power easement, which is approximately five metres by three metres. The easement exhibits varying levels of erosion from minor rill erosion to severe gully erosion to the east. Windrow is evident on the verges of the track showing construction method and type of surface impact.

The site is considered to be highly disturbed, and has minimal stratigraphic or spatial integrity as a result of excavation and erosion. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.4 ACM4 (Isolated Find)

ACM4 is located east of Quorrobolong Road in the Werakata State Conservation Area, within a power line easement on a lower hillslope that is also utilised as a vehicle track. The site consists of one silcrete broken flake, which is situated between two first order streams and is no more than 100 metres from a watercourse. Black Creek is approximately 800 metres to the west. The area maintains a western outlook with a slope of less than five per cent and is surrounded by heavy vegetation; including, revegetated Eucalypts, spotted gums, grass trees (Xanthorrhoea) and heavy leaf litter.

The site boundary is defined by the limits of an exposure along the power easement, measuring approximately five metres by three metres. The easement exhibits varying levels of erosion from minor rill erosion to severe gully erosion to the east. Windrow is evident on the verges of the track demonstrating the use of an excavator to construct the track.

The site is considered to be highly disturbed, and has minimal stratigraphic or spatial integrity due to excavation and erosion. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.5 ACM5 (Isolated Find)

ACM5 is located east of Quorrobolong Road in the Werakata State Conservation Area. The site consists of one silcrete broken flake situated within a dry stream bed of a first order stream. Black Creek is approximately 650 metres to the west. The site has a northern outlook and is surrounded by heavy vegetation; including, revegetated Eucalypts, paperbarks, ironbarks, spotted gums, grass trees (Xanthorrhoea) and heavy leaf litter.

The site boundary is defined by the limits of an erosion scour within the stream bed, which is approximately two metres by two metres. The stream bed is subject to regular alluvial movement, with water action resulting in rill erosion and depositing sediments downstream. It is considered likely that the stone artefact has been deposited within the stream in the recent past, and that the artefact will be subject to further post-depositional movement.

The site is considered to have no stratigraphic or spatial integrity due to ongoing alluvial action. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.6 ACM6 (Grinding Groove and Isolated Find)

ACM6 is located east of Quorrobolong Road in the Werakata State Conservation Area, within a first order stream alignment. The site maintains a northern aspect and is surrounded by heavy vegetation; including, revegetated Eucalypts, paperbarks, ironbarks, spotted gums, grass trees (Xanthorrhoea) and heavy leaf litter. Black Creek is approximately 650 metres to the west. The site has two components: a grinding groove and an isolated find.

The grinding groove is positioned on a sandstone conglomerate platform within the stream bed, measuring approximately 15 metres by six metres. The grinding groove is 320 millimetres by 35 millimetres in size, and is 8 millimetres deep. The platform also exhibits three circular depressions, which measure (approximately) 20 centimetres in diameter by 7 centimetres deep, 43 centimetres in diameter by 16 centimetres deep and 47 centimetres in diameter by 14 centimetres deep. At the time of survey, it could not be determined whether the depressions had been enlarged or utilised, as each was filled with water and leaf litter. No lids were identified at the site or in the surrounding landscape that could have been used to cover and retain water in each depression.

From the northern edge of the platform the stream bed level drops vertically approximately two metres and continues in a northerly direction, providing a northerly outlook downstream from the platform. The east and west banks of the stream also drop sharply approximately one to two metres to the stream bed as the stream continues north from the platform. The stream channel south of the platform is no more than two metres wide, and this expands up to three metres to the north of the platform. The hillslopes surrounding the stream are up to 10 per cent in gradient.

The sandstone conglomerate platform has been previously impacted by quarrying, with evidence of a drill mark and blasting on the northern ledge of the site. SCT (2008) identify that the northern end of the rockbar may have originally been an overhang rock shelf approximately 60 centimetres thick and up to four metres longer than present. Further inspection indicates that the overhang was more likely to be approximately 1 metre in length.

A lense of mudstone 20 centimetres thick is found immediately beneath the sandstone, and has preferentially eroded to form a slight overhang (which was much larger before blasting). Another sandstone horizon underlies the mudstone. SCT (2008) estimate that the quarrying took place at least 30 years ago based on sedimentation of the plunge pool and vegetation regrowth.

The remaining sandstone platform is of moderate integrity being subject to continued erosion from alluvial action, and having a low-angle joint crossing the upper sandstone layer in the southern portion of the rockbar. This joint probably extends upstream to daylight over the central and southern parts of the rockbar, although no surface cracks or fractures are currently visible.

The isolated find is located approximately 10 metres to the north of the grinding groove site also positioned within the stream bed. The find consists of one mudstone broken flake within an area of erosion, approximately two metres by three metres in size. It is likely that the artefact was deposited in this location by alluvial action, and future post-depositional movement is likely with continued water flow in the stream. The surrounding landscape is considered to be of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified the high importance of grinding grooves – and therefore this site – to the Aboriginal community.

7.4.7 ACM7 (Isolated Find)

ACM7 is located east of Quorrobolong Road in the Werakata State Conservation Area, on a vehicle access track approximately 17 metres from a second order stream. The site consists of one mudstone flake, within an exposure approximately three metres by three metres in size. The site maintains a north-east aspect with a slope of less than five per cent and has 100 per cent visibility on the track. The surrounding vegetation includes revegetated Eucalypts, paperbarks, ironbarks, spotted gums, grass trees (Xanthorrhoea) and heavy leaf litter. Black Creek is approximately 1.5 kilometres to the west.

The site boundary is defined by the limits of erosion at this location, and it is considered likely that the artefact was deposited in this location through sheetwash erosion, and it is not *in situ*. Consequently, the site is considered to be highly disturbed, and has minimal stratigraphic or spatial integrity due to excavation and erosion. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.8 ACM8 (Artefact Scatter)

ACM8 is located east of Quorrobolong Road in the Werakata State Conservation Area, along a vehicle access track extending across a lower hillslope. The track is situated less than five metres from a second order stream. The site maintains a westerly aspect with a slope of less than five per cent and has 100 per cent visibility on the track. The surrounding vegetation includes revegetated Eucalypts, paperbarks, ironbarks, spotted gums, grass trees (Xanthorrhoea) and heavy leaf litter. Black Creek is approximately one kilometre to the west.

The site consists of three mudstone flakes and one mudstone broken flake. The site boundary is defined by the extent of surface artefact distribution along the track, which measures approximately 10 metres by six metres.

The site is considered to be highly disturbed, and has minimal stratigraphic or spatial integrity as a result of excavation and erosion. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.9 ACM9 (Isolated Find)

ACM9 is located to the north of Sandy Creek Road, approximately 15 metres to the west of Cony Creek. The site consists of one mudstone flake, located on the northern extent of an ants' nest. Apart from Cony Creek to the east, the surrounding landscape is generally cleared farming land with an easterly aspect sloping less than one per cent. Casuarina and pasture grasses are the dominant vegetation type.

The site boundary is defined by the ant nest exposure, which measures approximately two metres by 1.5 metres and is situated toward the base of a lower slope. The landscape flattens out as it continues toward the confluence of Cony Creek and Sandy Creek (approximately 460 metres south of the site).

The site has undergone moderate levels of disturbance; including, erosional processes and bioturbation. However, the site is considered to be of high archaeological potential as it is located in an elevated location in close proximity to a major freshwater creek confluence, and therefore intensive past Aboriginal land use is considered likely.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.10 ACM10 (Artefact Scatter)

ACM10 is situated west of Cony Creek approximately 10 metres west of the stream bed. The site consists of one mudstone flaked piece and one mudstone flake, identified on an ants' nest. The surrounding landscape is generally cleared farming land with an easterly aspect sloping less than one per cent. Casuarina and pasture grasses are the dominant vegetation type.

The site boundary is defined by the ants' nest exposure, which measures approximately seven metres by four metres and is situated toward the base of a lower slope. The landscape flattens out as it continues toward the confluence of Cony Creek and Sandy Creek (approximately 600 metres south of the site). The site is also located approximately 140 metres north-north-east of ACM9.

ACM10 has undergone moderate levels of disturbance; including, erosional processes and bioturbation. However, the site is considered to be of high archaeological potential as, like ACM9, it is located in an elevated location in close proximity to a Cony Creek and its confluence with Sandy Creek, and therefore intensive past Aboriginal land use is considered likely.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.11 ACM11 (Isolated Find)

ACM11 is located to the east of Quorrobolong Road on private land to the south of Werakata State Conservation Area. The site consists of one quartzite flake, located on a vehicle track (with 100 per cent visibility) extending across a lower hillslope. The track has not been graded but has become established by regular vehicle movement. The flake is on the northern edge of the track and is seven metres west of a first order stream. The site has a southerly aspect, slope less than one per cent, and is surrounded by vegetation, including Melaleuca, box trees, stringy bark trees and spotted gums.

The site is considered to be highly disturbed, and has minimal stratigraphic or spatial integrity as a result of vehicle movement and erosion. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.12 ACM12 (Artefact Scatter)

ACM12 consists of one chert retouched flake and one silcrete core located on a lower slope, with the site located less than five metres from a watercourse. The site is located in the north-east of Stage 3, on an unsealed, raised vehicle track on private land to the north of Cony Creek Lane. The track has not been graded; rather, it is constructed of fill brought to the site.

The chert retouched flake is located on top of the raised track and likely to have been bought in with fill used in track construction. The silcrete core is located approximately 18 metres to the south of the retouched flake on the eastern edge of a concrete culvert associated with the track. The core has either been brought in with fill or has eroded from the adjoining landscape and been deposited on the culvert through alluvial movement.

The site has a south-west aspect and a slope of less than three per cent. The surrounding landscape is generally cleared farming land with scattered ironbarks and spotted gums. The site boundary is defined by surface artefact distribution along the vehicle track, which is contained to an area 18 metres by three metres.

The site was determined to have no stratigraphic or spatial integrity as the site is located on a disturbed landscape (track built with fill and on a concrete culvert). The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.13 ACM13 (Isolated Find)

ACM13 is located on private land to the south of Werakata State Conservation Area, and is situated on a mid hillslope. The site consists of one mudstone flake used as a core, recorded within an ants nest exposure approximately three metres by two metres in size. The site is within a pastoral grazing paddock with a westerly outlook on a slope of less than five per cent, and is surrounded by pasture grasses, spotted gums and eucalypts. The site is less than 20 metres from a second order stream, and Black Creek is approximately 1.2 kilometres to the west.

The site boundary is defined by the surface artefact location within the ants' nest exposure. The site is considered to have minimal stratigraphic or spatial integrity, due to the lack of topsoil (from erosion), clearance of vegetation and bioturbation. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.4.14 ACM14 (Artefact Scatter)

ACM14 is an artefact scatter extending along the southern bank of Cony Creek approximately 1.8 kilometres to the east of the confluence of Cony and Sandy Creeks. The site consists of 24 artefacts recorded in ten discrete locations along 700 metres of creek bank, as listed in **Table 7.10**. All artefacts are located within ten metres of the creek bank.

Table 7.10 - Discovery 14 Artefact Locations

Location #	Location (MGA)		No. Artefacts	Artefact Type	Raw Material
	Easting	Northing			
1	350706	6357134	3	Broken Flake	Silcrete
			2	Flake	Mudstone
2	350655	6357124	1	Broken Flake	Mudstone
3	350611	6357127	1	Flaked Piece	Mudstone
4	350613	6357141	2	Flake	Silcrete
5	350387	6357224	1	Core	Silcrete
			1	Broken Flake	Mudstone
			2	Flake	Silcrete
6	350367	6357238	1	Broken Flake	Silcrete
7	350375	6357213	1	Flake	Silcrete
8	350274	6357361	1	Broken Flake	Mudstone
			1	Flake	Silcrete
			1	Flake	Mudstone
9	350160	6357371	1	Flake	Silcrete
			1	Core	Silcrete
10	349999	6357454	4	Broken Flake	Silcrete

The site boundary has been defined by landform (flat), with the southern creek bank of Cony Creek (up to ten metres) included in the ACM14 site area. The adjoining slope leading down to the site is less than five per cent and has a northerly aspect. The site has a moderate level of visibility along its length and rises approximately two to five metres above the bed of Cony Creek.

ACM14 is located in an area of likely Aboriginal occupation. Situated within 10 metres of a freshwater source and accompanying flora and fauna resources, the flat would have also provided a suitable location for camping (dry and elevated). Artefactual material recorded along the length of the site are in seven distinct find locations, with no more than four artefacts recorded in any one location.

The area has been impacted by vegetation clearing for farming purposes, livestock trampling, vehicle tracks and wash erosion. Eucalypts, ironbarks and pasture grasses are the dominant vegetation types.

The site has undergone a moderate level of disturbance and erosion; however, ACM14 is considered to be of high archaeological potential due to its environmental context, being an elevated site adjacent to the resource-rich Cony Creek alignment. Further, the detection of spatially discrete artefact deposits along the creek alignment – where visibility is relatively constant – suggests that there may be some spatial if not stratigraphic integrity in the archaeological deposit.

During the survey, Aboriginal stakeholder representatives identified that this area would have been an area of high occupation and use, and as such, was culturally significant.

7.4.15 ACM15 (Isolated Find)

ACM15 is located on the northern bank of Cony Creek opposite ACM14, and consists of one mudstone broken flake. The site is within five metres of the creek, and the adjoining slope to the north is less than five per cent in gradient. The site maintains a southern aspect, and vegetation of the surrounding area consists mainly of pasture grasses, ironbarks and Eucalypts.

The site is defined by surface artefact distribution, with the isolated find found in an exposure approximately four metres by four metres. The area has been impacted by vegetation clearing for farming purposes, livestock trampling and wash erosion; as a result, the site area has no topsoil.

The site is considered to be highly disturbed, and has minimal stratigraphic or spatial integrity as a result of erosion. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that this area would have been an area of high occupation and use, and as such, was culturally significant.

7.4.16 ACM16 (Artefact Scatter)

ACM16 is located on the northern bank of Cony Creek opposite ACM14, approximately 180 metres west of ACM15. The site consists of one mudstone flake and one chert core, both of which are located within five metres of the creek. The artefacts were recorded on a vehicle track that has been cut across Cony Creek and is highly disturbed and eroded. The site has a southern aspect with the adjoining slope to the north being less than five per cent. Vegetation surrounding this area consists mainly of pasture grasses, ironbarks and Eucalypts.

The site is defined by the surface distribution of artefacts along the access track, which measures approximately five metres by two metres. The site is considered to have low archaeological integrity due to erosion and the construction and use of the vehicle track; however, the surrounding landscape is considered to be of high archaeological potential due to its environmental context, being the flat along Cony Creek.

During the survey, Aboriginal stakeholder representatives identified that this area would have been an area of high occupation and use, and as such, was culturally significant.

7.4.17 ACM17 (Isolated Find)

ACM17 is located on private property west of proposed LWA11, and is positioned on the southern verge of a crest within 30 metres of a watercourse. The site consists of one quartz

flake located in gully erosion. Cony Creek is approximately 700 metres to the south-south-east. The site is surrounded by pasture grasses and Spotted gums, has a southern aspect and a slope of 30 per cent.

The site boundary is defined by surface artefact distribution, being within an exposure approximately six metres by four metres (with internal 50 per cent visibility). The site is in poor condition due to high levels of erosion. The surrounding landscape is of low archaeological potential.

During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.

7.5 Areas of Archaeological Potential

Review of archaeological and environmental literature identifies that three landform contexts within the Stage 3 assessment area are of high archaeological potential, based on patterns of Aboriginal land use and the predicted survival of archaeological materials. As defined earlier, areas of high archaeological potential are defined as landscape areas predicted to have been intensively or repeatedly utilised by Aboriginal people in the past, such as creek confluences or elevated terraces above major watercourses. Terrain integrity in these areas may be variable, but the majority of open camp sites are expected to be of low to moderate integrity only, with geomorphic processes not acting to bury deposits *in situ.*

Areas of high archaeological potential identified by this study are:

- the alignment of Cony Creek, and associated landforms (flats, lower hillslopes) within 50 metres of the stream. This area is anticipated to contain a higher density of archaeological sites than surrounding landforms, and those sites are anticipated to contain a higher density of artefacts than in sites in surrounding landforms. This evaluation is based on:

    - resource availability and Aboriginal land use: as it enters the Stage 3 project area, Cony Creek is classified as a fourth order stream, and becomes a fifth order stream west of the Sandy Creek convergence. Sections of the Cony Creek alignment are also classified as wetlands, and are therefore likely to provide an increased range of flora and fauna resources than surrounding areas. The flats and lower hillslopes adjoining the creek line would have provided low gradient landforms for camping, being sufficiently elevated not to experience flooding. Given the above factors, it is anticipated that Cony Creek would have been more intensively and frequently utilised than the surrounding landscape;

    - archaeological patterning: previous archaeological investigations have identified a higher density of sites within 50 metres of watercourses, specifically permanent or semi-permanent watercourses, throughout the Hunter Valley, which are considered to reflect increased use of focal resource zones. As such, increased site and artefact density in these landforms is anticipated; and

    - landform integrity: since contact, Cony Creek has been directly impacted by clearance of vegetation, stock movement and areas of earthworks and excavation, which have further resulted in changes to pre-contact alignment and stream flow. Western portions of the creek within the Stage 3 assessment area are also subject to flooding, with a greater area affected by 100 year ARI flood events. These processes are likely to have affected the spatial and stratigraphic integrity of archaeological sites deposited along Cony Creek, particularly in the flood affected western portions that

experience over bank water flow and that contain water management infrastructure such as culverts and bridges. Archaeological sites in the eastern portion of Cony Creek may retain higher integrity, but impact from pastoral grazing and associated land use is expected;

- the alignment of Sandy Creek, and associated landforms (flats, lower hillslopes) within 50 metres of the stream. This area is anticipated to contain a higher density of archaeological sites than surrounding landforms, and those sites are anticipated to contain a higher density of artefacts than in sites in surrounding landforms. This evaluation is based on:

  - resource availability and Aboriginal land use: the one kilometre section of Sandy Creek occurring within the Stage 3 project area is a fourth order stream. Sections of the creek alignment are also classified as wetlands, and are therefore likely to provide an increased range of flora and fauna resources than surrounding areas. As with Cony Creek, the flats and lower hillslopes adjoining the creek line (particularly to the north) would have provided low gradient landforms for camping, being sufficiently elevated not to experience flooding. Given the above factors, it is anticipated that Sandy Creek would have been more intensively and frequently utilised than the surrounding landscape;

  - archaeological patterning: as with Cony Creek, previous archaeological investigations have identified a higher density of sites within 50 metres of watercourses, specifically permanent or semi-permanent watercourses, throughout the Hunter Valley, which are considered to reflect increased use of focal resource zones. As such, increased site and artefact density in these landforms is anticipated;

  - landform integrity: since contact, Sandy Creek has been directly impacted by clearance of vegetation, stock movement and areas of earthworks and excavation, which have further resulted in changes to pre-contact alignment and stream flow. Although these processes are likely to have affected the spatial and stratigraphic integrity of archaeological sites deposited along Sandy Creek, sites may retain some spatial and stratigraphic integrity; and

- Sandy Creek and Cony Creek confluence, specifically the elevated terrace to the north-east of the convergence. This area is anticipated to contain a higher density of archaeological sites than surrounding landforms, and those sites are anticipated to contain a higher density of artefacts than in sites in surrounding landforms. This evaluation is based on resource availability, archaeological patterning and landform integrity (as discussed above for Sandy and Cony Creeks respectively). Previous archaeological research throughout the Hunter Valley has identified that convergences, particularly those of major creek systems/wetlands, have high archaeological potential.

It is noted that a number of archaeological site locations are situated within the areas of archaeological potential, being ACM9, ACM10, ACM14, ACM15 and ACM16. As discussed in **Section 7.3**, all of these sites excluding ACM15 are considered to have further archaeological potential, reflecting the above statements regarding likely Aboriginal land use and archaeological site survival. ACM15 is not considered to have further archaeological potential, as the site area has been subject to localised disturbance, being the construction and ongoing use of a vehicle access track.

No areas of very high archaeological potential have been identified within the Stage 3 project area. This category is defined as landscape areas predicted to have been more intensively or repeatedly utilised than all surrounding landforms by Aboriginal people in the past, such as major creek confluences or lagoons. Terrain integrity in these areas may be variable, but these landforms may include areas of high terrain integrity, where geomorphic processes

may act to bury deposits *in situ*. Sites may therefore be of high archaeological research potential. An example of an area considered to be of very high archaeological potential would be Ellalong Lagoon to the west of the Stage 3 project area, which would have been a focal point for the region for resource exploitation and therefore occupation.

7.6 Discussion

7.6.1 Stage 3 Survey Results

Stage 3 archaeological survey identified 17 archaeological sites, consisting of seven artefact scatters, nine isolated finds and one grinding groove/isolated find. Site types are discussed individually below to develop an understanding of archaeological site patterning within the Stage 3 project area.

7.6.1.1 Artefact Scatters and Isolated Finds

Sites were recorded at a low density throughout the landscape, with 17 sites identified within the 76.4 hectares inspected. Sites were, however, recorded in all landform elements present within the Stage 3 assessment area, with sites recorded along stream banks (8), hillslopes (7), flats (1) and crests (1). Sites found in hillslopes were found in mid and lower slopes, but not on upper slopes.

Sites were recorded no more than 100 metres from a watercourse, with the majority of sites (9 of 17) recorded no more than 10 metres from a watercourse. Seven sites were in proximity to first order streams, five sites were in proximity to second order streams and five sites were in proximity to fourth order streams. Sites are predominantly located in the Branxton Formation geological unit, with only one of the 17 sites recorded in the Fenestella Shale geological unit. No sites were recorded in the Muree Sandstone or undifferentiated alluvium geological units. Sites are found in three of the four soil landscapes of the assessment area, with seven sites recorded in the Branxton Soil Landscape, five in the Aberdare Soil Landscape and five in the Quorrobolong Soil Landscape.

All sites have been found in areas of erosion or disturbance, with six sites recorded along graded vehicle access tracks (and one of these atop a culvert), three sites recorded on an ants' nest, two sites recorded within a power easement/access track, two sites located on creek bank erosion, two sites located within stream beds, one site recorded on introduced fill, and one site recorded in a crest erosion scour.

Artefacts were also recorded at a low density, with only 49 within the 76.4 hectares inspected. The majority of sites (10 of 17) contain only one artefact, with six remaining sites containing between two and four artefacts. Only one site contains more than four artefacts – ACM14, which is the largest artefact scatter with 24 artefacts. Of all 26 find locations, no single find location contains more than six artefacts.

Artefacts recorded consisted of flakes (21), broken flakes (20), cores (5), a retouched flake (1), a flake used as a core (1) and a flaked piece. Raw materials utilised included mudstone (22), silcrete (19), quartzite (5), chert (2) and quartz (1). Only one artefact recorded with evidence of retouch or use wear, and only one artefact retained any cortex, suggesting that the various raw material sources were relatively distant. A significant proportion of the assemblage was broken, with 40.8 per cent consisting of broken flakes.

The above summary identifies the recorded assemblage to have a number of characteristics. A key characteristic is the low density at which sites and artefacts are found, with only 17 recorded in the 5.4 hectares of effective survey coverage – meaning one site was recorded every 317 m^2. Low artefact numbers were recorded, with no one find location

containing more than six artefacts and average density of artefacts being one per 110 m^2. Although constrained by survey coverage and effective visibility, survey results do suggest a landscape with low site and artefact density, which appears characteristic of the Cessnock area, with previous surveys (discussed in **Section 5.4.3**) generally finding only a small number of sites that contain only a small number of artefacts. Low site and artefact density within the Stage 3 project area suggests that although Aboriginal use of the landscape was extensive, areas were not intensively used within the Stage 3 project area.

The artefact assemblage recorded does not enable detailed analysis, with only 49 artefacts recorded within the 17 sites, so few conclusions can be made regarding specific Aboriginal activities at individual sites. However, it can be noted that the small range of artefact types and raw materials present is characteristic of the Hunter Valley, and do not contain unique or rare artefacts types or materials. The high level of breakage evident in the assemblage is considered reflective of the land use history of the area, with the majority of artefacts recorded in disturbed environments such as access tracks, and may also reflect stock movement within this pastoral landscape. The association of sites with disturbed areas further indicates that site condition and integrity is generally low.

7.6.1.2 ACM6 Grinding Groove

The survey identified one grinding groove, recorded at ACM6. Edge grinding of axes and other implements such as hatchets and adzes has been present in the archaeological record of northern Australia since the late Pleistocene; however, the antiquity of edge grinding in south-eastern Australia appears limited from the mid-Holocene to recent period (McBryde and Binns 1972: 65). Based on this, the ACM6 grinding groove could date to anytime over the last 4000 years; however, as grinding grooves subject to waterborne sediments – such as at ACM6 – gradually wear away due to abrasion, it is hypothesised that the ACM6 groove is less than 1000 years old as it has not been subject to extensive erosion.

Previous research has considered the time required to produce edge-ground implements, and the time therefore taken to create resultant grooves. For example, experimental studies by Wilson (1994) involved manufacture of ground edge implements using the same raw materials and reduction techniques as control samples from museum and university collections, with records made of the time taken to generate individual implements and the morphology of the resultant grinding grooves (length, width, depth, shape). This work suggests that 2.5 to 3 hours of grinding on sandstone produced a groove approximately 1.5 to 1.8 centimetres deep (Wilson 1995). Average length of the experimental grooves created was 30 centimetres, whilst those measured within numerous grinding groove sites ranged and between 20 and 40 centimetres (the length of the groove depends on the length of the arms of the person doing the grinding and in some cases to the space on the rock outcrop on which they are grinding). Wilson also found that resharpening of an implement generally produced a shorter, shallower groove (often less than one centimetre) as a shorter stroke was used (less than 20 centimetres).

Wilson (pers. comm. 2006) found it likely that each grinding groove related to the preparation of the cutting edge of only one stone implement (and perhaps its subsequent resharpening - as long as the cross section of the implement remained relatively unchanged); as the shape of the groove created is unique to that particular stone implement and is not generally suitable for grinding a different implement. Dickson (1981:156) also concluded:

> Repeated use of the longitudinal kind of grinding groove formed in sandstone … can be successfully done if subsequent heads have breadths that fit the groove…. Experiment suggests that not more than two or three axe heads can practically be ground in a single groove before it becomes inconveniently deep with a risk of skinning the fingers grasping the head. The existence at various sites of considerable numbers of relatively shallow grooves side by side appears to confirm the suggestion that a grinding groove has a limited useful life.

The ACM6 site contains a single groove, measuring 320 millimetres by 35 millimetres in size, and is 8 millimetres deep. Based on the above, it is hypothesised that the groove most likely relates to the grinding or resharpening of a single implement only, in a single work session lasting no more than three hours. The depth of the groove also suggests that a small implement such as a hatchet or adze was being worked at the site, or an implement was being sharpened.

The creek line in which the grinding groove was located is ephemeral, and water passing over the rock bar would only be expected immediately following rain. However, the rock bar also contains three shallow circular depressions that would function to retain water following rain periods, and could therefore have been utilised during grinding. It is also possible that these may have been used for plant food preparation where water was a necessary part of the preparation process, for example, to leach toxins or simply to make a paste. No lids were identified at the site or in the surrounding landscape that could have been used to cover and retain water in each depression. At time of recording, it could not be determined whether the circular depressions had been enlarged or utilised by human action as the inside of each depression was obscured by water and leaf litter.

Survey identified that the ACM6 rockbar has been previously impacted, with sandstone quarried and removed from the site. It is possible that the northern portion of the rockbar may once have contained additional grinding grooves, although it is noted that the quality of the rockbar conglomerate is poor so it is unlikely that the rockbar would ever have been used intensively and/or repeatedly for grinding or sharpening.

Grinding groove sites are relatively rare throughout the Central Lowlands of the Hunter Valley, although this is variable between local regions. ERM (2002) reviewed the known Aboriginal archaeology of the upper Hunter Valley, and identified that of the 2,641 sites registered with AHIMS at that time, only 14 (0.5 per cent) were grinding groove sites. This is contrasted with known sites in the lower Hunter Valley, where for example, a 2002 search of the AHIMS database for an area between Seahampton to Branxton, passing north of the Sugarloaf Range, identified a total of 152 sites, of which 55 sites (36 per cent) contained grinding grooves (Umwelt 2003). The majority of grinding groove sites in the Central Lowlands have been recorded in the Sugarloaf Range, which is approximately 15 kilometres east of Quorrobolong. These sites are dominantly positioned in high landscape areas, where the conglomerate is less coarse – and more suitable for grinding – than that found in lower slopes. The concentration of grinding grooves in the Sugarloaf Range is rare in the context of the broader Hunter region and this gives the area they encompass high cultural heritage value (Umwelt 2003). The above indicates that while grinding grooves are relatively rare sites in the Hunter Valley, they are not as rare within the sandstone landscapes of the lower Hunter Valley.

Known grinding groove sites in the Hunter Valley generally contain multiple grooves, and a number are also associated with extensive artefact scatters. For example, a known grinding groove site at Loders Creek (AHIMS# 37-6-0148) contains 55 grinding grooves associated with a concentrated and extensive artefact scatter that forms part of a continuous low to medium density distribution of artefacts along Loders Creek. Another site at Beltana (AHIMS #37-6-0967) contains 39 grinding grooves, associated with several ovate and irregular depressions that may have been used for food preparation such as seed grinding, and an assemblage of over 2000 stone artefacts. In light of the known sites and their distribution, grinding grooves are recognised to be infrequent but not rare site types within the Lower Hunter Valley. The lack of substantial artefacts surrounding ACM6 suggests that this was not an area subject to frequent Aboriginal occupation.

7.6.2 Assessment of Predictive Model

This section of the report assesses the Stage 3 survey results in view of the predictive model to identify key consistencies and differences and therefore refine the current understanding of archaeological site patterning within the assessment area. **Table 7.9** outlines the original predictive model statements and evaluates the survey outcome against the predictive model, with reference to site type occurrence, distribution, content and integrity.

It is noted that the potential archaeological resource of properties that were not accessible is not considered in the following table, but is discussed in **Section 7.5.3**.

Table 7.11 - Assessment of Predictive Model

	Summary of Predictive Model	Survey Results	Assessment
Site Type Occurrence	Artefact scatters and isolated finds are predicted to occur in the assessment area, and be the dominant site type.	Survey identified 17 sites, of which 16 were artefact scatters and isolated finds.	Survey results conform to predictive model, and archaeology of larger Hunter Valley.
	Scarred trees may occur in all landform contexts retaining mature, native vegetation.	Survey did not identify any scarred trees within the Stage 3 assessment area. Little mature native vegetation observed.	Survey identified local vegetation to be predominantly regrowth, reflecting past clearance. Scarred trees unlikely site types.
	Rockshelter sites may occur in the sandstone landscapes of the assessment area, should there be sufficiently steep slopes.	Survey did not identify any rockshelter sites within the Stage 3 assessment area.	Survey identified that slopes in the Broken Back Range were not sufficiently steep to create overhangs or shelters; therefore there is no potential for this site type to occur.
	Grinding groove sites may occur in the sandstone landscapes of the assessment area, as they are known in the area.	Survey identified 17 sites, one of which (ACM6) contained a single grinding groove.	Survey identified one grinding groove in the Broken Back Range, on a rockbar exposed within a steep gully, demonstrating this site type may occur in this landform context. No sandstone rockbars were identified in the valley landforms, where underlying geology is covered by aggrading soil landscapes, indicating limited potential for this site to occur in these landform contexts.
	Ceremonial ground (bora) is a potential site type, as Needham (1981) documented one ceremonial site within the Quorrobolong Valley (although this information is unprovenanced).	Survey did not identify any ceremonial sites within the Stage 3 assessment area.	It is unknown whether the ceremonial site documented by Needham (1981) is the same ceremonial site on the AHIMS register (located in the Quorrobolong Valley). No physical evidence of a ceremonial site was observed within the Stage 3 assessment area.
	Burial sites are potential site types, as Needham (1981) documented two burials within the Quorrobolong Valley (although this information is unprovenanced).	Survey did not identify any burial sites within the Stage 3 assessment area.	Information contained in Needham (1981) suggests the two documented burial sites are to the west of the Stage 3 assessment area; however, this reference does identify the possible use of alluvial flats in the Quorrobolong Valley for burial.

Table 7.11 - Assessment of Predictive Model (cont)

	Summary of Predictive Model	Survey Results	Assessment
Site Type Occurrence	Sandstone sites such as engravings, grinding bowls, stone arrangements, water holes or wells and pot holes were not predicted to occur, as although these site types do occur in sandstone geological areas, they are relatively rare site types and therefore not expected.	Survey did not identify any engravings, grinding bowls, stone arrangements or water holes/wells/ pot holes within the Stage 3 assessment area.	Although no water holes/wells/pot holes were recorded, it is noted that the ACM6 rockbar containing a single groove also contains three circular depressions that may have been utilised as small water holes/pot holes for grinding and/or food processing. At the time of survey, these were obscured by sediment, leaf litter and water and evidence of human enlargement or use could not be identified.
	Carved trees were not predicted to occur, being highly visible sites that are often cleared, particularly in areas of extensive clearance.	Survey did not identify any carved trees within the Stage 3 assessment area.	Survey results conform to predictive model, with survey identifying local vegetation to be predominantly regrowth, reflecting past extensive clearance. The former presence of a carved tree to the south of the Stage 3 project area suggests past occurrence of this site type.
	Ochre and stone quarries were not predicted to occur, as no source of these materials is known within the assessment area.	Survey did not identify any ochre or stone quarries within the Stage 3 assessment area.	Survey results conform to predictive model, with no sources of raw material suitable for stone tool manufacture recorded within the assessment area.
	Fish traps were not predicted to occur, as the watercourses of the area are not key aquatic habitats, and the fabric of fish traps are unlikely to be conserved.	Survey did not identify any fishtraps within the Stage 3 assessment area.	Survey results conform to predictive model, with no evidence of fish traps identified.
	Post contact sites such as missions, camp sites with knapped glass or massacre sites were not predicted to occur, as these are not indicated by the ethno-historical research in this area.	Survey did not identify any contact sites within the Stage 3 assessment area.	Survey results conform to predictive model, with no evidence of post contact sites identified.

Table 7.11 - Assessment of Predictive Model (cont)

	Summary of Predictive Model	Survey Results	Assessment
Site Type Content	*The following section discusses only the identified site types: artefact scatters, isolated finds and grinding grooves.*		
	The majority of artefact scatters are likely to be small artefact scatters of less than 10 artefacts or isolated finds.	Of the 16 artefact scatters and isolated finds identified, only one contains more than four artefacts (ACM14 contains 24 artefacts).	Survey results conform to predictive model, reflecting archaeological site patterning of region.
	Surface artefact scatters of more than 50 artefacts are rare, but they could occur along Cony and Sandy Creeks, as these areas are predicted to have had higher levels of use.	Survey did not identify any sites with more than 24 artefacts.	ACM14 was recorded along Cony Creek, and was the largest site in the project area; but even this site contained no more than seven surface artefacts in any one find location.
	Silcrete and indurated mudstone predicted to dominate, reflecting Hunter Valley patterning. Other raw materials that may occur include quartz, quartzite, petrified wood, porcellanite, crystalline tuff, chalcedony and volcanics. Some of these materials, such as quartz and quartzite, may be locally sourced from conglomerates within the assessment area.	Silcrete and mudstone artefacts composed 91.8% of the Stage 3 assemblage. Other materials found included chert, quartz and quartzite.	Survey results generally conform to predictive model. Noted that range of raw materials smaller than found elsewhere, reflective of small size of assemblage. Sources of raw materials unknown, but quartz, quartzite and chert may have been locally sourced from conglomerates.
	Predominant artefact types are expected to be flakes (including broken flakes), followed by cores and retouched flakes. Evidence of retouch and use wear may be present in a small percentage of the assemblage. Microblade technology is rarer, and is most likely to be found in large assemblages.	Survey identified a small assemblage, dominated by flakes and broken flakes, with a small number of cores. Only one artefact with evidence of retouch. No microblade technology present.	Survey results conform to predictive model, reflecting archaeological site patterning of region.
	Ground artefacts (grindstones and axes) are not common artefact types, and may not be found within the Stage 3 assessment area (or found in very low frequencies).	Survey did not identify any ground artefacts.	Survey results conform to predictive model, reflecting Stage 3 small artefact assemblage with limited artefact type variability.

Table 7.11 - Assessment of Predictive Model (cont)

	Summary of Predictive Model	Survey Results	Assessment
Site Type Content	Grinding grooves are grooves on rock surfaces that have been manufactured by the sharpening of stone axe heads, stone chisels or fire hardened wooden spear points. Axe grinding groove sites in the Sugarloaf Range are often associated with pot holes, which indicate a purpose of providing water for the axe grinding process.	Survey identified one site – ACM6 – that contains a single grinding groove. Circular depressions in the rockbar were also recorded.	Containing one groove only, ACM6 is not reflective of the majority of grinding groove sites in the Hunter Valley, which often contain multiple grooves and associated features such as pot holes. ACM6 contains a single groove only, indicating the rockbar was utilised for only one grinding event – considered to reflect the poor quality of the sandstone. Circular depressions on the rockbar may have been utilised as water sources.
Site Type Distribution	*The following section discusses only the identified site types: artefact scatters, isolated finds and grinding grooves.*		
	Artefact scatters and isolated finds are predicted to occur in all landform contexts, but with increased frequency within 100 metres of watercourses.	All 17 sites recorded were within 100m of streams, with 14 of 17 recorded no more than 15m from streams.	Survey results conform to predictive model, reflecting archaeological site patterning of region. The absence of sites beyond 100m from a watercourse reflects the numerous watercourses found in the Stage 3 project area, and also suggests lower use of landforms away from streams.
	Low-gradient landscape areas in association with permanent or semi-permanent water are generally preferred for camp sites, and creek confluences are often the location of sites. Areas such as spur crests and ridge crests that offer broad outlooks may also be used for camp sites. Creeklines or spur crests may provide excellent travel routes between resources.	Of 14 sites recorded along streams, 7 were recorded on flats/terraces above creeks and 2 were recorded within stream beds, 3 lower and 2 mid. Survey also identified the terrace north-east of the Cony and Sandy Creeks confluence as a PAD. Only one site was recorded on a crest.	Survey results conform to predictive model, reflecting archaeological site patterning of region.
	Sandy and Cony Creeks are classified as wetland environments, and as such, would have provided increased resource diversity. Artefact scatters not isolated finds are expected to characterise these areas, reflecting increased intensity of Aboriginal use.	Five sites were recorded along Cony Creek: 3 artefact scatters and two isolated finds. No more than seven artefacts were found in any one find location.	Survey results generally conform to the predictive model, with the largest artefact scatters within Stage 3 found along Cony Creek. However, the surface site/artefact density observed during survey is considered low within the Hunter Valley, and does not appear to indicate intensive Aboriginal use in the past.

Table 7.11 - Assessment of Predictive Model (cont)

	Summary of Predictive Model	Survey Results	Assessment
Site Type Distribution	Artefact scatters and isolated finds are expected to be found in exposed areas resulting from erosion and/or human action, as these areas often provide the only effective visibility within pastoral landscapes characterised by dense grasses.	All 17 sites were found in exposed landscape areas: 9 resulting from human action and 7 resulting from natural process.	Survey results conform to the predictive model, reflecting archaeological site patterning of region. The survey results also evidence the limited visibility within most areas from vegetation cover, particularly dense native and introduced grasses.
	Grinding groove sites were predicted to occur on sandstone ledges that outcrop in or immediately adjacent to creek beds within sandstone geological areas. Further, grinding groove sites were predicted as most likely to occur on steeper landforms, where rockbars would be exposed rather than buried by geomorphic processes. This suggests the most likely location is within the landforms of the Broken Back Range.	Survey identified one grinding groove in ACM6 – located on a rockbar within a stream bed within the Werakata State Conservation Area (and Broken Back Range) in the north of the Stage 3 assessment area.	Survey results conform to the predictive model, with ACM6 found in a first order stream on the southern slopes of the Broken Back Range. At this location, the landform is eroding rather than aggrading and the terrain is moderately inclined; resulting in the exposure of the sandstone rockbar rather than its burial under alluvial sediments.
Site Type Integrity	*The following section only discusses identified site types: artefact scatters, isolated finds and grinding groove.*		
	Artefact scatters and isolated finds within most landforms of the valley lowlands were expected to have low to moderate integrity as a result of vegetative clearance and grazing.	All sites were assessed to be of low or moderate integrity, with all found in areas affected by erosion or human activity.	Survey results conform to the predictive model, with no site considered to have high terrain integrity. This reflects on effective visibility within Stage 3, with sites only associated with exposures resulting from erosion or human action.
	Artefact scatters and isolated finds within areas subject to past and present cultivation (within the valley lowlands) are expected to be of low integrity, as ploughing will redistribute artefacts both spatially and stratigraphically. Where cultivation is undertaken on terraces and lower slopes (i.e., in soil profiles of some depth), sites may survive with some integrity beneath the plough zone.	No evidence of past agricultural cultivation was identified at any recorded site.	As survey did not identify evidence of cultivation at any recorded site, no evaluation of the predictive model can be made.

Table 7.11 - Assessment of Predictive Model (cont)

	Summary of Predictive Model	Survey Results	Assessment
Site Type Integrity	Artefact scatters and isolated finds within areas of localised earthworks or excavation, including residential, pastoral, agricultural and industrial are expected to have very low integrity, and many sites in these areas may have been destroyed.	8 of 17 sites recorded were positioned along access tracks (recreational or for transmission lines) within the Werakata State Conservation Area through excavation (graded).	Survey results conform to the predictive model, with all sites recorded along access tracks considered to be of low integrity.
	Artefact scatters and isolated finds associated with ephemeral creeks are unlikely to retain integrity due to erosion and stock trampling.	12 of 17 sites were recorded within 15m of a stream, and of these 7 were located along access tracks, 2 were found on ants' nests, 2 were within the stream bed and 1 was within an erosion caused by stock.	Survey results generally conform with the predictive model, with sites recorded along ephemeral streams (i.e., all but Cony and Sandy Creeks) being associated with erosion and human or stock action. These sites are considered to be of low integrity.
	Artefact scatters on slopes are expected to have been affected by the downslope movement of soils causing the redistribution of the artefacts down the slope and their remixing and reburial downslope.	Survey identified 7 sites in hillslope contexts.	Survey results generally conform with the predictive model, although variations between hillslope sites do occur between the Broken Back Range and valley lowlands. In the latter, downslope movement of soil and therefore artefacts is minimal due to the low gradient of the landscape. This process is more evident in the Broken Back Range where terrain ranges from moderately to steeply inclined.
	Sandstone archaeological sites such as grinding grooves were predicted to have high integrity due to their likely location within the Werakata State Conservation Area. Grinding groove sites within streams may be subject to ongoing erosion from water action.	ACM6 has been previously impacted by human action, specifically blasting and quarrying of the northern portion of the rockbar. The site is also subject to ongoing water action.	Survey results do not conform to the predictive model, as the ACM6 rockbar has been previously quarried for sandstone, reducing the integrity of the site to low.

In summary, Stage 3 archaeological survey results generally conformed to the predictive model developed for the project, although the following key deviations are noted:

- site types considered possible but not found included scarred trees, rockshelter sites, ceremonial sites and burials. Scarred trees were not found due to extensive clearance of mature, native vegetation, and rockshelter sites were not found due to the lack of sufficiently steep slopes in this section of the Broken Back Range. The presence of ceremonial sites and burial sites within the area was recognised as a possibility following review of Needham (1981), but the survival of such sites in the area is limited, and with burials, the potential for surface evidence is unlikely;

- Cony and Sandy Creeks were identified as wetland environments that may have provided increased resources for Aboriginal use in addition to low gradient flats and terraces along the creek suitable for camping. Consequently, larger artefact scatters were predicted to occur along the creeks, reflecting Aboriginal land use of higher intensity. However, survey identified low site and artefact numbers along the surveyed portion of Cony Creek (five sites and 30 artefacts), which does not indicate intensive Aboriginal land use. However, as archaeological survey can only identify surface sites, the density of presence of subsurface artefacts (and the density at which they occur) cannot be determined at this time; and

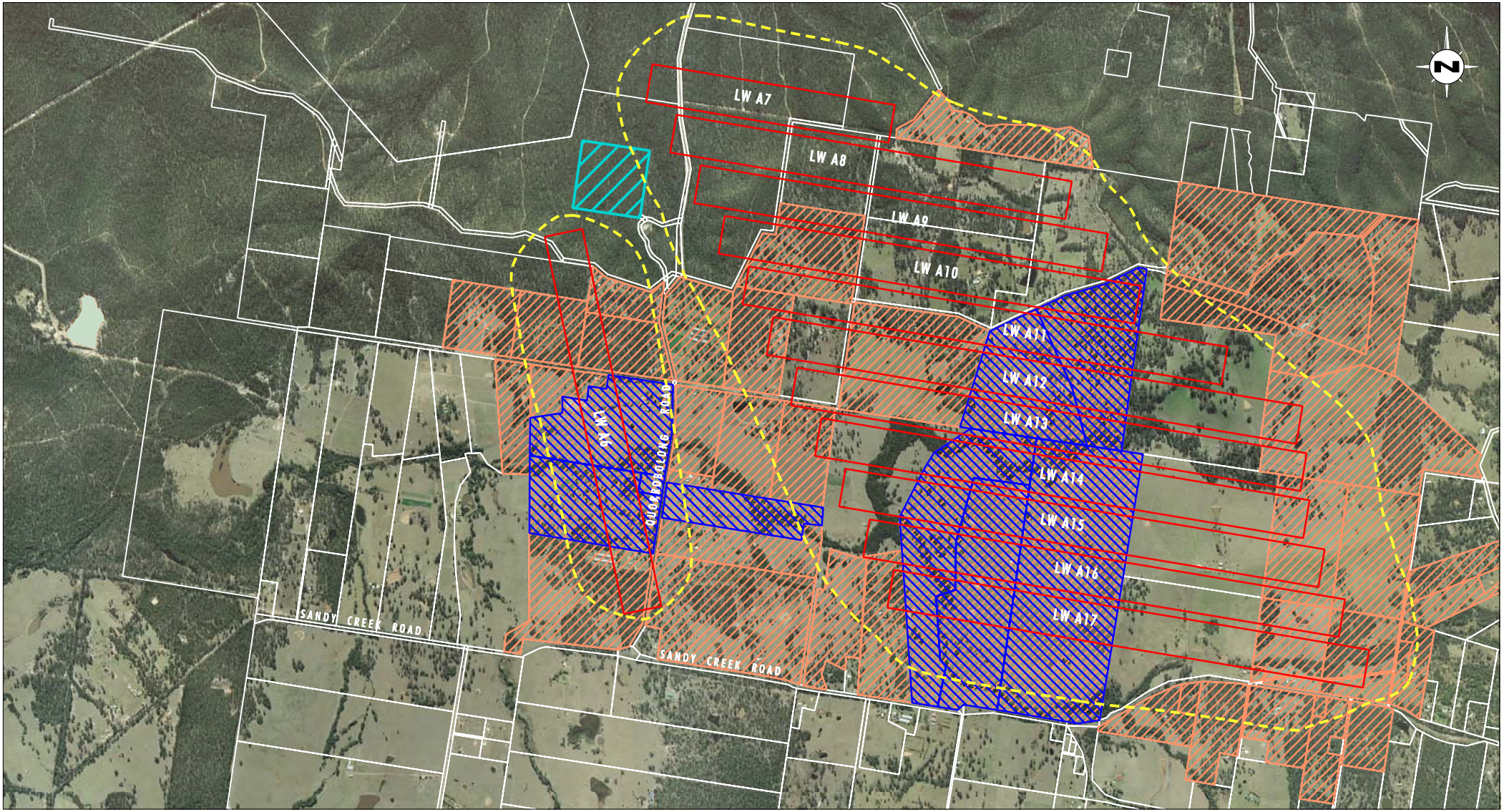
- grinding groove sites were predicted to be of moderate to high integrity, being predicted to occur within creeklines of the Werakata State Conservation Area. However, ACM6 – containing a single grinding groove on a rock bar within a creek line – was identified to be of low integrity as a result of past blasting and quarrying.

7.6.3 Likely Aboriginal Archaeological Values of Inaccessible Properties

As identified in **Section 7.1,** survey of the entire Stage 3 assessment area was not possible at the time of inspection as access was only obtained to Austar owned properties, Werakata State Conservation Area and five private properties. Properties not accessed for archaeological survey are illustrated on **Figure 7.5**. In order to develop an understanding of the likely Aboriginal heritage values of these properties, this section reviews their environmental characteristics and discusses the likely Aboriginal archaeological resources of each following consideration of the refined predictive model.

All properties not accessed for survey are situated in the valley lowlands of the Stage 3 assessment area. Archaeological survey identified that grinding groove sites could occur within the slopes of the Broken Back Range, being sandstone geological areas of sufficient gradient to expose rockbars in or adjacent to streams for human use. Landforms of the valley lowlands within sandstone geological areas were identified to be of gentle gradient, and characterised by aggrading soil landscapes. These areas are therefore unlikely to contain grinding groove sites as geomorphic processes do not function to expose sandstone rockbars that could be utilised for ground edge implement production.

All properties have at least one stream or drainage line present, and the majority display the characteristic landforms of the valley, with streams, hillslopes and crests present. Review of relevant literature and archaeological survey results has identified that artefact scatters and isolated finds are found throughout all landforms of the Stage 3 project area, and specifically within 100 metres of watercourses. Given this, it is recognised that artefact scatters and isolated finds may occur in all properties above the Stage 3 area, but are most likely to be found in close proximity (within 100 metres) of streams. Sites are predicted to be relatively small, with the majority containing less than 10 surface artefacts. A significant number of sites may be isolated finds.



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW,
Aerial Photography: AAM Hatch 2006

0 0.5 1 1.5km
1:32 000

Legend

- Conceptual Layout for Stage 3 Longwall Panels
- 20mm Subsidence Contour
- Surface Infrastructure Site
- Lots Not Accessed for Survey
- Lots Containing Areas of High Archaeological Potential

FIGURE 7.5

Evaluation of Inaccessible Properties

The primary land use of all properties that were not accessible is pastoral, although 15 properties contain private residences and two have been subject to primary industrial development (i.e. the chicken sheds to the east of Quorrobolong Road). This infrastructure represents discrete areas of localised high disturbance, where archaeological sites with integrity are highly unlikely to be found. Remaining landscape areas will also have been subject to disturbance as a result of tree clearance, agricultural cultivation and grazing, and consequently, the majority of artefact scatters and isolated finds throughout the landscape are likely to have been subject to some level of spatial or stratigraphic movement.

This assessment has identified that the Cony and Sandy Creek corridors are of high archaeological potential, and are likely to contain a higher site and artefact density than surrounding landforms. Eight properties not accessed for survey contain sections of Cony Creek, two contain sections of Sandy Creek, and an additional two contain sections of both Cony and Sandy Creeks. These properties therefore contain areas of archaeological potential, being the terraces, flats and lower hillslopes within 100 metres of Cony and Sandy Creeks. Integrity of sites along Cony and Sandy Creeks is predicted to be variable, with higher archaeological integrity expected in landforms above the 100 year flood event boundary, and in those areas not subject to intensive post-contact land use.

Scarred and carved trees are potential site types that may occur in areas where mature, remnant vegetation is present. The majority of properties in the Stage 3 assessment area have been extensively cleared for pastoral grazing and development, and the potential for scarred or carved trees is consequently low. However, archaeological survey identified that some mature (over 100 years old), native vegetation is retained in the private properties of the valley lowlands, and therefore it is recognised that vegetation found on the properties above Stage 3 may include Aboriginal scarred or carved trees.

8.0 Significance Assessment

Cultural heritage significance is a measure of the relative value or importance of heritage sites. Evaluation of the significance of Aboriginal heritage sites is an extremely complicated process, and spans evaluation of the cultural value of the site to the Aboriginal community, archaeological/scientific significance, aesthetic significance, tourism potential and educational significance. The *NSW NPWS Guidelines for Archaeological Report Writing* (1997: 25) states:

> While Aboriginal sites and places may have educational, tourism, and other values to groups in society their principle values are likely to be in terms of their cultural/social significance to Aboriginal people and their scientific significance to archaeologists. It is thus possible to identify two main streams in the overall significance assessment process: the assessment of cultural/social significance to Aboriginal people and the assessment of scientific significance to archaeologists.

Therefore, this report discusses the significance of all Aboriginal archaeological sites identified within the Stage 3 assessment area, spanning both Aboriginal cultural significance as determined by Aboriginal stakeholders and scientific significance as determined by Umwelt archaeologists.

The assessment of significance is fundamental to the heritage management process, as it determines appropriate cultural heritage management outcomes for Aboriginal sites that may be impacted by proposed development.

8.1 Cultural Significance

Throughout the assessment process, Aboriginal stakeholders were requested to provide comment on the cultural significance of the recorded sites within the Stage 3 project area, and the cultural significance of the larger area within the Quorrobolong Valley.

During survey, field archaeologists provided opportunity for Aboriginal stakeholder representatives to comment on the cultural significance of recorded sites. At this time, all Aboriginal stakeholder representatives involved in survey stated that all archaeological sites are of cultural significance, but that the grinding groove site (ACM6) was of particular significance due to its rarity. Aboriginal stakeholder representatives also stated that site ACM14, an artefact scatter along Cony Creek, was also of higher cultural significance as the area would have been an area of high occupation and use. A summary of comments provided during fieldwork are listed below.

Aboriginal stakeholders were also invited to make comment on the cultural significance of all recorded archaeological sites within the Stage 3 area – and the larger Stage 3/Quorrobolong Valley area – in meetings in December 2007, January 2008 and July 2008. At these meetings, as discussed in **Section 10**, Aboriginal stakeholders identified that all archaeological sites are of cultural value, but that the ACM6 grinding groove site was of particular significance. Areas of high archaeological potential identified in **Section 7.5** were also identified to be of cultural value due to the likely occurrence of archaeological sites.

Following draft report review, six of the 15 Aboriginal stakeholders involved in the assessment provided comment on the Stage 3 project and the draft report. All comments received are attached in **Appendix 1**, and the following points summarise all statements regarding the cultural significance of the Stage 3 area and recorded archaeological sites:

- Arthur Fletcher identified that artefact scatters located in the vicinity of Black Creek reflect periodic use of the area for activities such as hunting, fishing and retooling. However,

due to the time that has passed since these areas have been used in a traditional manner, evidence of this use has been degraded. Mr Fletcher also stated that areas around water courses are culturally significant as they represent a livelihood and a connection to country. On the ACM6 grinding groove, Mr Fletcher stated that the site is of particular significance as it represents a tangible link to past traditional use of the area. The grooves represent an area where tools could have been repaired, and are evidence of our cultural existence and belonging to the area. Mr Fletcher further stated that this area is of the highest cultural significance as it serves as a cultural link to his ancestors' lives. On the ACM14 artefact scatter, Mr Fletcher stated that the site represents an obvious area of high occupation, on which basis the area is highly culturally significant; and

- Des Hickey of WWCCS identified that the ACM6 grinding groove site is highly significant;

8.2 Scientific Significance

8.2.1 Assessment Criteria

Scientific significance is assessed according to principles outlined originally in Australia in the Burra Charter (1979), which was adapted from the UNESCO sponsored ICOMOS (International Council for Monuments and Sites) Venice Charter. The Burra Charter defines cultural significance as the 'aesthetic, historic, scientific or social value for past, present or future generations' of a place.

The archaeological or scientific significance of Aboriginal archaeological sites is primarily assessed according to their value to contribute to the archaeological/scientific understanding of Aboriginal culture (their research potential). Six criteria underlie the scientific assessment process, being:

- **rarity:** whether the site (location, type, integrity, contents, and archaeological potential) is common or rare within the local and regional context;

- **representativeness:** whether the site (location, type, integrity, contents, and archaeological potential) is common or uncommon within a local and regional context and sites of similar nature (or in better condition) are already set aside for conservation within the region;

- **integrity:** whether the site appears relatively undisturbed and there is a high possibility that useful spatial information can still be obtained from subsurface investigation;

- **connectedness:** whether the site is connected to sites in the local area or the region through chronology, site type, the use of an unusual raw material, knapping technique/reduction strategy, and/or information provided by Aboriginal oral history;

- **complexity:** whether the site exhibits or is predicted to contain either a complex assemblage of stone artefacts in terms of artefact types and/or raw materials, or features such as hearths or heat treatment pits, activity areas; and

- **potential for archaeological deposit:** whether the site has the potential to contain subsurface archaeological material that has stratigraphic integrity or is of a nature that suggests its subsurface investigation would assist with answering questions of contemporary archaeological interest or that indicate it should be preserved for its future research potential.

8.2.1.1 Rarity

The scientific significance of a site is assessed as higher if it is perceived as unique or rare within the local area and/or within the region; conversely, the scientific significance of a site is assessed as lower if it is perceived as common within the local area and/or within the region. This rarity may relate to the type of site, the age of the site, the location of the site in the landscape, the preservation of the site (undisturbed sites are rare), or the nature of the site contents (it may contain artefact types or reduction strategies that are unknown or not well represented in other sites; it may contain raw material types or mixes of raw material types that are not usually found in sites or are unusually informative of Aboriginal resource use in that area, it may contain hearths or other features rarely preserved in sites).

All 16 artefact scatters and isolated finds within the Stage 3 project area are assessed as having low scientific significance for rarity in the local and regional context, based on the following:

- artefact scatters and isolated finds are the most common site types in the local area, with a search of the AHIMS database in October 2007 identifying 60 artefacts by site type, and of these 44 were artefact scatters and isolated finds. This reflects regional trends, with artefact scatters and/or isolated finds the most common site types in the Hunter Valley;

- the location of these artefact scatters and/or isolated finds within the landscape is typical of local and regional patterns, with 16 of 17 sites found within 30 metres of watercourses;

- the artefact types and raw materials recorded in these artefact scatters and/or isolated finds reflect local and regional patterns, being dominated by silcrete and indurated mudstone flakes and broken flakes, with lower frequencies of other raw materials and artefact types. No raw materials or artefact types that are considered rare at local and regional levels were identified within the Stage 3 assessment area; and

- all artefact scatters and/or isolated finds recorded are in landscape areas of low to moderate integrity, with all being recorded in exposures resulting from erosion or human action. This lack of undisturbed sites is typical of open sites at local and regional levels.

The remaining known site – ACM6 (grinding groove/isolated find) – is assessed as having high scientific significance in the local and regional context based on the following:

- grinding groove sites are relatively rare in the Hunter Valley, as demonstrated by ERM (2002) who identified that only 0.5 per cent of sites registered in the upper Hunter Valley (14 of 2,641 registered sites) were grinding groove sites. However, grinding groove sites are more frequent in the lower Hunter Valley, as demonstrated by Umwelt (2003) who identified that 36 per cent of registered sites between Seahampton and Branxton (55 of 152 registered sites) contained grinding grooves;

- grinding groove sites are a rare site type within the local Quorrobolong area, with a search of the AHIMS database in October 2007 identifying only two grinding sites amongst the 60 known sites recorded. However, as the landforms of the Broken Back Range to the north and the Watagan Mountains to the south are suitable for grinding groove sites, it is noted that the low numbers of grinding groove sites is likely to reflect the lack of archaeological survey rather than the absence of grinding groove sites;

- grinding groove sites of the Hunter Valley are predominantly located within or immediately adjacent to watercourses, as water is a critical element of the grinding or resharpening process. The location of ACM6 within a creek line therefore reflects common patterns within the region; and

- the grinding groove site is of low integrity, having been damaged by past quarrying activity. The majority of known grinding groove sites in the Hunter Valley are of a high integrity, indicating the ACM6 grinding groove site cannot be considered rare for having high integrity.

8.2.1.2 Representativeness

One of the aims of cultural heritage management is to ensure that a representative sample of sites is preserved for future generations. The objective is to preserve a sample of every type of site in the range of landscapes in which they occur to provide for future research that may have different research agendas than those of the contemporary Aboriginal and archaeological community.

All 16 artefact scatters and isolated finds within the Stage 3 project area are assessed as having low scientific significance for representativeness in the local and regional context, based on the following:

- they are common site types, and their distribution reflects local and regional patterns;
- the majority of sites were recorded in disturbed areas, indicating they are of low archaeological integrity and thus low research potential. Sites along Cony Creek may be of higher integrity due to less intensive post-contact land use; and
- similar sites are presently conserved within existing Conservation Areas or Heritage Management Zones in the Hunter Valley, for example, conservation areas at Beltana, Bulga, Mount Arthur, Yorks Creek and Mount Owen. The Werakata State Conservation Area adjoining the Stage 3 area to the north is also expected to contain a range of similar site types, although archaeological survey in the area has been limited and actual sites present are unknown.

The remaining known site – ACM6 (grinding groove/isolated find) – is assessed as having high archaeological significance for rarity in the local and regional context, based on the following:

- the site type is relatively rare at local and regional levels, although its location within a gully is usual for grinding groove distribution;
- the disturbed nature of the site as a result from quarrying and the lack of associated potential deposit limits its integrity; and
- grinding groove sites are presently conserved within existing Areas or Heritage Management Zones in the Hunter Valley, for example, Sugarloaf Range within the Watagans National Park. The landscape of the adjoining Werakata State Conservation Area is also expected to contain grinding groove sites, with large areas of sandstone geology and steeply sloping gullies and watercourses acting to expose sandstone outcrops.

8.2.1.3 Archaeological Integrity

The archaeological integrity or intactness of a site is important when assessing its significance and conservation value. A site that has been subject to minimal disturbance following the deposition of cultural materials contains considerably more information about environmental change and/or cultural sequences than a similar site that has been disturbed by natural process or human actions.

Of the 16 isolated finds and seven artefact scatters within the Stage 3 project area, 13 are assessed as having low scientific significance for archaeological integrity based on:

- ACM1, ACM2, ACM3, ACM4, ACM7, ACM8, ACM11 and ACM16 were recorded on access tracks, and have therefore been disturbed by construction and maintenance of the tracks (all have been graded), ongoing vehicle use and accelerated erosion from water action;

- ACM12 was also recorded on a track that has been constructed through deposition of fill. It is unclear whether the artefact was imported amongst the fill, or whether it has since washed down onto the track from a higher landform. In either scenario, the recorded site location has limited archaeological integrity;

- ACM 13 was recorded on an ants' nest site in close proximity to Black Creek, within Werakata State Conservation Area. Although not directly impacted by construction activities, the site has been affected by tree clearance, stock grazing and insect activity. Further, the terrain at this location is relatively steep and the soil highly erodible, indicating that artefacts deposited in this area are likely to be subject to post-depositional movement. These factors indicate low archaeological integrity;

- ACM15 was recorded in a stream bed, with a single artefact washed into the stream from upstream landforms. On this basis, the recorded site area has no archaeological integrity; and

- ACM17 was recorded in an erosion scour within the steep slopes of the Broken Back Range, and is considered to have little archaeological integrity due to the likelihood of post depositional movement in this landform.

Of the 16 isolated finds and seven artefact scatters within the Stage 3 project area, three are assessed as having moderate scientific significance for archaeological integrity based on:

- ACM9 and ACM10 were recorded on ant's nest sites in close proximity to Cony Creek. Although these areas have been subject to disturbance, such as tree clearance, stock grazing and insect activity, the recorded site areas have not been impacted by construction activities. Further, both site areas are gentle in slope and soils are aggrading rather than eroding; suggesting that post-depositional movement may not be significant. On this basis, subsurface deposits associated with these sites may have archaeological integrity; and

- ACM14 is the largest artefact scatter recorded within the Stage 3 survey area, and consists of 24 artefacts recorded in ten discrete find locations. The site is positioned on the high southern terrace adjacent Cony Creek, which is not subject to flooding. Disturbance to the site has been limited to tree clearance and stock grazing, although one track has been graded across the creek within the designated site area. As with ACM9 and ACM10, the site is gentle in slope and soils are aggrading rather than eroding, suggesting that post-depositional movement may not be significant. On this basis, the site – including subsurface materials that may be found between surface find locations – may retain some stratigraphic or spatial integrity.

The remaining known site – ACM6 (grinding groove/isolated find) – is assessed as having low archaeological significance for archaeological integrity in the local and regional context, based on the following:

- the site has been directly impacted by quarrying, with the northernmost portion of the rockbar blasted and/or drilled to remove sandstone conglomerate; and

- ongoing erosion of the grinding groove, with the groove positioned within the base of the stream and therefore subject to regular water action. Erosion of the groove is compounded by the poor quality of the rockbar.

8.2.1.4 Connectedness

Connectedness refers to the relationship between sites within an area. Connectedness can be considered in a number of ways, at a number of scales. In its broadest sense, 'connectedness' refers to patterns linking sites within an area. Connectedness is often difficult to ascertain as the chronological sequence of use of surface sites is unknown at this stage of their assessment. Thus connectedness must be related to other features of sites and/or their assemblages. Sites may appear connected due to their location within the landscape (for example a series of sites associated with a terrain unit or landform element) or because of the nature of their assemblages (for example the use of similar raw materials and reduction sequences aimed at producing similar implement types) or the nature of features within the sites (for example heat treatment pits, hearths, knapping floors). In some cases, it may be that a series of sites within an area relates to a number of different activities which are in fact all components of a single land use system (for example a stone quarry, a camp site at which reduction of that stone takes place, a sandstone outcrop on which that stone is ground). As mentioned above, the difficulty with assessing such an aspect of connectedness arises in demonstrating that all of the sites relate to the same period of time. While it is broadly possible to assign some artefacts to limited time periods (backed blades, Bondi points, eloueras, edge ground axes), these time periods still span thousands of years and the artefacts in question generally only represent a minor component of most assemblages and thus their presence cannot be used to make statements about the majority of the artefacts within any assemblage. Thus, the use of 'artefact types' to date surface assemblages remains too broad (e.g. 4000 to 7000 years) to be useful in discussing the operation of a pattern of land use at any given time and to make judgements related to connectedness.

All sites recorded within the Stage 3 assessment area are assessed as having low significance for connectedness at both local and regional levels, as no recorded archaeological evidence provides associations between sites on the basis of landform distribution or the nature of assemblages recorded.

8.2.1.5 Complexity

The complexity of a site is an indication of its ability to contribute information on the local Aboriginal culture. The complexity of a site may be indicated by the number and/or density of stone artefacts it contains, or by the range of raw materials, knapping methods, reduction strategies and/or features that occur within it. Features that may occur within a site include knapping floors, heat treatment pits, hearths or other items that do not fall within the description of a generalised scatter of flaked stone artefacts.

Of the 16 isolated finds and seven artefact scatters within the Stage 3 project area, all are assessed as having low scientific significance for complexity based on:

- the small number of stone artefacts recorded, with no single site within the Stage 3 project area containing more than 24 artefacts (and no single find location containing more than six artefacts). It is noted that additional subsurface artefacts are predicted to occur along Cony and Sandy Creeks, but that large complex assemblages are not likely to occur based on known surface artefacts and local patterning;

- the small range of artefact types and raw materials present, which provides minimal information on knapping methods and reduction techniques. Only one artefact from the total assemblage of 51 displays retouch;

- the absence of any features such as hearths, knapping floors or heat treatment pits; and

- the context of the sites – geomorphic processes and land use history identify that sites are unlikely to have subsurface deposits and therefore have limited potential for subsurface features.

The remaining known site – ACM6 (grinding groove/isolated find) – is also assessed as having low archaeological significance for complexity in the local and regional context, based on the absence for artefactual deposits within the surrounding landscape, which is characterised by moderately to steeply inclined slopes and highly dispersible soils.

8.2.1.6 Potential for Archaeological Deposit

For a site to be able to contribute to an understanding of cultural sequences, it must contain distinguishable features or aspects that can be shown to have been created at different times within the context of that site or between sites. For such relationships to be possible the artefacts or features within the sites need to be located within a stratified context. It is also possible that a site may contain artefacts in a subsurface context that may not remain in a stratified context, but that may by their investigation add to the knowledge of Aboriginal use of the landscape/resource base in a more general sense.

Of the 16 isolated finds and seven artefact scatters within the Stage 3 project area, 13 (ACM1-5, ACM7-8, ACM11-13, ACM15-17) are assessed as having low scientific significance for potential archaeological deposit based on:

- the disturbed nature of each site area, with all impacted by geomorphic process and/or human action, such as access track construction and use, tree clearance, deposition of fill, and water erosion; and

- the limited potential for subsurface deposits, with the majority of sites situated in areas characterised by steeply sloping land and highly dispersible soils. These landform areas are not conducive to the retention of archaeological deposits, and are unlikely to retain archaeological deposits with spatial and/or stratigraphic integrity.

Of the 16 isolated finds and seven artefact scatters within the Stage 3 project area, four are assessed as having moderate scientific significance for potential archaeological deposit, being ACM9, ACM10 and ACM14. These sites are found along the Cony Creek alignment, which has been assessed to be of archaeological potential as a result of:

- the predicted Aboriginal use of the Cony Creek alignment, which is likely to have been higher than surrounding landforms due to the attractive combination of water and flora and fauna resources. More intensive and/or repeated Aboriginal use is likely to be reflected in the archaeological record through higher site and artefact densities. This is reflective of local and regional site patterning, where a higher density of sites has been identified within 50 metres of significant watercourses; and

- the moderate integrity of the sites, which although impacted by tree clearance, stock movement and insect activity, has not been affected by construction. Further, the Cony Creek terrace is above the 100 year ARI flood event level, indicating that geomorphic processes are less likely to impact spatial and stratigraphic integrity of any remnant archaeological deposits.

The area of archaeological potential associated with ACM14 spans the larger site area, and therefore includes the areas between surface find locations.

The remaining known site – ACM6 (grinding groove/isolated find) – is assessed as having low archaeological significance for potential archaeological deposit in the local and regional context, based on the limited potential for subsurface deposit, with the site positioned in a stream bed and the surrounding landforms characterised by steep slopes and highly dispersible soils, indicating post-depositional movement is highly likely.

8.2.2 Ranking of Criteria for Evaluating Archaeological Significance

Past studies within the Hunter Valley, such as Umwelt 2007, have developed a standardised approach to the evaluation of scientific significance, involving the use of numerical values for each significance criterion so that an overall significance assessment could be quantified. **Table 8.2** outlines the basis for numerical values attributed to each criteria set, which are as follows:

- low significance was afforded a score of 1;
- moderate significance was afforded a score of 2; and
- high significance was afforded a score of 3.

Overall significance was scored as follows:

- low significance 12-15;
- low to moderate significance 16-19;
- moderate significance 20-23;
- moderate to high significance 24-27; and
- high significance 27+.

Table 8.2 - Criteria Used in Evaluating Archaeological Significance

	Low (Score of 1)	**Moderate (Score of 2)**	**High (Score of 3)**
Rarity	The location of the site within the landscape, its type, integrity, contents and/or potential for sub-surface artefacts, are common within the local and regional context.	The location of the site within the landscape, its type, integrity, contents and/or potential for sub-surface artefacts, are common within the regional context but not the local context.	The location of the site within the landscape, its type, integrity, contents and/or potential for sub-surface artefacts, are rare within the local and regional context.
Representativeness	This site, when viewed in relation to its type, contents, integrity and location in the landscape, is common within a local and regional context and sites of similar nature (or in better condition) are already set aside for conservation within the region.	This site, when viewed in relation to its type, contents, integrity and location in the landscape, is uncommon within a local context but common in a regional context and sites of similar nature (or in better condition) are already set aside for conservation within the region.	This site, when viewed in relation to its type, contents, integrity and location in the landscape, is uncommon within a local and regional context and sites of similar nature (or in better condition) are not already set aside for conservation within the locality or region.

Table 8.2 - Criteria Used in Evaluating Archaeological Significance (cont)

	Low **(Score of 1)**	**Moderate** **(Score of 2)**	**High** **(Score of 3)**
Integrity	Stratigraphic integrity of the site has clearly been destroyed due to major disturbance/loss of topsoil. The level of disturbance is likely to have removed all spatial and chronological information.	The site appears to have been subject to moderate levels of disturbance, however, there is a moderate possibility that useful spatial information can still be obtained from sub-surface investigation of the site, even if it is unlikely that any useful chronological evidence survives.	The site appears relatively undisturbed and there is a high possibility that useful spatial information can still be obtained from sub-surface investigation of the site, even if it is still unlikely that any useful chronological evidence survives. (In cases where both spatial and chronological evidence is likely to survive the site will gain additional significance from high scores for rarity and representativeness).
Connectedness	There is no evidence to suggest that the site is connected to other sites in the local area or the region through: - their chronology (rarely known); - their site type (e.g. connectedness could be argued between an axe quarry, a nearby set of axe grinding grooves and an adjacent site exhibiting evidence of axe reduction);	There is some evidence to suggest that the site is connected to other sites in the local area or the region through one of the following: - their chronology (rarely known); - their site type (e.g. connectedness could be argued between an axe quarry, a nearby set of axe grinding grooves and an adjacent site exhibiting evidence of axe reduction);	There is good evidence to support the theory that the site is connected to other sites in the local area or the region through two or more of the following: - their chronology (rarely known); - their site type (e.g. connectedness could be argued between an axe quarry, a nearby set of axe grinding grooves and an adjacent site exhibiting evidence of axe reduction);
Connectedness	- by the use of an unusual raw material, knapping technique/reduction strategy; - similar designs/motifs in the case of art sites and engravings; and/or - information provided by Aboriginal oral history.	- by the use of an unusual raw material, knapping technique/reduction strategy; - similar designs/motifs in the case of art sites and engravings; or - information provided by Aboriginal oral history.	- by the use of an unusual raw material, knapping technique/reduction strategy; - similar designs/motifs in the case of art sites and engravings; and/or - information provided by Aboriginal oral history.
Complexity	The site does not exhibit and is not predicted to contain either of the following in a sub-surface context: - a complex assemblage of stone artefacts in terms of artefact types and/or raw materials (including use of local and imported raw materials) and/or knapping techniques/reduction strategies; and/or - features such as hearths or heat treatment pits, activity areas.	The site exhibits or can be predicted to contain one of the following in a sub-surface context: - a complex assemblage of stone artefacts in terms of artefact types and/or raw materials and/or knapping techniques/reduction strategies and/or use of local and imported raw materials; and/or - features such as hearths or heat treatment pits, activity areas.	The site exhibits or can be predicted to contain both of the following in a sub-surface context: - a complex assemblage of stone artefacts in terms of artefact types and/or raw materials and/or knapping techniques/reduction strategies and/or use of local and imported raw materials; and - features such as hearths or heat treatment pits, activity areas.

Table 8.2 - Criteria Used in Evaluating Archaeological Significance (cont)

	Low (Score of 1)	**Moderate (Score of 2)**	**High (Score of 3)**
PAD	The site does not have or has only a low potential to contain sub-surface archaeological material that has stratigraphic integrity or is of a nature that suggests its sub-surface investigation would assist with answering questions of contemporary archaeological interest or that indicate it should be preserved for its future research potential.	The site has a moderate potential to contain sub-surface archaeological material that has stratigraphic integrity or is of a nature that its sub-surface investigation would assist with answering questions of contemporary archaeological interest or that indicate it should be preserved for its future research potential.	The site has a high potential to contain sub-surface archaeological material that has stratigraphic integrity or is of a nature that its sub-surface investigation would assist with answering questions of contemporary archaeological interest or that indicate it should be preserved for its future research potential.

Based on the discussion in **Section 8.2.1**, **Table 8.3** lists the numerical values attributed to each archaeological site recorded for each scientific assessment criterion.

Table 8.3 - Scientific Significance Assessment

Site Name	Rarity		Represent-ativeness		Archaeological Integrity		Connectedness		Complexity		Potential for Archaeological Deposit		Overall Archaeological Significance	
	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Score	Significance
ACM1	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM2	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM3	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM4	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM5	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM6	3	3	3	3	1	1	1	1	1	1	1	1	20	Moderate
ACM7	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM8	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM9	1	1	1	1	2	2	1	1	1	1	2	2	16	Low to Moderate
ACM10	1	1	1	1	2	2	1	1	1	1	2	2	16	Low to Moderate
ACM11	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM12	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM13	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM14	1	1	1	1	2	2	1	1	1	1	2	2	16	Low to Moderate
ACM15	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM16	1	1	1	1	1	1	1	1	1	1	1	1	12	Low
ACM17	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*12*	Low

8.2.3 Summary Statements of Scientific Significance

This section provides a summary of the scientific significance of all archaeological sites identified within the Stage 3 assessment area.

Of the 16 artefact scatters and isolated finds recorded within the Stage 3 assessment area, 13 sites (ACM1-5, ACM6-8, ACM11-13, ACM15-17) are assessed as having low archaeological significance due to the following:

- small artefact scatters and isolated finds are common site types at local and regional levels, and are not considered rare;
- similar sites are presently conserved within existing Conservation Areas or Heritage Management Zones in the Hunter Valley, for example, the Sugarloaf Range within the Watagans National Park and the conservation areas at Beltana, Bulga, Mount Arthur, Yorks Creek and Mount Owen. Similar site types are also expected to be present throughout the Werakata State Conservation Area immediately north of the Stage 3 assessment area, although site numbers are not known due to lack of archaeological survey;
- integrity of the sites is generally low, with all sites recorded in areas of disturbance resulting from human action or geomorphic processes. These processes have resulted in sites with little potential for spatial or stratigraphic integrity;
- there is no evidence for connectedness amongst all sites, as recorded archaeological features do not directly link any sites;
- there is no evidence for complexity at any site, primarily as a result of the low archaeological integrity noted above; and
- potential for archaeological deposit is limited, with the majority of sites positioned in landforms characterised by steep slopes and highly dispersible soils. Sites in valley lowland landforms are more likely to retain artefacts, although the sites listed above are not likely to retain artefacts as they are found in eroding and not aggrading soil landscapes.

The remaining three artefact scatters and isolated finds recorded within the Stage 3 assessment area (ACM9-10, ACM14) are assessed as having low-moderate scientific significance as they deviate from the above sites in two key aspects: archaeological integrity and potential archaeological deposit, both of which have been assessed as moderate at both local and regional levels.

The grinding groove and isolated find site (ACM6) is assessed as having moderate archaeological significance due to the following factors:

- the relative rarity of grinding groove sites within the Hunter Valley, although it is noted that grinding groove sites are more frequent in the lower Hunter Valley than in the upper areas of the region;
- the inclusion of grinding groove sites within existing Conservation Areas or Heritage Management Zones in the Hunter Valley, for example, the Mount Sugarloaf Range. Grinding groove sites are also expected to be present throughout the Werakata National Park and the Watagans National Park, although exact site numbers are not known due to lack of archaeological survey;

- integrity of the site is low, with the northern section of the sandstone conglomerate platform being quarried in the past. The site is also subject to ongoing erosion from water action, being situated in a stream bed;
- there is no evidence for connectedness between the grinding groove site and other known sites within the Stage 3 assessment area;
- there is no evidence for complexity at any site; and
- potential for archaeological deposit is limited, with the surrounding landscape characterised by steep slopes and highly dispersible soils.

Table 8.2 provides a summary of the scientific significance of all 17 sites recorded within the Stage 3 assessment area, noting the response to each criterion.

9.0 Heritage Impact Assessment

This section identifies the potential impact of the Stage 3 proposal on all known Aboriginal heritage sites identified by this assessment, including surface archaeological sites and areas of high archaeological potential. The following discussion outlines the potential impact of surface infrastructure and subsidence.

9.1 Surface Infrastructure

As detailed in **Section 2** and illustrated on **Figure 2.3**, the Stage 3 proposal includes the following surface infrastructure:

- a new surface infrastructure facility to the south-west of Kitchener. This facility will include upcast and downcast ventilation shafts, bathhouse, workshop, electricity substation, store, service boreholes and offices. An access road will be built to connect the facility to Quorrobolong Road, and an electricity distribution line will also be constructed along the access road alignment to connect the facility to existing infrastructure on Quorrobolong Road; and

- other unspecified minor infrastructure and works that may be required within the project mining leases, to be identified throughout the life of the Stage 3 project.

The impact of both on the identified Aboriginal cultural heritage values of the Stage 3 assessment area is discussed below.

9.1.1 Surface Infrastructure Site

Survey identified no surface archaeological sites within the proposed surface infrastructure facility site and associated road and electricity alignment. Further, the landforms of the surface infrastructure site are assessed to be of low archaeological potential.

No sites or places of cultural significance within the surface infrastructure site were identified by Aboriginal stakeholders throughout the course of the assessment.

Consequently, no impacts to Aboriginal heritage sites or areas are identified within the Stage 3 surface infrastructure site.

9.1.2 Minor Infrastructure and Works

Current subsidence predictions indicate that it is unlikely that remediation works in response to surface disturbance will be required. As a result, the impact of construction of other unspecified minor infrastructure (if required) within the Stage 3 assessment area on Aboriginal archaeological and cultural values cannot be assessed at this time, as the locations any such works is not yet known.

9.2 Subsidence

As detailed in **Section 2** and illustrated on **Figure 2.2**, the Stage 3 proposal involves underground mining of an additional twelve longwalls with coal to be extracted using LTCC technology. The normal ground movements resulting from longwall mining are referred to as systematic subsidence movements. These movements are typically described by the parameters of subsidence, tilt and strain, which were defined in the report by MSEC (2008) and are summarised below:

1. **subsidence** refers to both the vertical and horizontal displacement of a point, which is usually expressed in the units of millimetres;

2. **tilt** is the change of the slope of the ground as a result of differential subsidence, and is calculated by dividing the change of subsidence between two points by the distance between those points. Tilt is usually expressed in the units of millimetres per metre; and

3. **strain** is the relative change in horizontal distance between two points on the ground divided by the original distance between those points. Strain is typically expressed in the units of millimetres per metre. Tensile strain occurs where the distance between two points increases; and compressive strain occurs when the distance between two points decreases.

Non-systematic subsidence includes far-field horizontal movements, irregular subsidence and valley related movements. Valley related movements are a natural phenomenon, resulting from the formation and ongoing development of the valley, which can be accelerated by longwall mining. The parameters typically used to describe valley related movements were defined in the report by MSEC (2008) and are summarised below:

1. **upsidence** is the reduced subsidence, or the net uplift in the base of a valley, which results from the dilation or buckling of near surface strata in the base of a valley resulting from the redistribution of horizontal stresses in the strata around the collapsed zones above extracted longwalls;

2. **closure** is the reduction in horizontal distance between the valley sides, also resulting from redistribution of horizontal stresses in the strata around the collapsed zones above extracted longwalls; and

3. **compressive and tensile strains**, as defined above.

Specialist advice regarding likely subsidence resulting from the Stage 3 proposal and the potential impacts to Aboriginal heritage sites and areas within the assessment area has been provided by MSEC (2008) and SCT (2008). A copy of the SCT report is attached as **Appendix 3**. Detailed descriptions of the predicted subsidence parameters and the impact assessments were provided in these reports, and the following sections provide a summary of key findings regarding potential impacts to archaeological sites.

9.2.1 Known Archaeological Sites

A total of 19 archaeological sites are located within the predicted 20 millimetre subsidence contour, and MSEC (2008) has described the potential subsidence impacts at these site locations. In summary, the archaeological sites are located across the assessment area and are expected, therefore, to experience the full range of predicted systematic subsidence movements. The following sections discuss the potential impact to site types within the Stage 3 assessment area.

9.2.1.1 *Artefact Scatters and Isolated Finds*

This assessment identified that of the 16 artefact scatters and isolated finds in the Stage 3 assessment area, 13 are of low scientific significance. ACM9, 10 and 14 were assessed to be of low to moderate scientific significance.

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

Surface cracking in soils as a result of systematic subsidence is rarely seen at depths of cover greater than 500 metres, such as at Austar. Surface cracking in soils as a result of systematic subsidence movements that has been observed in the past at these depths of cover has generally been isolated and of a minor nature.

Fracturing of bedrock due to valley related movements has been observed in the past at these depths of cover, however, if a sufficient depth of soil is present at the open sites, it is unlikely that any significant cracking would be expressed at the surface.

Any surface cracking in the overlying soils within Stage 3 is therefore expected to be isolated and of a minor nature. In some cases, the surface cracking of soils could be transient, as the tensile phase behind the longwall extraction face, which causes cracks, is generally followed by a compressive phase that partially closes them.

Following review of Stage 3 conditions, MSEC (2008:78) note that in areas where the depth of cover is around 500 metres or greater and where a reasonable thickness of soil exists, any surface cracking that occurs would be expected to be expressed as a number of narrower cracks rather than a single crack. In these instances, it is likely that cracks would be infilled by subsequent soil movement (MSEC 2008:78).

Potential surface cracking and associated stratigraphic cracking may impact on the sites containing artefact scatters and isolated finds throughout the Stage 3 area, however, the artefacts themselves are unlikely to be directly impacted. These impacts are considered to be similar to those of existing bioturbation processes already affecting many sites, and therefore not considered to be a significant impact. The infilling of cracks during subsequent soil movement is also likely to limit significant post-depositional movement.

9.2.1.2 *ACM6 Grinding Groove*

This assessment identified that the grinding groove recorded at ACM6 is of high cultural significance and moderate scientific significance. MSEC provided the following systematic subsidence predictions for this site:

- subsidence is predicted to be 1445 millimetres increasing to 2345 millimetres in the maximum upperbound prediction;
- tilt is predicted to be 3.6 millimetres per metre increasing to 5.3 millimetres per metre in the maximum upperbound prediction;
- tensile strain is predicted to be 0.5 millimetres per metre increasing to 0.8 millimetres per metre in the maximum upperbound prediction; and
- compressive strain is predicted to be 1.9 millimetres per metre increasing to 2.6 millimetres per metre in the maximum upperbound prediction.

MSEC (2008:36) identifies that the fracturing of bedrock has been observed in the past where tensile strains have been greater than 0.5 mm/m or compressive strains have been greater than 2 mm/m. The maximum upperbound systematic strains at the grinding groove site are greater than 0.5 mm/m tensile and 2 mm/m compressive and, therefore it is possible that some minor fracturing could occur in the bedrock of the creek bed.

Elevated compressive strains are also known to result from valley related movements which occur in the bottom of valleys. MSEC (2008) estimates ACM6 may be affected by upperbound valley closure of up to 85 millimetres. On this basis, SCT (2008) estimated that

the ACM6 grinding groove site may be affected by an estimated 120 millimetres of upsidence.

SCT (2008) report that intact rock strata is commonly observed to fracture in lab tests at horizontal compressions strains of 1-3mm/m, with strata movements occurring at lower strain levels along existing joints. Following review of MSEC (2008) predictions, SCT (2008) noted that '…there is considered to be potential for the onset of rock fracturing if compressive strain peaks coincide with the location of the rockbar'. In addition to predicted horizontal strains, SCT (2008) further estimate that there is potential for valley closure related strains of 4-5mm/m additional to any systematic strains that may occur, suggesting that '…there is likely to be sufficient horizontal compression available to fracture rock as a result of the total predicted subsidence'.

SCT (2008) estimate the potential for perceptible fracturing to occur on the surface of the rockbar as a result of mining of LWA7 and LWA8 is in the range of 10 to 30 per cent. Further, SCT (2008) note that rock fracturing may not occur with the extraction of LWA7 but more likely following the subsequent extraction of LWA8, and that the potential for fracturing as a result of LWA7 extraction is likely to be at the lower end of this range, while the potential for fracturing as a result of subsequent LWA8 extraction is likely to be at the upper end of this range. Natural jointing of the ACM6 rockbar is such that initial fracturing is most likely to occur along the projected location of the low angle joint visible on the southern side of the downstream rockbar (SCT 2007).

9.2.2 Areas of Archaeological Potential

This assessment identified three key areas to be of archaeological potential: the alignment of Cony Creek and surrounding landforms; the alignment of Sandy Creek and surrounding landforms; and the confluence of Sandy and Cony Creeks, particularly the elevated north-east terrace. It is predicted that these areas contain a higher frequency of archaeological sites, and that those sites have a higher frequency of artefacts, than surrounding landforms. These sites may occur as both surface and subsurface deposits.

As detailed in **Section 9.2.2.1**, cracking of surface soils is identified as a key issue that may affect the sites containing artefactual deposits throughout the area, although it is unlikely that the archaeological deposits themselves would be directly impacted. Any surface cracking in the soils is expected to be minor in nature and reflective of existing disturbances in scope and scale. For example, potential cracking of surface soils is likely to occur as several smaller cracks, all of which are likely to be infilled during subsequent soil movement. Although this may result in the downward movement of artefacts, such downward movements are already evident through bioturbation at sites.

10.0 Management Context

10.1 Statutory and Policy Framework

Stage 3 of the Austar Coal Mine is defined as a Major Project under SEPP (Major Projects), in accordance with Clause 5 (1)(a) because it is 'development for the purpose of mining'. Consequently, Part 3A of the EP&A Act applies and the Minister for Planning will determine the Project Application.

As a result, the provisions of the NPW Act do not apply, and Part 6 Section 87 Permits and Section 90 Consents will not be required for any investigation/salvage works undertaken as part of this project, if approved. This does not mean that the level of assessment work required or the way issues are managed changes, it mainly relates to reducing the number of separate approvals and time required to start a project once approved. Prior to granting approval for a project the DoP will consider Aboriginal cultural heritage issues and consult with the DECC regarding the project to ensure that those issues are appropriately considered when a decision is made about whether or not to approve a project. They will also consider what management requirements need to be implemented.

As no Section 87 Permits or Section 90 Consents are required for this project, Austar will be required to manage cultural heritage issues in accordance with the management recommendations made in this Aboriginal Cultural Heritage Assessment report and with any approval conditions imposed by the DoP. This may include conservation outcomes, salvage of artefacts, subsurface works or any other management strategies.

The information presented in this report follows the *NPWS Standards and Guidelines for Archaeological Report Writing* 1997 and DECC's draft Part 3A assessment guideline *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*, July 2005. Aboriginal consultation has been undertaken in accordance with the above guidelines and following DECC's *Interim Community Consultation Requirements for Applicants* 2004.

10.2 Aboriginal Stakeholder Input

Aboriginal stakeholder involvement in determining appropriate management outcomes is critical to the Aboriginal heritage management process. The following sections outline Aboriginal stakeholder input provided throughout the project regarding the assessment process and appropriate heritage management outcomes.

10.2.1 Aboriginal Stakeholder Meeting Outcomes

As detailed in **Section 3**, Aboriginal Stakeholder Meetings were held at key stages of the project to discuss the aims, methods and results of the survey, the significance of identified sites and areas, the likely impact resulting from the Stage 3 proposal, and appropriate management strategies. A summary of Aboriginal stakeholder meetings held in December 2007, January 2008 and July 2008 is provided below.

10.2.1.1 11 December 2007

Following completion of the archaeological survey, an Aboriginal stakeholder meeting was held on 11 December 2007 to discuss the results of the archaeological survey and the in-progress evaluation of scientific significance and the impact assessment. **Table 10.1** lists all Aboriginal stakeholders who attended the Austar project meeting on 11 December 2008, and participated in the following discussion.

Table 10.1 - Aboriginal Stakeholder Meeting Attendance, 11 December 2007

Stakeholder	Representative
Aboriginal Native Title Consultants	Michael Matthews
Arthur Fletcher	Arthur Fletcher
Giwiirr Consultants	Michele Stair
Hunter Valley Cultural Consultants	Colleen Stair
Hunter Valley Cultural Surveying	Luke Hickey
Lower Hunter Wonnarua Council	Tracey Skene
Mindaribba Local Aboriginal Land Council	Christine Dever
Mingga Consultants	Tony Matthews
Upper Hunter Heritage Consultants	Cheryl Matthews
Wattaka Wonnarua Cultural Consultants Services	Des Hickey
Wonnarua Culture Heritage	Gordon Griffiths
Yarrawalk	Nicky Taggart

During the meeting, all Aboriginal heritage issues identified to date were discussed, including known archaeological sites (grinding groove, artefact scatters and isolated finds), areas of high archaeological potential and issues identified from the literature review (the potential for ceremonial/burial sites). James Barbato (MSEC) provided an overview of the proposed LTCC technology and predicted subsidence assessment by MSEC, and the predicted subsidence for the grinding groove site location predicted by MSEC and SCT. Management strategies for all identified Aboriginal heritage impacts were discussed, ranging from the grinding groove offset strategy to procedures for future works on site. The meeting also involved a site visit to the ACM6 grinding groove site to provide an opportunity for those not involved in fieldwork in that area to inspect the site.

Following independent discussion during the meeting, Aboriginal stakeholders present made the following recommendations:

1. that the timeframe for the Aboriginal heritage assessment is too short, and that Aboriginal stakeholders need more time to discuss the project and consider management options;

2. that Austar should provide Aboriginal stakeholders with advice on the cost of engineering mitigation works at the grinding groove site;

   note that this request reflected discussions between Aboriginal stakeholders and Austar regarding mitigation works and the offset strategy, specifically one option to not conduct mitigation works at the grinding groove site and in its place, Austar would contribute an equal value to an Aboriginal community project/outcome of their choice;

3. Ellalong Lagoon conservation offset outcomes were discussed amongst Aboriginal stakeholders, and it was decided that this was not an appropriate offset strategy; and

4. another Aboriginal stakeholder meeting should be held following receipt of information from Austar, to further discuss mitigation options and the offset strategy.

10.2.1.2 30 January 2008

Following provision of information regarding the likely cost of mitigation works at the grinding groove site by Austar, another Aboriginal stakeholder meeting was held on 30 January 2008. This meeting was held to further discuss the management strategies for the project,

specifically the management of the grinding groove site and offset strategy options for the project.

Table 10.2 lists all Aboriginal stakeholders who attended the Austar project meeting on 30 January 2008, and participated in the following discussion.

Table 10.2 - Aboriginal Stakeholder Meeting Attendance, 30 January 2008

Stakeholder	Representative
Aboriginal Native Title Consultants	Margaret Matthews
Arthur Fletcher	Adam Fletcher
Giwiirr Consultants	Michele Stair
Lower Hunter Wonnarua Council	Tom Miller
Hunter Valley Cultural Consultants	Colleen Stair
Hunter Valley Cultural Surveying	John Matthews
Mindaribba Local Aboriginal Land Council	Christine Dever
Mingga Consultants	Clifford Matthews
Upper Hunter Heritage Consultants	Justin Matthews
Wonnarua Culture Heritage	Gordon Griffiths
Yarrawalk	Nicky Taggart

Prior to the meeting, opportunity was provided for a site inspection of the ACM6 grinding groove site for any Aboriginal stakeholders who had not participated in the previous site inspections. As a result, Adam Fletcher (representing Arthur Fletcher) requested to visit the site, and was escorted by Meaghan Russell and Julian Travaglia of Umwelt.

During the meeting, discussion continued regarding appropriate management strategies for the identified Aboriginal heritage impacts that would result from the Stage 3 proposal, spanning the grinding groove offset strategy, fencing of the grinding groove site, impact mitigation works, management of recovered artefacts, access to archaeological sites and cultural heritage awareness training for relevant Austar mine personnel. Following general discussion of these issues, Aboriginal stakeholders and DECC representatives held an independent meeting, on which basis the following recommendations were presented by Len Anderson (DECC) on behalf of those Aboriginal stakeholders in attendance:

1. that Austar offer $100,000 not $50,000 for the offset strategy. This money is in addition to any remediation works that may be required should the rockbar crack;

   [note that the above recommendation followed Austar's offer of $50,000 as the grinding groove offset strategy, on the basis that engineering mitigation works to minimise potential impacts to the site would cost approximately $30,000 to $50,000]

2. that Austar provide local Wonnarua people with employment at the mine, specifically that 15 per cent of the new 100 employees are Aboriginal;

3. that the grinding groove site is fenced off for its protection. The money for this will come from the $100,000 offset strategy;

4. that access be obtained to private properties if possible for survey and management of known sites;

5. that all future works at sites will require Aboriginal stakeholders to be present (following earlier discussions that non-Aboriginal people should not go to an Aboriginal site without an Aboriginal stakeholder present);

6. that full-day payment rates should be used for all survey and meeting attendance; and

7. that Aboriginal stakeholders deal with Austar directly on all project issues, and not go through Umwelt.

At the meeting, Len Anderson further requested that Umwelt type up the list of recommendations and provide a copy to all Aboriginal stakeholders. Austar representatives also noted the requests, and advised that a response would be provided in writing to all Aboriginal stakeholders after consultation with senior management.

Following the meeting, MLALC requested that the recommendation for Aboriginal employment be expanded to Aboriginal people, not just local Wonnarua people.

In April 2008, Austar provided a response to the above recommendations, which is reproduced below:

1. Austar Coal will make a payment of $100,000 as the total cost of the grinding groove offset strategy to be contributed to an Aboriginal heritage or community project as decided by Aboriginal stakeholders. This amount to be paid upon Austar Coal receiving all necessary approvals and agreements to allow the commencement of mining in the area defined in the Stage 3 EA Review.

2. Austar Coal is an equal opportunity employer in accordance with NSW requirements. From time to time Austar Coal has vacancies for skilled and non-skilled employment and would welcome local Wonnarua people making application for those employment positions.

3. Austar Coal will use its best endeavours to have the grinding groove site fenced for its protection subject to approval from the National Parks and Wildlife Service and any restrictions imposed by the subject land being a conservation area. Funds for these works are part of the $100,000 offset strategy and will be available upon Austar Coal receiving all necessary approvals and agreements to allow the commencement of mining in the area defined in the Stage 3 EA Review.

4. Austar Coal is not in a position to permit access to private properties for survey and management of known sites but will use its best endeavours to obtain access to private properties for Aboriginal site management (noting that access cannot be guaranteed).

5. Austar Coal will commit to having Aboriginal stakeholders present for any future works required at registered Aboriginal sites.

6. Austar Coal will continue to pay half-day payment rates for attendance of up to 4 hours and full-day payment rates for attendance in excess of 4 hours for survey and meetings as required.

7. Austar Coal welcomes the opportunity to directly liaise with Aboriginal stakeholders, and this can be arranged by contacting the Senior Site Executive at Austar Coal who will appoint a suitable Aboriginal Liaison Representative

10.2.1.3 8 July 2008

Following provision of the draft *Aboriginal Heritage Assessment* report in June 2008, a meeting was held on 8 July 2008 to discuss Aboriginal stakeholder comments on the draft report and Stage 3 project. This meeting coincided with the end of the formal 21 day Aboriginal stakeholder review period 7 July 2008, and therefore aimed to discuss all comments received to date and to obtain verbal comments from those stakeholders who had not submitted comments within the formal review period.

Table 10.3 lists all Aboriginal stakeholders who attended the Austar project meeting on 8 July 2008, and participated in the following discussion.

Table 10.3 - Aboriginal Stakeholder Meeting Attendance, 8 July 2008

Stakeholder	Representative
Arthur Fletcher	Adam and Troy Fletcher
Aboriginal Native Title Consultants	Michael Matthews
Giwiirr Consultants	Barry Stair
Hunter Valley Cultural Consultants	Colleen Stair
Lower Wonnarua Tribal Consultancy	Barry Anderson
Mingga Consultants	Clifford Matthews
Mindaribba Local Aboriginal Land Council	Christine Dever
Tracey Skene	Marie Waugh
Upper Hunter Heritage Consultants	Tony Matthews
Wonnarua Culture Heritage	Joey Griffiths

During the meeting, each recommendation of the draft report was discussed, with opportunity provided for Aboriginal stakeholder comment. As some meeting attendees had not attended past meetings, the context to development of management recommendations was also discussed, spanning survey access constraints, survey results, literature review results, impact assessment and the outcomes of past Aboriginal stakeholder meetings. Meeting notes are attached in **Appendix 1**, and a summary of key comments made by Aboriginal stakeholders on the Stage 3 project and draft report is provided below:

- Barry Anderson of LWTC stated that he did not consider the draft report to be complete as the area had not been fully surveyed (due to access restrictions on some private properties). Mr Anderson further noted that some properties were assessed to be of high archaeological potential, and these areas in particular needed to be surveyed;

- Christine Dever of MLALC enquired whether Umwelt had been able to find any additional information on the potential ceremonial site or two burial sites in the Quorrobolong Valley (as identified by Needham 1981). No new information on this issue since January 2008 had been sourced, and the issue was discussed again for all those attending;

- Barry Anderson of LWTC stated that he could not make a statement on the cultural significance of the Stage 3 area as only parts had been surveyed. Mr Anderson further noted that all archaeological sites are of cultural significance;

- the fencing of the ACM6 grinding groove was discussed, and Barry Anderson of LWTC, Christine Dever of MLALC and Barry Stair of GC stated that the site should not be fenced as it would draw attention to the grinding groove site and possibly place the site at risk; and

- Barry Anderson of LWTC stated that if artefacts were collected from Stage 3 in the future, they could be stored in a Keeping Place provided by Austar, such as a small shed with lockable storage cabinets that could be accessed by Aboriginal stakeholders and archaeologists.

At the end of the meeting, all Aboriginal stakeholders were encouraged to provide written comment on the project for inclusion in the final Aboriginal Heritage Assessment report, which would be submitted to the Department of Planning in late July 2008.

10.2.2 Aboriginal Stakeholder Comments

All written Aboriginal stakeholder comments provided during the course of the assessment are attached in **Appendix 1** and are summarised below.

10.2.2.1 Aboriginal Native Title Consultants

Aboriginal Native Title Consultants provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report.

10.2.2.2 Arthur Fletcher

Following draft report review, Arthur Fletcher provided Umwelt with a written statement on the Stage 3 project and draft report on 9 July 2008. The statement provided the following comment on the cultural significance of sites identified in the Stage 3 report:

- artefact scatters located in the vicinity of Black Creek reflect periodic use of the area for activities such as hunting, fishing and retooling. However, due to the time that has passed since these areas have been used in a traditional manner, evidence of this use has been degraded;

- areas around water courses are culturally significant as they represent a livelihood and a connection to country;

- the grinding groove site is of particular significance as it represents a tangible link to past traditional use of the area. The grooves represent an area where tools could have been repaired, and are evidence of our cultural existence and belonging to the area. Mr Fletcher further stated that this area is of the highest cultural significance as it serves a cultural link to our ancestors' lives; and

- the artefact scatter in ACM14 represents an obvious area of high occupation. As a result, the area is highly culturally significant.

On the management recommendations in the draft report, Mr Fletcher states that they are suitable, particularly the archaeological site monitoring program. Mr Fletcher further notes that he would like Austar and Aboriginal stakeholders to work together to connect with the local community to gain access to extend the program (survey) to as many properties as possible. On the management of any artefacts recovered from Stage 3 during future works, Mr Fletcher states that a designated keeping place should be established.

10.2.2.3 Giwiirr Consultants

Following draft report review, Rodney Mathews of Giwiirr Consultants provided Umwelt with a written statement on the Stage 3 project and draft report on 23 July 2008. The statement identified that the draft report should not be finalised until the archaeological survey of private

properties was completed. Mr Matthews also noted that the ACM6 grinding groove site should not be fenced as it could draw attention to the site.

10.2.2.4 Hunter Valley Cultural Consultants

Hunter Valley Cultural Consultants provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report.

10.2.2.5 Hunter Valley Cultural Surveying

Following draft report review, Luke Hickey of Hunter Valley Cultural Surveying provided Umwelt with a written statement on the Stage 3 project and draft report on 23 July 2008. This statement identified that the methodology for the heritage assessment of the Stage 3 project should be extended to include archaeological survey of the whole area. Mr Hickey also stated that a HVCS representative needed to be involved in all days of survey, and as only part of the area had been seen, a thorough cultural heritage report could not be prepared. Mr Hickey also commented that any information on the cultural heritage values of the study area would be appreciated by Hunter Valley Cultural Surveying.

10.2.2.6 Lower Hunter Wonnarua Council

Lower Hunter Wonnarua Council provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report.

10.2.2.7 Lower Wonnarua Tribal Consultancy

Following draft report review, Barry Anderson of Lower Wonnarua Tribal Consultancy provided Umwelt with a written statement on the Stage 3 project and draft report on 22 July 2008. This statement identified that the LWTC could not comment on the draft report as the Stage 3 area has not been fully surveyed, and on this basis, LWTC do not agree with the report in its current form. Mr Anderson also referred to the archaeological survey coverage and assessment of inaccessible properties in the draft report, and noted that the Stage 3 area needs to be surveyed as a whole due to the high archaeological potential of the area. The statement also clearly notes that these areas (referring to areas of high archaeological potential) are of high cultural value. In conclusion, Mr Anderson requests that the Department of Planning and DECC read the minutes from the 8 July 2008 meeting and take into account the issues raised with Austar and Umwelt.

10.2.2.8 Mindaribba Local Aboriginal Land Council

On 18 March 2008, Rick Griffiths of Mindaribba Local Aboriginal Land Council provided Umwelt with a letter stating disagreement with the outcomes of the Aboriginal stakeholder meeting held on 30 January 2008, as MLALC Christine Dever advised that no formal recommendations were presented by Aboriginal stakeholders at the meeting. In response to this, Umwelt notes that Christine Dever left the meeting before Aboriginal stakeholders in attendance presented the recommendations. The letter further states that MLALC concurs with two of the recommendations, relating to Aboriginal employment at the mine and access to Aboriginal archaeological sites; but that the grinding groove site does not have to be destroyed but that Austar Coal Mine consider this the easiest and least expensive way to manage the site. MLALC also states that Umwelt appears to be supporting the destruction of the site.

MLALC provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report following draft report review.

10.2.2.9 Mingga Consultants

Following draft report review, Clifford Matthews of Mingga Consultants provided Umwelt with a written statement on 10 July 2008. This stated that Mingga Consultants would not like artefacts (within the Stage 3 project area) to be fenced. This statement followed on from discussions at the Aboriginal stakeholder meeting on 8 July 2008 where fencing of the ACM6 grinding groove site was discussed, and a number of stakeholders in attendance stated that they would not like the ACM6 grinding groove site to be fenced as it would put the site at risk.

10.2.2.10 Tracey Skene

Tracey Skene provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report.

10.2.2.11 Upper Hunter Heritage Consultants

Upper Hunter Heritage Consultants provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report.

10.2.2.12 Wanaruah Custodians

Wanaruah Custodians provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report.

10.2.2.13 Wattaka Wonnarua Cultural Consultants Service

Following draft report review, Des Hickey of Wattaka Wonnarua Cultural Consultants Service provided Umwelt with a written statement on the Stage 3 project and draft report on 22 July 2008. This statement identifies that WWCCS has no objection to the draft report, but does note that all highly significant Aboriginal sites (listed as grinding groove sites, scarred trees and carved trees) must be avoided and protected at all cost. Mr Hickey also notes that WWCCS strongly support the recommendation for cultural heritage awareness training for Austar Coal Mine personnel, and that this should be ongoing in the future.

10.2.2.14 Wonnarua Culture Heritage

WCH provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report.

10.2.2.15 Yarrawalk

Yarrawalk provided no written comment on the Stage 3 project or draft *Aboriginal Heritage Assessment* report.

11.0 Management Strategies

The following sections outline all management strategies formulated for the Stage 3 project, which include the development and implementation of an Aboriginal Cultural Heritage Management Plan (ACHMP), the grinding groove offset strategy, impact mitigation strategies for sites within accessible properties, impact mitigation strategies for any future surface works and cultural heritage awareness training for relevant Austar Coal Mine personnel. Note that all works discussed below require Aboriginal stakeholder involvement, as per an agreement between Austar and Aboriginal stakeholders, no archaeological site or archaeological area will be visited (or works conducted there) without Aboriginal stakeholders in attendance.

11.1 Aboriginal Cultural Heritage Management Plan

Austar will prepare an ACHMP for the Stage 3 project, which will outline detailed management strategies for all identified Aboriginal heritage sites and areas located within the Stage 3 project area. The ACHMP will also incorporate Aboriginal heritage management requirements from previous consents and approvals, to provide Austar Coal Mine with a framework for managing Aboriginal heritage responsibilities for all approved operations. The ACHMP will also clearly identify the responsibilities of all parties involved – Austar, Aboriginal stakeholders, archaeologists – and designate timeframes for required heritage management works. **Appendix 4** outlines the requirements for preparation of the ACHMP.

11.2 Grinding Groove Offset Strategy

Evaluation of potential impacts to the ACM6 grinding groove site by MSEC (2008) and SCT (2008) identified that the rockbar may fracture or crack as a result of compressive strain resulting from both systematic subsidence and valley closure. The probability of this is not considered high, but SCT (2008) noted the potential for impact was in the 10 to 30 percentile bracket. The ACM6 grinding groove site was assessed by Aboriginal stakeholders to be of high cultural significance, and assessed by Umwelt archaeologists to be of moderate scientific significance.

In recognition that the Stage 3 proposal could impact a site of high cultural significance, Austar further recognised the need for an appropriate grinding groove offset strategy to be developed with Aboriginal stakeholders. Austar and attending Aboriginal stakeholders discussed the issue in key project meetings in December 2007 and January 2008, during which Aboriginal stakeholders advised Austar that a monetary offset for an Aboriginal heritage or community outcome was considered more appropriate than a land-based conservation offset. Upon conclusion of the January 2008 meeting, Aboriginal stakeholders requested a monetary offset to the value of $100,000, to which Austar has agreed. This monetary contribution will be made upon Austar Coal receiving all necessary government approvals and agreements to allow the commencement of mining in the area defined in the Stage 3 EA Review, and will be contributed to a community project to be decided upon by Aboriginal stakeholders.

During these meetings, Aboriginal stakeholders further identified that engineering mitigation works at the grinding groove site were not culturally appropriate. Fencing of the grinding groove site for its protection was discussed in meetings held in January and July 2008, and on this issue, Aboriginal stakeholders expressed alternate opinions – as some requested fencing for its protection, while others considered that fencing would draw attention to the site and place it at risk. Although fencing as a management outcome has not been agreed upon, it was stated by Aboriginal stakeholders attending the January 2008 meeting that if the site

was fenced, funding for this activity would be sourced from the grinding groove offset monetary contribution. In the January 2008 meeting, attending DECC representatives advised Aboriginal stakeholders that they would continue to liaise directly on this issue.

11.3 Archaeological Site Monitoring Program

Predictions regarding subsidence impacts to known Aboriginal archaeological sites have been prepared by MSEC (2008), and have been summarised in **Section 9** of this report. To ensure potential impacts to known sites are detected and managed appropriately, it is recommended that Aboriginal archaeological sites on accessible properties are included in a monitoring program.

As part of the ACHMP, baseline records of archaeological sites on accessible properties should be generated prior to the monitoring program by an archaeologist and Aboriginal stakeholders, to document existing content, condition and integrity. This baseline recording will allow changes to content, condition or integrity to be detected.

Monitoring following subsidence should be conducted by an archaeologist and Aboriginal stakeholders, to detect any changes to existing ground surface and any changes in site condition or integrity. Advice from Austar will be required to determine the timing of monitoring, to be outlined in the ACHMP.

Should subsidence impacts be detected during the monitoring program, any archaeological mitigation works required (if any) will be determined by an archaeologist and Aboriginal stakeholders following inspection. **Appendix 5** contains a research design and methodology for the Stage 3 project, which outlines procedures for the management of archaeological sites and areas should future works, such as subsidence remediation works, be required.

It is noted that all known sites are on property not owned or managed by Austar, with eight sites recorded within the Werakata State Conservation Area and nine sites recorded on privately owned properties. Access to all known archaeological sites for baseline recording and monitoring is therefore reliant on approval from individual landholders prior to commencement of Stage 3 works. Consequently, additional archaeological sites to be included in the monitoring program cannot be identified at this time.

11.4 Mitigation of Future Surface Works

As outlined in **Section 9.1.2**, current subsidence predictions indicate that it is unlikely that remediation works in response to surface disturbance will be required above the Stage 3 mining area.

As identified in **Section 2.3.1**, minor surface infrastructure or remediation works may be required within the Stage 3 assessment area at future stages of the project, such as remediation works for subsidence affected areas.

As no assessment of future surface works required (if any) to Aboriginal heritage sites or places can be made at this time, the following procedure is recommended for future surface works:

- Austar will identify the location of surface works required and their nature to a qualified archaeologist and Aboriginal stakeholders, and in response, advice will be provided on any required Aboriginal heritage works. Responses will identify one of the three options below:

1. if the surface work location was not surveyed as part of this assessment, an archaeologist and Aboriginal stakeholder representative(s) will be required to inspect the works location to identify any potential Aboriginal heritage impacts;

2. if the surface work location was surveyed as part of this assessment, and no archaeological sites/areas were identified, no further Aboriginal heritage works will be required; and

3. if the surface work location was surveyed as part of this assessment, and an archaeological site or area of high archaeological potential was identified, an archaeologist and Aboriginal stakeholder representative(s) will be required to inspect the works location to identify any potential Aboriginal heritage impacts.

Should potential Aboriginal heritage impacts be identified as a result of future surface works, advice will be provided by the archaeologist and Aboriginal stakeholders on appropriate management strategies. These strategies will consider the nature of the required works and the significance (both scientific and cultural) of the identified site/area. Examples of likely outcomes include:

- location of the proposed surface works to avoid locations of highly significant sites/areas where possible, such as grinding groove sites, or scarred or carved trees. It is noted that while relocation of surface works may be an option, remediation works for subsidence impacts cannot be relocated;

- archaeological test pitting or salvage should proposed surface works be situated within an area of archaeological potential or site with subsurface archaeological potential. In these areas, test pitting may be required to identify any subsurface deposit and salvage may be required to recover the subsurface deposit; and

- surface artefact collection may be required for known sites with low archaeological potential.

Appendix 5 contains a research design and methodology for the Stage 3 project, which outlines procedures for the management of archaeological sites and areas should future works be required.

11.5 Management of Recovered Artefacts

Should artefacts be recovered from the Stage 3 project area as a result of future impact mitigation works such as surface collection, test pitting or salvage, the following management procedures will be followed.

Following recovery, artefacts will be provided to a qualified archaeologist for recording and analysis. A catalogue of recovered artefacts will be developed by the archaeologist, a copy of which is to be provided to Austar and Aboriginal stakeholders for their records.

Management of any artefacts recovered from Stage 3 by future works was discussed in Aboriginal stakeholder meetings in January and July 2008. Two primary options were suggested in these meetings: (a) that artefacts be returned to the fenced grinding groove location, and (b) that Austar Coal Mine provide a Keeping Place for the storage of artefacts during mining, which can then be returned to the original site locations following completion of Stage 3 mining. In the July 2008 meeting, it was suggested that the keeping place could be established within the surface infrastructure site off Quorrobolong Road, and depending on the number of artefacts recovered (if any) by future works, it could take the form of a small

shed with lockable cabinets to provide the required security. Aboriginal stakeholders attending the July 2008 meeting further stated that such a keeping place could hold the artefacts would also ensure that Aboriginal stakeholders and archaeologists could access the artefacts for educational or research purposes. As fencing of the grinding groove site was discussed but not agreed on by Aboriginal stakeholders, the storage of artefacts in a keeping place within the surface infrastructure site the preferred management outcome for any artefacts recovered from Stage 3 by future works.

11.6 General Management Recommendations

In addition to the above, three further general recommendations are made:

- that relevant Austar representatives attend a cultural heritage awareness training session, to be provided by Aboriginal stakeholders and (if requested by Aboriginal stakeholders) an archaeologist. This should be conducted prior to commencement of Stage 3 mining;

- should a previously unknown site be located within any part of the Austar Stage 3 assessment area, an archaeologist and Aboriginal stakeholders will be informed and the locality inspected to determine its Aboriginal heritage value and appropriate management. The DECC will be supplied with an AHIMS site card for all new sites located (if any); and

- should human/possible human skeletal material be uncovered during surface works or by natural erosion processes within any part of the Austar Stage 3 assessment area, any surface works in that area will cease to allow for forensic assessment and management. If the remains are identified as forensic or non-Aboriginal, the local police are to be notified immediately. If the remains are identified as Aboriginal, the site is to be secured and Austar are to notify the DECC, an archaeologist and all Aboriginal stakeholders. A physical or forensic anthropologist should be contacted to inspect the remains *in situ*, and make a determination of ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or forensic). This process will allow appropriate management of the location/remains to be determined.

12.0 References

AAM Hatch. 2006. Ellalong Valley ALS – Digital Data Documentation, prepared for Austar Coal Mine Pty Ltd.

Allen, M.J. 1991. Analysing the landscape: a geographical approach to archaeological problems. In: A.J. Schofield (ed). *Interpreting Artefact Scatters: Contributions to Ploughzone Archaeology.* Oxbow Monograph 4. Oxbow Books. Oxford.

Appleton, J. 1993. *A report of the archaeological investigation of a proposed cable route between Paxton and Bellbird, via Ellalong, south of Cessnock, Hunter Valley NSW.* Report to Australian and Overseas Telecommunications Corporation Limited. April 1993.

Australian National Botanic Gardens Education Services 2000. *Aboriginal Plant Use & Technology.* Accessed on 13 November 2007. http://www.anbg.gov.au/education/pdfs/aborigainal_plant_use_and_technology.pdf.

Australian National Botanic Gardens 2007. Accessed on 13 November 2007. http://www.anbg.gov.au/aborig.s.e.aust/s.e.a.mapkey.html.

Baker, N. 1992. *New South Wales National Parks & Wildlife Service Hunter Valley Aboriginal Sites Assessment Project: Stone Artefact Assessment and Analysis – Recording Techniques and Methodology*. Unpublished report to NSW NPWS.

Baker, N. 1994. Moffats Swamp Dune - Final Report on Archaeological Site Salvage, Testing and Artefact Analysis. Prepared for RZM Pty Ltd

Baker, N 1996. Part 2 in Effenberger, S. and Baker, N. 1996. *Archaeological test excavation and significance assessment F3 Freeway, Black Hill*. A report to the Roads and Traffic Authority, Major Projects, Newcastle.

Besant, A. Undated. *The Proposed Cessnock Aged Care Establishment, Lot 4 DP 867713 Cessnock, Archaeological Assessment*. Report to Harper Somers Pty Ltd.

Besant, A. 2002a. *Proposed substation location Kerlew Street Allandale and Corner of Fletcher and Pinchen Streets Nulkaba near Cessnock NSW, Archaeological Assessment.* Report to PPK Environment and Infrastructure. August 2002.

Besant, A. 2002b. *Stages 6 to 12 Vineyard Grove Urban Subdivision near Cessnock NSW, Archaeological Assessment*. Report to Conacher Travers. August 2002.

Blyton, G, D. Heitmeyer and J. Maynard. 2004. *A history of Aboriginal and European contact in Muswellbrook and the Upper Hunter Valley*. Umulliko Centre for Indigenous Higher Education, The University of Newcastle. A Project of the Muswellbrook Shire Council Aboriginal Reconciliation Committee.

Botanic Gardens Trust. 2007. *Aboriginal Bush Foods.* Accessed on 13 November 2007. http://www.rbgsyd.nsw.gov.au/plant_info/Aboriginal_bush_foods.

Bowdler, S. 1999. A Study of Indigenous ceremonial ('Bora') sites in eastern Australia. Paper delivered at 'Heritage Landscapes: Understanding Place and Communities' conference', Southern Cross University, Lismore.

Brayshaw, H. 1984. *The Hunter Valley and its Aboriginal Inhabitants. An Ethno-historical Study.* Prepared for Anutech Pty Ltd.

Brayshaw, H 1966. *Some aspects of the material culture of the Aborigines of the Hunter Valley at the time of first white settlement.* BA (Hon) Thesis, University of New England Armidale.

Brayshaw, H. 1986. *Aborigines of the Hunter Valley. A study of colonial records.* Published by Scone and Upper Hunter Historical Society, Scone NSW. Bicentennial Publication No. 4.

Brayshaw, H. 1987a. Bellbird South Coal Project near Cessnock NSW: Archaeological Survey. Unpublished report to Southland Coal Pty Limited through Epps and Associates Pty Limited.

Brayshaw, H. 1987b. *Aborigines of the Hunter Valley.* Bicentennial Publication 4, Scone and Upper Hunter Historical Society.

Breton, W.H. 1833. *Excursions in NSW, WA and Van Diemen's Land (1830-1833).* London.

Bureau of Meteorology (BoM). 2007. *Climate statistics for Australian locations: Cessnock Post Office.* Accessed on 15 November 2007. http://www.bom.gov.au/climate/averages/tables/cw_061009.shtml/.

Caswell, E. 1841. *Letter to C. Jackson.* October 19 1841. ML MS Ac 147.

Charman, P.E.V and Murphy, B.W 1991. *Soils: their properties and management*. Sydney University Press, Sydney.

Crago, T. 1979. *Historic Towns and Buildings of New South Wales Hunter Region.* Ure Smith. Sydney.

Cribb, A.B. and Cribb, J. 1986. *Wild Foods in Australia*. Collins, Sydney.

Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. and Leigh, J.H. 1992. *Plans of Western New South Wales*. Inkata Press, Australis.

Cunningham, P. 1827. *Two Years in New South Wales.* London.

Curr, E.M. 1887. *The Australian Race.* Melbourne.

Dawson, R. 1830. *The Present State of Australia.* London.

Davidson, I and C, Lovell-Jones. 1993. *Ethnographic Investigations Proposed Bayswater No 3 Colliery Authorisation Area (A437)*. A Report to Resources Planning Pty Ltd.

Dean-Jones, P. and Mitchell, P.B. 1993. *Hunter Valley Aboriginal Sites Assessment Project. Environmental Modelling for Archaeological Site Potential in the Central Lowlands and the Hunter Valley.*

Department of Environment and Conservation 2004a. *Interim Community Consultation Requirements for Applicants.*

Department of Environment and Conservation 2004b. *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.*

Dickson, F.P. 1981. *Australian Stone Hatchets: a Study in Design and Dynamics*. Academic Press. Sydney.

Domanski, M. and Webb, J.A. 1992. Effect of heat treatment on siliceous rocks used in prehistoric lithic technology.' *Journal of Archaeological Science* **19:**601-614.

Ebsworth, H.T. 1826*. A letter book, kept at Sydney and Port Stephens.* ML MS B852.

Effenberger, S. and Baker, N. 1996. *Archaeological Test Excavation and Significance Assessment: F3 Freeway, Black Hill NSW.* Unpublished report to the NSW Roads and Traffic Authority.

Environmental Resources Management (ERM) 2002. Upper Hunter Valley Aboriginal Heritage Baseline Study. Report prepared for the Upper Hunter Aboriginal Heritage Trust.

Environmental Resources Management (ERM). 2003. Aboriginal Archaeology Retrieval Excavation – Hunter Employment Zone, Cessnock LGA. Unpublished report to Cessnock City Council.

Environmental Resources Management (ERM). 2004. *Upper Hunter Valley Aboriginal Heritage Baseline Study*. Report Prepared for the Upper Hunter Aboriginal Heritage Trust.

Etheridge, R 1918. 'The dendroglyphs, or 'carved trees' of New South Wales'. *Memoirs of the Geological Society of New South Wal*es. Ethnological Series No. 3.

Eyre, E.J. 1859. *Autobiographical narrative of residence and explorations in Australia (1832-39).* ML MS ZA1806.

Fawcett, J.W. 1898. Notes on the customs and dialect of the Wonah-ruah tribe. *Science of Man.* 7:152. 8:180-181.

Fife, L R 1995. *An Archaeological perspective of traditional Aboriginal ceremonial sites of south-eastern Australia*. Unpublished BA Hons Thesis. University of New England, Armidale, NSW.

Fitzpatrick, F.A. 1914. Peeps into the Past. Cumberland Argus, Parramatta.

Flenniken, J. and White, J.P. White. 1983. Heat treatment of siliceous rocks and its implications for Australian Prehistory.' *Australian Aboriginal Studies.* 1983/1: 43-48

Flood, J. 1980. *The Moth Hunters*. Australian Institute of Aboriginal Studies. Canberra.

Foley, R. 1981. A model of regional archaeological structure. *Proceedings of the Prehistoric Society.* 47:1-17.

Fraser, I. and McJannett, M. 1993. *Wild about Canberra – A Field Guide to the Plants and Animals of the ACT.*

Gay, L. 1999. *Aboriginal Site Survey for the Upgrade of Two Bridges on George Booth Drive, Cessnock Local Government Area*. Report to Sinclair Knight Merz. July 1999.

Gott, B. 1995. NSWUSE – Database of plants utilised by Aborigines.

Gott, B. 2007. *Aboriginal Trail. Australian National Botanic Gardens*. http://www.anbg.gov.au/anbg/Aboriginal-trail.html. Accessed on 13 November 2007.

Grant, J. 1803. *The narrative of a voyage of discovery, performed in his vessel the Lady Nelson…1800, 1801 & 1802, to New South Wales.* London.

Greenway, Rev C.C. 1910. *Kamilari Tribe: Foods. Science of Man.* Vol XII. No. 1. May 2, 1910. Pp 15-16.

Grugeon, T. 2007. *Climate of the Hunter Valley.* Accessed on 15 November 2007. http://www.hunterweather.com/pages.php?pageID=climate.

Gunson, N. 1974. Australian reminiscences & papers of L.E. Threlkeld. *Australian Aboriginal Studies.* 40. AIAS, Canberra.

Heritage Office and Department of Urban Affairs and Planning. 1996. Regional Histories of New South Wales. Crown Copyright.

Hiscock, P. 1985a. The need for a taphonomic perspective in stone artefact analysis, *Queensland Archaeological Research* 2:82-95.

Hiscock, P. 1985b. *A technological analysis of stone artefact assemblages from the Hunter River Valley Region. Volume 4, NSW National Parks and Wildlife Service Hunter Valley Region Archaeology Project Stage 1*.

Hiscock, P. 1986. *NSW National Parks and Wildlife Service Hunter Valley Region Archaeology Project Stage 1: A Technological Analysis of Stone Artefact Assemblages from the Hunter River Valley Region. Volume 4*. Unpublished report by Anutech Pty Ltd to NSW NPWS.

Hiscock, P. and Clarkson, C. 2000. Analysing Australian stone artefacts: An agenda for the twenty first century. *Australian Archaeology 50.*

Hiscock, P. and Attenbrow, V. 2004. A revised sequence of backed artefact production at Capertee 3. *Archaeology in Oceania* 39:94-99

HLA-Envirosciences Pty Limited. 1995. An Archaeological Survey of the Proposed Ellalong Colliery Extension near Cessnock, NSW. Unpublished report for Newcastle Wallsend Coal Company.

Howe, J. 1819. Windsor Papers. ML MS 106.

Howitt, A.W. 1904. *The native tribes of south-east Australia.* London.

Hughes, P. 1984. NSW National Parks and Wildlife Service Hunter Valley Region Archaeology Project Stage 1: An Overview of the Archaeology of the Hunter Valley: its Environmental Setting and the Impact of Development. Volume 1. Unpublished report by Anutech Pty Ltd to NSW NPWS.

Jones, R and White, N 1988. Point blank: stone tool manufacture at the *Ngilipitji* quarry, Arnhem Land. In Meehan, B. and Jones, R. (eds.) *Archaeology with Ethnography: An Australian Perspective.* Australian National University, Canberra. pp.51-87.

ICOMOS, Australian, 1988. *The Burra Charter: The Australia ICOMOS charter for the conservation of places of cultural significance.*

Koettig, M. 1990. *Regional Study of Heritage Significance, Central Lowlands Hunter Valley, Electricity Commission Holdings. Volume 3: Assessment of Aboriginal Sites.* A Report to the Electricity Commission of NSW in Three Volumes.

Koettig, M. 1992. *Salvage Excavations of Aboriginal Sites on the Camberwell Lease. Volumes 1-3.* Unpublished report to Camberwell Coal Pty Ltd.

Koettig, M. 1994. *Bulga Lease Authorisation 219 Salvage Excavations. Volumes 1-5.* Unpublished report to Saxonvale Coal Pty Ltd.

Koettig, M. 1986. *Test excavations at six locations along the proposed pipeline route between Singleton and Glennies Creek Dam, Hunter Valley region, NSW.* Unpublished report to the Public Works Department, NSW.

Koettig, M. 1987. *Monitoring excavations at three locations along the Singleton to Glennies Creek Pipeline Route, Hunter Valley, NSW (Third report on archaeological investigations along this route).* Report to the Public Works Department, NSW. March 1987.

Koettig, M. and P.J. Hughes. 1985. Archaeological Investigations on the United Collieries Coal Lease, Warkworth, Hunter Valley, NSW. Unpublished report for United Collieries Pty Ltd.

Kovac, M. and Lawrie, J.W. 1991. *Soil Landscapes of the Singleton 1:250,000 Sheet.* Soil Conservation Service of NSW, Sydney.

Kuskie, P.J. 1994. *Further Archaeological Investigations of Lot 1 DP 559519, Thornton, NSW.* Unpublished report to Gutteridge Haskins and Davey Pty Ltd.

Kuskie, P.J. 2000. An Aboriginal Archaeological Assessment of the Proposed Mount Arthur North Coal mine, near Muswellbrook, Hunter Valley, New South Wales. Report to Dames and Moore.

Kuskie, P. J. 2002. *An Aboriginal Archaeological Assessment of Lot 2 DP 873320, Black Hill, Lower Hunter Valley, New South Wales*. Unpublished report to P.J. & S. E. Evans.

Kuskie, P.J. and Clarke, E. 2004. *Salvage of Aboriginal Heritage Sites in the Mount Arthur North Coal Mine Lease, Hunter Valley, New South Wales. Volume A.* Report to BHP Billiton – Hunter Valley Energy Control.

Kuskie, P.J. and Kamminga, J. 2000. *Salvage of Aboriginal archaeological sites in relation to the F3 Freeway, near Lenaghans Drive, Black Hill, New South Wales. Volume A*. A report to the Roads and Traffic Authority, New South Wales.

Long, A 2005. *Aboriginal scarred trees in NSW – A field manual.* Department of Environment and Conservation. Penrith Art Printing Works: Penrith.

Low, T. 1989. *Bush Tucker: Australia's Wild Food Harvest*. Angus and Robertson, Sydney.

McBryde, I. and Binns, R.A. 1972. *A petrological analysis of ground-edge artefacts from northern New South Wales*. Prehistory and Material Culture Series 10. Canberra: Australian Institute of Aboriginal Studies.

McBryde, I 1974. *Aboriginal Prehistory in New England*. Sydney University Press, Sydney.

McCarthy, F. D. 1976. *Australian Aboriginal stone implements.* Australian National Museum Trust, Canberra.

McCardle, P. 2006. *Kitchener Local Environmental Study.* Prepared by Glendinning Minto and Associates on behalf of Cessnock City Council.

McCardle Cultural Heritage Pty Ltd. 2005. *Proposed Sewerage Scheme Millfield-Ellalong, Indigenous Archaeological Assessment Desktop Component, Draft*. Report to Connell Wagner. July 2005.

McDonald, R.C., Isbell, R.F., Speight, J.G., Walker, J. and Hopkins, M.S. 1990. *Australian Soil and Land Survey Field Handbook.* Second Edition. Department of Primary Industries and CSIRO Australia. Goanna Print, Canberra.

MacDonald, K. and Davidson, I. 1998. *The Bayswater Archaeological Research Project. Vol 1*. School of Human and Environmental Studies, University of New England.

McDonald, A. 1878. The Aborigines of the Page and the Isis. *Journal of the Anthropological Institute of Great Britain and Ireland.* 7:255-258.

Mine Subsidence Engineering Consultants (MSEC). 2008. *Report on the Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Surface Infrastructure Resulting from the Extraction of Proposed Austar Longwalls A6 to A17 in Support of a Part 3A Application.* Unpublished report to Austar Coal Mine Pty Limited.

Miller, J. 1985. *Koori: a will to win.* Angus & Robertson.

Moore, D.R. 1969. The Prehistory of the Hunter River Valley. *Australian Natural History* 16(5):166-171.

Moore, D.R. 1970. Results of an archaeological survey of the Hunter River Valley, New South Wales, Australia. Part 1: The Bondaian industry of the upper Hunter and Goulburn River valleys. *Records of the Australian Museum*. 28(2): 25-64.

Mulvaney, D.J. 1986. *The Prehistory of Australia*. Ringwood, Vic: Hammondsworth, England: Penguin Books.

Needham, W.J. 1981. Burragurra - Where the Spirit Walked - The Aboriginal Relics of the Cessnock-Wollombi Region in the Hunter Valley of NSW.

NSW Department of Education and Training 2007. *Swamp Lily*. Accessed on 13 November 2007.
http://www.rumbalara-e.schools.nsw.edu.au/bushtucker/Crinum_pedunculatum.htm.

NSW Department of Primary Industries. 2007. *Mining by Aborigines – Australia's first miners.* Primefact, February 2007.

NSW National Parks and Wildlife Service. 1997. *Aboriginal Cultural Heritage Guidelines*.

NSW National Parks and Wildlife Service. 2001. *Cultural Heritage Information Policy*.

NSW National Parks and Wildlife Service. 2002a. *Talking History: Oral History Guidelines*.

NSW National Parks and Wildlife Service. 2002b. *Cultural Heritage Community Consultation Policy*.

NSW National Parks and Wildlife Service. 2007. *Sydney Basin Bioregion*. Accessed on 9 November 2007. http://192.148.120.24/npws.nsf/Content/Sydney+Basin+Bioregion.

Parkes, W.S., Comerford, J. and Lake, M. 1979. *Mines, Wines and People. A History of Greater Cessnock.* Published by the Council of the City of Greater Cessnock. Cessnock.

Pike, Walter and Associates. 1994. City of Cessnock Heritage Study. Pike, P, Walker, M and Associates.

Poiner, G. 1971. *The process of the year: towards a model of prehistoric economic life on the New South Wales central and south coast.* BA(Hons) thesis, University of Sydney.

Poiner, G. 1976. The process of the year among Aborigines of the central and south coast of NSW. *Archaeology and Physical Anthropology in Oceania*. 11(3): 186-206.

Rich, E 1993. *Archaeological Survey for Aboriginal Sites, Proposed Bengalla Coal Mine, Muswellbrook, NSW C-2687*. Report prepared for Bengalla Joint Venture.

Rich, E. 1995. Site W4 (NPWS#37-6-155), Warkworth, Hunter Valley: artefact analysis. In Haglund, L and Rich, E *Warkworth Open Cut Coal Mines: Report on Salvage Investigation of Site 37-6-155 (= Mt Thorley E/W4), Carried out in Compliance with NPWS Consent #732. Volumes 1- 3.* Unpublished report to Warkworth Mining Ltd.

Ridley, W. 1864. *The Aborigines of Australia*. Sydney.

Royal Botanic Gardens. 2007. *Aboriginal Walk*. Accessed on 9 November 2007. http://www.rbgsyd.nsw.gov.au/royal_botanic_gardens/tours_education/self-guided_tours/Aboriginal_walk

SCT Operations Pty Ltd. 2008. Site Inspection Report for Aboriginal Grinding Groove Site D6. Unpublished report to Umwelt Australia.

Stedinger Associates. 2003. *Indigenous Archaeological Sites Assessment, Proposed Residential Subdivision at Mounts View Road, Cessnock, NSW*. Report to Johnson Partners (NSW) Pty Ltd. March 2003

Stedinger Associates. 2005. *Final Report on Archaeological Excavations at Mount View Road, Cessnock*. Report to Gobbo Holdings Pty Ltd. January 2005.

Strahler, A.N. 1964. Quantitative geomorphology of drainage basins and channel networks, in *Handbook of Applied Hydrology*, ed. Ven te Chow. McGraw-Hill. New York.

Story, R, Galloway, R.W., van de Graaf, R.H.M. and Tweedie, A.D. 1963. *General Report on the lands of the Hunter Valley, NSW*. CSIRO Melbourne.

Sturt, C. 1833. *Two expeditions into the interior of southern Australia. Vol I*. London

Tindale, N B 1965. 'Stone implement making among the Nakako, Ngadadjara and Pitjandjara of the Great Western Desert'. *Records of the South Australian Museum:* 131-164.

Umwelt (Australia) Pty Limited 2003. Proposed National Highway link: F3 Freeway to Branxton. Additional Aboriginal Heritage Assessment. Unpublished report to NSW Roads and Traffic Authority.

Umwelt (Australia) Pty Limited 2007. Mount Arthur Underground Project, Aboriginal Archaeological Assessment. Unpublished report to Mount Arthur Coal.

Umwelt (Australia) Pty Limited 2008a. Austar Ecological Assessment, Stage 3 Mine Area (Longwalls 6 to 17) and Surface Infrastructure Site. Unpublished report to Austar Coal Mine Pty Ltd.

Umwelt (Australia) Pty Limited 2008b. Austar Coal Mine Flooding Assessment: Stage 3. Unpublished report to Austar Coal Mine Pty Ltd.

Umwelt (Australia) Pty Limited 2008c. Historical Heritage Assessment: Austar Coal Mine Project, Stage 3. Unpublished report to Austar Coal Mine Pty Ltd.

UniServe Science. 2007. *Aboriginal use of native plants*. http://science.uniserve.edu.au/school/curric/stage4_5/nativeplants/gallery/index.html . Accessed on 13 Nov 2007.

Vinnicombe, P. 1980. *Predilection and Prediction: a study of Aboriginal sites in the Gosford-Wyong region.* NPWS.

Watson, P. 2007. http://home.vtown.com.au/~dbellamy/native/cherry.html. Interesting morsels about out native cherry. Accessed on 13 Nov 2007.

Wilson, J. 1994. The Use of Aboriginal Axe Quarries in the Tamworth Region and the Socio-Economic Context when Seen in Relation to the 'Daruka' Long Transfer Quarry. Honours Thesis. University of New England, Armidale, NSW.

Whitten, D G A and J R V Brooks 1972. *The Penguin Dictionary of Geology*. Penguin Books, London.

Wilson, J. 1995. *The Archaeological Survey and Salvage of Aboriginal Sites in the area of McDonald's Pit, McDonald's Pit Dump Site and Saddler's Pit.* A report prepared for Associate Professor Iain Davidson, University of New England, Armidale, NSW as part of the Bayswater 3 Colliery Archaeological Project.

Witter, D. 1995. *National Parks Workshop on Significance Assessment*. Unpublished paper.

Wood, W.A. 1972. *Dawn in the Valley: the story of settlement in the Hunter River Valley to 1993*. Wentworth Books, Sydney.

Xu, B. 2001. The longwall top coal caving method for maximizing recovery at Dongtan Mine. 3rd Intl Underground Coal Conf., UNSW, Sydney, Australia, 12 - 15 June, 2001.

Zola, N. and Gott, B. 1992. *Koorie Plants Koorie People. Traditional Aboriginal Food, Fibre and Healing Plants of Victoria*. Koorie Heritage Trust, Melbourne, Victoria.

13.0 Executive Summary

Austar Coal Mine Pty Ltd (Austar) operates the underground operations of the Austar Coal Mine in the lower Hunter Valley of New South Wales. Austar propose to expand existing operations with an additional twelve longwalls and a new surface infrastructure site, which would form Stage 3 of the project. Umwelt (Australia) Pty Limited (Umwelt) has been commissioned by Austar to prepare an EA for the Stage 3 proposal, with this Aboriginal heritage assessment undertaken as part of the EA.

The aim of this assessment is to develop an understanding of the archaeological and cultural Aboriginal heritage values of the Stage 3 assessment area, through consultation with Aboriginal stakeholders, background research and archaeological survey. To identify appropriate management strategies for each identified site/area, an assessment of scientific and cultural significance is required, and impact resulting from the Stage 3 proposal is evaluated. On this basis, management recommendations for each identified site/area/issue have been formulated, spanning both conservation outcomes and impact mitigation strategies. All above works were conducted in compliance with DECC Guidelines (1997) for archaeological survey and assessment, DECC (2004) *Interim Community Consultation Requirements for Applicants* (DECC 2004a) and DECC's draft Part 3A assessment guideline *Draft Guidelines (2004b).*

Aboriginal Stakeholder Consultation and Involvement

Aboriginal stakeholders are the primary determinants of the significance of their heritage (DECC 2004:3), and accordingly, the consultation process for the Stage 3 project aimed to involve Aboriginal stakeholders in the identification, assessment and management of Aboriginal heritage values. A total of twelve Aboriginal stakeholders registered an interest in the Stage 3 project at its outset, being: Aboriginal Native Title Consultants; Giwiirr Consultants; Arthur Fletcher; Hunter Valley Cultural Consultants; Hunter Valley Cultural Surveying; Lower Hunter Wonnarua Council; Lower Wonnarua Tribal Consultancy; Mindaribba Local Aboriginal Land Council; Upper Hunter Heritage Consultants; Wattaka Wonnarua Cultural Consultants Service; Wonnarua Culture Heritage; and Yarrawalk. During the course of the project, a further two stakeholders also registered an interest in the project and where consulted from that time, being: Mingga Consultants, Tracey Skene and Wanaruah Custodians.

During the assessment process, Aboriginal stakeholders were provided with the opportunity to contribute to the survey strategy, to identify sites/places of cultural significance, to assess the impact of the proposal to sites/places of cultural significance, and to determine appropriate heritage management strategies. In the latter stages of the project, three Aboriginal stakeholder meetings were held between December 2007 and July 2008 to discuss key Aboriginal heritage issues and determine their appropriate management. Aboriginal stakeholder input was a determining factor in the final heritage management outcomes, through determining appropriate impact mitigation works and the nature of the conservation offset strategy. A draft copy of this report was also provided to all Aboriginal stakeholders for review and comment, following which six Aboriginal stakeholders provided written comment on the project.

Austar also provided the opportunity for Aboriginal stakeholders who registered at the outset of the project to participate in the Stage 3 archaeological survey. As a result, eleven stakeholders took part in the survey, with fieldwork positions rotated between stakeholders during the six day survey conducted in September and October 2007.

Government Agency Consultation

Liaison with the DECC was undertaken at key stages of the assessment via phone conversations, correspondence and attendance at two Aboriginal stakeholder meetings in December 2007 and January 2008. Consequently, DECC representatives Roger Mehr and Len Anderson were involved in critical discussions between Austar, Umwelt and Aboriginal stakeholders regarding appropriate heritage management outcomes. During the above meetings, DECC representatives expressed general agreement with the management strategies outlined in this report, and supported Aboriginal stakeholder recommendations provided to Austar in both key meetings.

Archaeological Survey Results

The Stage 3 assessment area totals 1354 hectares, of which 567 hectares (41.8 per cent) were available for inspection. The remaining area consists of private property where landholders denied access. Survey covered a total area of 76 hectares, which covered the entire surface infrastructure site and provided a sample of all landforms of the Stage 3 mining area.

Archaeological survey identified an additional 17 archaeological sites within the Stage 3 assessment area, consisting of nine isolated finds, seven artefact scatters and one grinding groove/isolated find. These sites contain a total of 49 surface stone artefacts and one grinding groove. Stone artefact numbers per site are relatively low, with only one find location containing more than six artefacts. The largest artefact scatter contains 24 artefacts in ten discrete find locations. Artefacts consisted of: flakes (21); broken flakes (20); cores (5); a retouched flake (1); a flake used as a core (1); and a flaked piece. Raw materials utilised include: mudstone (22); silcrete (19); quartzite (5); chert (2); and quartz (1).

Literature review and archaeological survey also identified areas of high archaeological potential within the Stage 3 assessment area, being the alignments of Cony Creek and Sandy Creek, flats and lower hillslopes within 50 metres of Cony and Sandy Creeks, and the elevated terrace to the north-east of the convergence of Cony and Sandy Creeks. These areas are likely to have been more intensively and frequently utilised by Aboriginal people in the past as they provided an attractive combination of landform and resources (water, flora and fauna, possibly raw stone materials). This is expected to be reflected in the archaeological record through an increased site and artefact density than the surrounding landscape.

Significance Assessment

The significance of Aboriginal sites is determined by two components, being: cultural significance, which is determined only by Aboriginal stakeholders; and archaeological/ scientific significance, which is determined by archaeologists based on established scientific criteria. These two components are often not interrelated, with sites potentially having different cultural and scientific values.

Aboriginal Cultural Significance

Throughout the assessment process, Aboriginal stakeholders were requested to provide comment on the cultural significance of the recorded sites within the Stage 3 project area, and the cultural significance of the larger area within the Quorrobolong Valley. In response, Aboriginal stakeholders have identified that all archaeological sites are of cultural significance, but that the grinding groove site (ACM6) is of particular cultural significance due to its rarity, and as it represents a tangible link to past traditional use of the area. Aboriginal stakeholders have also identified that site ACM14, an artefact scatter along Cony Creek, is of higher cultural significance as the area would have been an area of high Aboriginal

occupation and use. Other comments identified that areas around watercourses are culturally significant as they represent a livelihood and a connection to country; and that areas of archaeological potential are of cultural value as they are likely to contain Aboriginal archaeological sites.

Archaeological Scientific Significance

Criteria used to determine scientific significance include rarity, representativeness, integrity, connectedness, complexity and potential for archaeological deposit. One site within the Stage 3 project area was assessed as having moderate archaeological significance, being the ACM6 grinding groove and isolated find located in the Werakata State Conservation Area. Of the remaining sites, three (ACM9-10 and ACM14) were assessed as having low-moderate archaeological significance, as they have some potential for archaeological deposit with archaeological integrity. All remaining sites (ACM1-5, ACM7-8, ACM11-13 and ACM15-17) were assessed as having low archaeological significance.

Heritage Impact Assessment

The Stage 3 proposal includes the construction of a surface infrastructure site to the south-west of Kitchener, which will be connected to Quorrobolong Road by an access road and electricity line. Survey identified no Aboriginal archaeological sites within this impact area, and the landforms of the surface infrastructure site are assessed to be of low archaeological potential. Consequently, no impacts from known surface infrastructure are identified.

Potential impacts from subsidence to known Aboriginal archaeological sites and areas were assessed by MSEC (2008) and SCT (2008). MSEC (2008) advise that artefact scatters and isolated finds may potentially be affected by cracking of surface soils, but that this is likely to be isolated and minor in nature as cracking is rarely seen in areas where depth of cover is greater than 500 metres, as within the Stage 3 area. MSEC (2008) also note that if surface cracks do occur, they would be expected to be expressed as a number of narrower cracks rather than a single crack, and in these instances, it is likely that cracks would be infilled by subsequent soil movement (MSEC 2008:78). The compressive phase following tensile strain could also act to partially close surface cracks. Such cracking of soil is also likely to affect areas of archaeological potential along Cony Creek and Sandy Creek.

MSEC (2008:36) and SCT (2008) identify that some minor fracturing could occur in the rockbar containing the ACM6 grinding groove, as maximum upperbound subsidence predictions for the site exceed strain levels at which fracturing of bedrock has been observed in the past. SCT (2008) estimate the potential for perceptible fracturing to occur as a result of mining of LWA7 and LWA8 is in the range of 10-30 per cent, and that fracturing may not occur with the extraction of LWA7 but more likely following the subsequent extraction of LWA8. Natural jointing of the ACM6 rockbar is such that initial fracturing is most likely to occur along the projected location of the low angle joint visible on the southern side of the downstream rockbar (SCT 2007).

Current subsidence predictions indicate that it is unlikely that remediation works in response to surface disturbance will be required. As a result, the impact of construction of other unspecified minor infrastructure (if required) within the Stage 3 assessment area on Aboriginal archaeological and cultural values cannot be assessed at this time, as the exact work locations are not yet known.

Management Strategies

Management strategies formulated for the Stage 3 project include the grinding groove offset strategy, impact mitigation strategies for sites within accessible properties, impact mitigation strategies for any future surface works and cultural heritage awareness training for relevant

Austar Coal Mine personnel. Requirements for all management will be outlined in an ACHMP, including roles and responsibilities of all parties and the timeframes for future Aboriginal heritage works.

Grinding Groove Offset Strategy

In recognition that the Stage 3 proposal could impact a site of high cultural significance to Aboriginal stakeholders – the ACM6 grinding groove site – Austar and Aboriginal stakeholders have developed a grinding groove offset strategy. In summary, this involves a monetary contribution of $100,000 to an Aboriginal community project or program to be decided by Aboriginal stakeholders. This monetary contribution is in lieu of conducting engineering mitigation works at the site, which are not considered appropriate by Aboriginal stakeholders, and will be made upon Austar Coal receiving all necessary government approvals and agreements to allow the commencement of mining in the area defined in the Stage 3 EA Review. Fencing of the grinding groove site, if approved by the NSW National Parks and Wildlife Service, will be funded by the grinding groove offset.

Archaeological Site Monitoring Program

To ensure potential subsidence impacts to Aboriginal sites are identified and managed appropriately, it is recommended that known archaeological sites on accessible properties are included in a monitoring program. This will involve baseline recording and monitoring following subsidence by an archaeologist and Aboriginal stakeholders. Advice from Austar will be required to determine the timing of monitoring and this will be outlined in the ACHMP. Appropriate management of any detected impacts will be determined by an archaeologist and Aboriginal stakeholders following inspection and will be based on the nature of the impact and the significance (both scientific and cultural) of the identified site/area.

Mitigation of Future Surface Works

Current subsidence predictions indicate that it is unlikely that remediation works in response to surface disturbance will be required. However, should future surface works be required for subsidence remediation or infrastructure, works will be identified by Austar to an archaeologist, who will provide advice on the need for survey and assessment (based on the level of previous Stage 3 survey and assessment). Should survey and assessment be required, this will be conducted by an archaeologist and Aboriginal stakeholders to identify potential Aboriginal heritage impacts and identify appropriate management. Appropriate management will be determined following consideration of the nature of the required works and the significance (both scientific and cultural) of the identified site/area.

Management of Recovered Artefacts

Should artefacts be recovered from the Stage 3 project area as a result of future archaeological works, artefacts will be provided to a qualified archaeologist for recording and analysis. Following this. artefacts will be stored in a Keeping Place to be provided by Austar in the Stage 3 surface infrastructure site. Aboriginal stakeholders have advised this could take the form of a small shed with lockable cabinets to provide the required security, which could be accessed by Aboriginal stakeholders and archaeologists.

General Management Recommendations

Three general recommendations have also been made, being: that relevant Austar personnel attend a cultural heritage awareness training session, to be provided by Aboriginal stakeholders and (if requested by Aboriginal stakeholders) an archaeologist; that if any previously unknown archaeological sites are found within the Stage 3 area, an archaeologist and Aboriginal stakeholders should be informed to inspect and assess the site; and that

should human or possible human skeletal material be uncovered during surface works, works will cease to allow for forensic assessment and appropriate management to determined and conducted.

APPENDIX 1

Aboriginal Stakeholder Comments

8 Fitzgerald ave
Muswellbrook NSW 2333

Phone: 0265410506
Fax : 0265410751
Mobile 0432476009
ABN: 90505477543

Giwiirr

23rd July, 2007

Attention: Meaghan Russell

Reference: Austar Coal Mine

Dear Meaghan

The survey of the Austar mine I feel was not complete because the private properties were not surveyed and we feel that they should be done before the final draft is completed also the grinding grooves should no be fenced because it could draw attention to the site.

Regards,

Rodney Matthews
Manager

Hunter Valley Cultural Surveying

facsimile transmittal

To:	**Meaghan Russell (Umwelt)**	**Fax:**	02 49505737
From:	H.V.C.S.	**Date:**	11 September 2007
Re:	Austar Coal Mine (Stage3) Project	**Pages:**	2 (including this one)
Contact	Luke Hickey		

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Dear Meaghan

RE. Survey Strategy on the Austar (Stage 3) proposal and Aboriginal Heritage Assessment.

It is essential to note that in any given area there may be a number of undiscovered and /or unrecorded sites. It is also important to note that there may be errors in these recordings. If accurate site locations are required it may be necessary to confirm the locations on the ground.
Issues that should be included in the assessment.

1) Due to the existing underground operations subsidence may affect sites within and/or surrounding areas of interest such as Shelter with deposit.
2) Shelter with art
3) Axe grinding grooves
4) Bora / ceremonial
5) Rock engraving
6) Scarred tree
7) Carved tree
8) Quarry

Office: 6571 5967 **Mobile:** 0448552477 **Facsimile:** 02 6571 4870
Mailing Address: 297 Pioneer Rd Singleton NSW 2330

9) Ochre quarry
10) Fish trap
11) Stone arrangement
12) Waterhole/Well

Subject to existing and potential future impacts both within and outside the project area.
For these reasons, these measures need to be treated with some caution.
Agree in principal to draft survey strategy; however surveying should extend across a variety of landforms, which maybe impacted due to Austar (Stage 3) under ground mining operations.

Survey should also include areas of infrastructure. Such as roads, access trails, air vents and areas of subsidence monitoring on surface areas to be surveyed from existing operations and future monitoring area. And ground disturbs Facilities related to the mining activities.

It is anticipated that the development of a regional register of Aboriginal owners, over the next few years, will provide the basis for the identification of Aboriginal people, with traditional association to lands, and hence the appropriate people to be involve in cultural significance and heritage assessment processes.

If you have any questions, please contact me on 65715967.

Regards
Luke Hickey

H.V.C.S.
Manager

Hunter Valley Cultural Surveying

Facsimile transmittal

To:	**Jan Wilson UMWELT**	**Fax:**	
From:	H.V.C.S.	**Date:**	23 July 2008
Re:	Methodology for Cultural Heritage Assessment on Draft report Stage 3 Austar Coal Mine	**Pages:**	2 (included cover page)
Contact	Luke Hickey		

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

Dear Jan

Methodology proposed Archaeological & Cultural Heritage Assessment on austar coal mine surveying should extended across the whole area and landforms that may be impacted and that all infrastructure areas should included the area of disturbance in this project as Vegetation cover across the study area consists of extensive pasture grass and bushland in some areas. This affect visibility and reduce the potential for identifying though surface inspection. Surface visibility & exposures a range of types of sites potential archaeological deposit (PAD) located in the study areas by the Aboriginal community to have an opportunity to located areas of cultural significance identified within the life of the stage 3 project. To do a proper investigation of the survey area H.V.C.S. needs to have a Cultural Heritage sites officer on site the whole study

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Mailing Address: 297 Pioneer Rd Singleton NSW 2330

area and just not one small part and can only comment on the areas we survey to make a thorough CULTURAL Heritage report. These comments can only relate to the study areas we surveyed on the day and expect that the areas would have been thoroughly surveyed and potential sites are identified and wish to survey the areas. We don't have the opportunity to do so.. Please include my contact details in your data base for future reference.

Hunter Valley Cultural Surveying organisation wishing to submit an expression of interest. WE have provide this Information to you in regards to the project I have forward name and contact details, a statement of capabilities and experiences, and copies of certificates of incorporation, currency of insurance and workers compensation ABN to your database.

We welcome your feedback on the method of assessing the Aboriginal Heritage significance of the study area, and we understand that there are a number of methods that could be used in such an assessment. We would also welcome any information that could provide us with concerning the Cultural Heritage values of the study area.

Following current N.S.W. DECC Aboriginal Heritage consultation guidelines.

Look forward to hearing from you in the near future regarding any project in the Wonnarua lands.

If you have any questions please don't hesitate to contact me.

Regards
Luke Hickey

Hunter Valley Cultural Surveying
Manager

Lower Wonnarua Tribal Consultancy Pty Ltd

156 The Inlet Road
Bulga NSW 2330
Telephone (02) 6574 5303
facsimile (02)6574 5303
Mobile 0417 403 153
ABN: 51 104 794 176

22nd July 2008

Ms Meaghan Russell
Senior Archaeologist
Umwelt (Australia) Pty Ltd
2/20 The Boulevarde
PO Box 838
Toronto NSW 2283

RE: **Draft Aboriginal Heritage Assessment Report: Stage 3, Austar Coal Mine June 2008.**

Dear Meaghan,
As to the meeting that we had at the Austar Coal Mine on the 8th July 2008 with Umwelt, Austar Coal Mine and the Aboriginal stakeholder groups. The question was raised if official minutes were being taken it was noted that a secretary from Umwelt was on hand to take these minutes. I ask that will these minutes be added to the final document that will be going to the Department of Planning and also Department Environment Conservation.
The meeting started and it was at this point I raised my concerns regarding this Draft Document and that we the Aboriginal Stakeholders **COULD NOT COMMENT ON THIS DRAFT AS THE AREA HAS NOT BEEN FULLY SURVEYED**

It was pointed out by the Austar Manager Mr Frank Fulham that this was due to the fact that we were not able to access all the properties / lands were the proposed Stage 3 Underground Mine is going due to ownership of these properties / lands.

We the LWTC have read the above draft document dated June 2008.

We the **LWTC DO NOT AGREE** with this proposed draft report in it current form.

We the LWTC would like to point out the following.

Figure 7.3 Archaeological Survey Transect
Shows the area of transects that where only able to be carried out.

Figure 7.5 Evaluation of Inaccessible Properties
Shows the area where no survey or transects carried out and the areas of High Archaeological Potential, which are within the following longwall mining panels LW A6, LW A10, LW A11, LW A12, LW A13, LW A14, LW A15, LW A16, AND LW A17.

7.6.3 Likely Aboriginal Archaeological Values of Inaccessible Properties
This section reviews the environmental characteristics and the likely of Aboriginal Archaeology. It must be pointed out that this is a scientific view.

We the LWTC must point out that these area's are of High Cultural Values to the Aboriginal Community and these Properties Needs to be Surveyed as a Whole area survey and not just random transects due to the fact that they are of High Archaeological Potential.

We the LWTC ask that the Dept of Planning & DEC take the time to read the minutes from our last meeting and take in account the issues raised with Austar Coal Mine and Umwelt.

If you have any further questions please do not hesitate to contact me on the above mentioned numbers.

Regards

Barry Anderson
Wonnarua Decedent

Mindaribba Local Aboriginal Land Council

Phone: 49348511
Fax: 49348544

PO Box 401
East Maitland NSW 2323

1A Chelmsford Dr.
Metford NSW 2323

A.B.N 8282 6020 881

RECEIVED
18 MAR 2008

Meaghan Russell
Senior Achaeologist Umwelt
P.O. Box 838
Toronto NSW 2283

Re: Austar Mining Project
Aboriginal Stakeholders Meeting

Dear Meaghan

Thank you for your notes on the above project.

When discussing this with Christine Dever, who represented Mindaribba Local Aboriginal Land Council, Christine disputed the recommendations entirely. She said there was discussion but never any recommendations framed from this meeting. Christine did agree that discussions around these issues were conducted however.

In reading No 2, Mindaribba LALC would recommend that 15 people from groups that represented be given the opportunity to gain employment with Austar Coal Mine not just the one group.

The Grinding Grooves don't have to be destroyed, they can be preserved if consultants and the Company wanted to, however they are looking at the easy and less expensive way in mining to ensure maximum financial gain. Umwelt appears to be supporting this proposal strongly.

MLALC totally agree that Aboriginal people be present when people visit the site , this includes all people especially Archaeologists.

When the final report is sent to MLALC on this project, we can only comment on when our sites officers worked.

If you wish to discuss this matter further please do not hesitate to contact me on the number provided

Yours sincerely

Rick Griffiths
C.E.O.
M.L.A.L.C.
13.3.08

MINGGA CONSULTANTS

Clifford Matthews
11 Coolibah Cl,
Muswellbrook NSW 2333
[redacted]

FACSIMILE

To: MEAGAN RUSSELL
UMWELT

Fax No: 1

From:

Date: 10-7-08

Total number of pages (incl. cover):

Message: I AGREE ABOUT NOT PUTTING A FENCE AROUND ARTIFACTS

THANKYOU

Clifford Matthews

M.C

Wattaka Wonnarua Cultural Consultants
Services: Ph: 0432977178 Fax: 02 65712609
B>RN-98 021 119-ABN-57 914 734 912
4 Kennedy St Singleton 2330

W.W.C.C.S

Umwelt
Environmental Consultants
Ph: 02 4950 5322
Fax: 02 4950 5737

22/7/08

Att: Meaghan Russell

Re: Aboriginal Stakeholder Comments On The Draft Aboriginal Heritage Report, Austar Coal Mine (Stage 3)

Dear Meaghan

Wattaka WCCS has no objections to the above draft report.
However all highly Aboriginal significant sites (grinding grooves sites, and scarred or carved trees areas) must be avoided and protected at all cost within all accessible properties.

11.0 Management Strategies

Wattaka Strongly supports Cultural Heritage awareness training for all Austar Coal Mine personel, this awareness and training must be ongoing for all future mineing personel.

Des Hickey

Manager W.W.C.C.S

Wonn 1 Contracting
Arthur Fletcher
Fieldworker

619 Main Road Glendale
NSW 2285
Phone: (02) 49547751
Fax: (02) 49547751
Mobile: 0402146193
wonn1sites@gmail.com
ABN: 71 525 918 602

Wednesday, 9 July 2008

Attn: Jan Wilson, Manager
Umwelt Environmental Consultants
PO Box 838
Toronto NSW 2283

Dear Jan,

RE: Draft Aboriginal Heritage Assessment Report: Stage 3, Austar Coal Mine

I am writing to comment on the cultural significance of sites identified in the stage 3 report.

- I believe that artefact scatters located in the vicinity of black creek reflect the periodic usage of the area for a number of day-to-day activities (such as hunting, fishing and retooling). However due to the period of time that has passed since these areas have been utilised in a traditional manner, the evidence of this usage has degraded. I believe that areas around water courses are culturally significant as they represent a livelihood and a connection to country.
- The grinding groove site is of particular significance, as it represents a tangible link to the past usage of the traditional people in the area. The grooves represent an area where tools could have been repaired, and is evidence of our cultural existence and belonging to the area. I believe this area to be of the highest cultural significance, as it serves as a cultural link to our ancestors lives.
- The artefact scatter in ACM14 represents an obvious area of high occupation. As a result the area is highly culturally significant.

I find the management recommendations to be suitable, in particular the Archaeological Site Monitoring Program. However, I would like to express the desire for the aboriginal stakeholders to work together with Austar to connect with the local community in order to extend the program to as many properties as possible. While I recognise that at present only land owned by Austar can be accessed, I believe the findings of the report indicate the possibility that other sites that could be damaged by mining activities may exist on other properties. As a result community involvement may allow the identification and protection of any other sites in the area.

In regards to the management of recovered artefacts, I believe that a designated keeping place should be established for any artefacts that will be directly impacted by mining activities (a small amount in the case of underground mining), with the remainder to be kept as close as possible to their natural positions.

Yours Sincerely,

Arthur Fletcher
Fieldworker Wonn1 Contracting

Austar Coal Mine (Stage 3): Aboriginal Stakeholder Meeting

Date: Tuesday 8 July 2008

Location: Austar Coal Mine

Attendees: Michael Matthews (Aboriginal Native Title Consultants), Adam and Troy Fletcher (Arthur Fletcher), Barry Stair (Giwiirr Consultants), Colleen Stair (Hunter Valley Cultural Consultants), Barry Anderson (Lower Wonnarua Tribal Consultancy), Christine Dever (Mindaribba Local Aboriginal Land Council), Cliff Matthews (Mingga Consultants), Maree Waugh (Tracey Skene), Tony Matthews (Upper Hunter Heritage Consultants), Joey Griffiths (Wonnarua Culture Heritage).

Meaghan Russell, Julian Travaglia and Fran Davies (Umwelt), Frank Fulham and Sarah Harvey (Austar).

Meeting commenced at 9.10 am.

General introduction of all in attendance by name and organisation.

Meaghan Russell: *(after general introduction)* Fran Davies from Umwelt is attending today's meeting to take minutes, as the notes will be included in the final report – so it is important that we have a detailed and accurate record of today's discussion.

Christine Dever: So this is a formal meeting with minutes? Were notes taken of past meetings and whether they will be included in the report?

Meaghan Russell: Yes – this meeting will have formal minutes that will be included in the final report, due to the importance of this meeting. Notes were also taken at past meetings, but they were not formal minutes and they will not be included in the final report.

Christine Dever: I am just asking as I did not think the last meeting was formal with minutes taken, but after the meeting Umwelt sent a letter to the Land Council with a list of formal recommendations. This was a problem as my notes did not include formal recommendations and I was unaware of these recommendations until receiving the letter from Umwelt.

Meaghan Russell: We did also receive a letter from Mindaribba on this issue, and the problem occurred as you (Christine) left the January meeting early and there was continued discussion after the independent Aboriginal stakeholder meeting. The formal recommendations did not come from Umwelt, but were presented by Len Anderson on behalf of Aboriginal stakeholders at the end of the January meeting – and it was requested that Umwelt type them up and send a copy to all stakeholders. Apart from those recommendations, no formal meeting notes were taken.

Frank arrives at this point and introduces himself and explained that he had recently taken over from Greg Duncan as the Senior Site Executive.

Meaghan Russell: The aim of today's meeting is to talk through Aboriginal stakeholder comments on the Stage 3 project and draft assessment report sent out a few weeks ago – specifically the cultural significance of archaeological sites and the larger Stage 3 area, and to talk through the impact assessment and management recommendations. We are looking for feedback as to whether those recommendations are considered appropriate and what, if any, any additional recommendations you would like to put forward. All recommendations in the draft report are based on discussions at past Aboriginal stakeholder meetings in December and January, so there is a long history of discussion for some of these issues. For those who did not attend past meetings, please just ask questions as we go if you need further information. The meeting is being held today as the formal review period for the report ended yesterday (on Monday 7 July 2008). No written comments have been received so far, but this meeting also provides an opportunity to provide verbal comments on the report. We recognise that some people here today represent organisations and some of you may not be able to make comment on behalf of the group, but you will be able to take information discussed today back to your groups. For those who can speak on behalf of a group, we are hoping that you will provide comment today on the project and draft report. The timeframe for the project is critical, and the report will be finalised in a matter of days rather than weeks, so providing written or verbal comment this week is critical.

Barry Anderson: This draft report, is this the one that will go to DoP?

Meaghan Russell: When it is finalised, yes. At the moment, the report is primarily an archaeological assessment as Aboriginal stakeholder comment on cultural significance of sites/the larger area has not yet been provided. We hope to receive Aboriginal stakeholder comments on the draft before it is finalised, as at the moment, this crucial information is missing.

Barry Anderson: As far as I am concerned, the report is not complete in its current form due to the survey restrictions, accessibility to other land. Reading the report some of the areas and some of the transects carried out (refers to Figure 7.3 – transects 39 to 39, 18 to 18) are not complete. For example, the section of the creek in the middle (Cony Creek), what is in there? It was not looked at. Is there opportunity for Austar to speak to property owners so we can go and have a look?

Meaghan Russell: When the survey was conducted, it was only on properties where landholders had provided access. This mine is different to others in the Hunter Valley, as Austar may never buy the land – so unless we are given permission, we simply cannot go onto their land.

Barry Anderson: Are there restrictions by the property owners because they don't want underground mining?

Frank Fulham: We are not sure why access was not provided, and whether they have declined to give access for a particular reason – we will have to check.

Sarah Harvey: We can look at records and pull up a plan to see whether they commented on why access was not provided.

Barry Anderson: There was no survey of that stretch along Quorrobolong Road as well. There are a lot of areas in there that have the potential to contain Aboriginal artefacts and sites. If the report does go to DoP, DoP will give approval regardless. But as far as I am concerned, the survey has not been completed.

Christine Dever: This was brought up at the last meeting.

Meaghan Russell: It is an unfortunate position for us as our access is only determined by those areas where property owners have given us access. Although we have not surveyed the rest of the area, we have considered the potential for those areas to contain additional sites and what types of sites. Those sections of Cony and Sandy Creek – and the confluence of the two – have been identified to be of high potential. We would expect higher artefact densities and more sites in this area. Grinding grooves would not be expected here – only in the steeper areas in Aberdare State Forest, which we did survey in full.

Christine Dever: When can we get onto those properties for survey?

Frank Fulham: *Frank identifies that Austar cannot access private properties without consent (an agreement being reaches), and describes the consultation process with local landholders.*

Christine Dever: What if some company wanted to drill?

Sarah Harvey: They would still have to get permission to enter private property. We only hold an underground mining lease, so only have rights starting at 15 metres below the surface. Landholders have the surface rights, we need their permission for any work on the surface.

Frank Fulham: We need to go through a process with the landholders, to develop agreements for access. People tend not to sign up straight away, we need to go through a process for them to give access. If they do not give access where it is needed, we have to go to the Wardens Court to get access.

Christine Dever: Has Austar been onto their properties and discussed mining with those people?

Frank Fulham: We haven't finished the Stage 3 EA, when completed we will talk to the community and landholders about the Stage 3 mining. The EA is due to be completed this month – the understanding is that the EA will be put in and then we will speak to people in the area and hold community forums.

Barry Anderson: When will this mining start?

Frank Fulham: Extraction of the longwall blocks in Stage 3 is not planned to start until 2011-2012. Extraction is then expected to continue until 2024.

Barry Anderson: Is there the opportunity to survey some of these properties in the future?

Frank Fulham: That will depend on what DoP say in relation to some of those properties and major subsidence. For Stage 2, not all properties had to be acquired – only two. It is up to the government department to decide which properties we would have to acquire for subsidence.

Barry Anderson: Is it true that subsidence will be up to 1.8 metres?

Frank Fulham: That would be right, we are extracting 6.5 metres of the Greta seam. We currently mine between 450-520 metres. In the Pelton-Ellalong mine life some longwalls were extracted from 700-750 metres deep. It has been done before.

Meaghan Russell: In response to Christine's earlier comment, if surface works are needed for the Stage 3 project in the future, there is a management recommendation in the report to address this – the process requires that Austar have to notify us as a group and we need to respond with advice about whether survey or management is needed. If the area has not been inspected during this survey, there will be a survey to have a look at the works area.

Christine Dever: Will Austar only tell Umwelt or will they tell everybody?

Meaghan Russell: All Aboriginal stakeholders and an archaeologist will be notified directly by Austar. The need for survey work will then have to be identified, if for example the area was looked at already, a second survey may not be needed. However, if the area was not looked at or if it is near a site or area of high potential, Aboriginal stakeholders and an archaeologist would need to do survey work. The need for further work – i.e., surface collection of salvage excavation – would then be decided by the team, and Austar would be advised on best management. The outcome depends on type of site, what work is needed, etc, so what exactly may happen is unknown at this stage – but a process is in place to ensure that areas are managed properly.

Barry Anderson: If you go to Figure 7.5 you can see the overlay, where the underground is, of areas of high archaeological potential. Who decided that – the people or Umwelt?

Meaghan Russell: Both – this was based on our understanding of where sites are most likely to be, but it was also discussed with Aboriginal stakeholders involved in the survey – who identified that Cony and Sandy Creek were the more important places.

Barry Anderson: Even if I had a look around before mining starts if we cannot get out there and have a look at it.

Frank Fulham: Part of the Stage 3 process will be discussing with the landholders the fact we do have the right to mine the coal under their properties, but that we do understand they own the land and we would like to work with them. We will need to do some Property Subsidence Management Plans (PSMPs) for structures on the surface, to do that we need to have agreements with them to access their land. Part of the community information session will be informing them of these requirements, and we will need to do this before we can actually get agreement to mine. Subsidence Management Plans (SMP's) and PSMP's need to be drafted and in place prior to extraction. If we

cannot come to agreement, we may need to go through the Wardens Court, but we do not want to do this unless we are forced to. We may also have to acquire some of these properties but until the Stage 3 consent conditions are provided, we do not know which ones may need to be acquired. We have an idea it may be some of those properties that sit where the longwall blocks will be but some on the edges may not, they may fall under Safe, Serviceable and Repairable (SS&R) guidelines.

Barry Anderson: The property in the middle, with longwalls 14-15-16-17 going through it, that runs through the middle of their property.

Frank Fulham: Yes, the house is on the edge of longwalls 16-17.

Barry Anderson: If this area is going to subside 1.8 metres, how will it affect the creek?

Frank Fulham: Umwelt has done some studies in relation to flows in the creek, and we can provide that information to you. The Quorrobolong Valley is wide, not like the narrow ravines and steep sided cliffs that the Nepean River flows through in the Southern Highlands where valley closure effects and longwall extraction panels have been discussed in the media, so we do not expect the same valley closure affects to disturb creek flows.. There has been testing of water flows right through the mining area to determine what will happen, and we are confident there won't be any detrimental effects to the flow of the creek. We can give you some of those presentations if you want because that work has been done. The work has considered not just Cony Creek but also Quorrobolong and Sandy Creeks.

Meaghan Russell: A key issue to discuss today is the cultural significance of archaeological sites recorded during survey, and the larger Stage 3 area. To refresh everyone's memory, 17 sites were recorded during survey, and of these 16 small artefact scatters and isolated finds. Sites had very low artefact numbers, with only one having more than 6 artefacts – and the largest site having only 24 artefacts along a 700 metre section of Cony Creek. This is a much lower artefact density than seen elsewhere in the Hunter Valley. The other site recorded was the key archaeological issue for the project – being the grinding groove site in the northern part of the assessment area, in the slopes of Aberdare State Forest. During survey, Aboriginal stakeholder representatives involved stated that all sites are of cultural significance, but that the grinding groove site is of high cultural significance. Cony Creek was also said to be of cultural value as it would have been a good camping place. Would anyone like to provide any additional comment on the cultural significance of recorded sites?

Barry Anderson: We cannot make a statement on the cultural significance of the larger Stage 3 area because you have only looked at parts of the area – you do not have the whole picture to look at.

Meaghan Russell: When I refer to cultural significance of the larger area, I mean whether there are cultural stories or knowledge relating to the Quorrobolong Valley that are relevant to the assessment.

Barry Anderson: The significance assessment in the report talks about low, moderate significance – these are terms of the law, white man's terms.

Meaghan Russell: Yes – the archaeological significance assessment that Umwelt prepared uses those terms, but this is not the cultural significance assessment – only the scientific.

Barry Anderson: All sites are of high significance. Some of those sites will be impacted by mining activities, some might be in the areas that are going to be subsided. Will mitigation works go in and repair those sites? Once the area has subsided, will the damage be repaired?

Sarah Harvey: That will be part of the PSMPs. We need to do more work – talk to the landholders and get permission to look at the area. Once subsidence has occurred, we basically go out and rehabilitate any areas that were impacted.

Barry Anderson: If there is any area where there is only 1 to 2 artefacts on the surface due to exposure, no one knows what is below the surface. There could be more artefacts.

Meaghan Russell: We have also considered the potential for subsurface artefacts in the report. The area in Aberdare State Forest is quite steep in some areas, and there is very little soil on most of the slopes, with bedrock visible in many places. This area has low potential for buried artefacts as there simply is not enough soil in most areas where artefacts could be found. However, when you move into the lowlands along Cony and Sandy Creek, the landscape is very different and there is potential for artefacts to be buried in these areas. We have identified that these as areas of high archaeological potential (or a PAD) as artefacts may be buried in these areas. This was also based on discussion with Aboriginal stakeholders during survey, who identified that the two major creek lines were good camping grounds and would have been used.

Meaghan Russell: Barry also asked a question earlier about subsidence impacts and remediation works. Two engineering companies – MSEC and SCT – have provided us with advice on potential impacts to archaeological sites resulting from subsidence, as specialist advice was needed. We have been told that although the ground will subside, this mine is very different to others in the Hunter Valley due to the depth of the coal. *Requests that Frank provides an explanation of the predicted subsidence for Stage 3.*

Frank Fulham: *Frank explains current mining activity for Stage 1, and discusses results of subsidence monitoring lines.* We are mining A2 longwall right next to the previously extracted A1 longwall where we should see maximum subsidence effects. Along longwall A2, we are now getting 600mm subsidence in an area that was predicted to have 1.6m subsidence. Subsidence is less as this area has massive sandstones and conglomerates that we believe are bridging across the extracted voids.

Barry Anderson: Are longwalls A1 and A2 in here, part of this project?

Frank Fulham: No, they are Stage 1. *Frank explains the location of Stage 1 longwalls, with reference to report maps.*

Meaghan Russell: We had a meeting in October last year that included a visit to the Stage 1 mining area, and we walked along one of these monitoring lines. For those that attended, you would remember that there was no fracturing or cracking of the ground surface – the whole area has dropped through subsidence but unless you had been told, you would not know that the area had been mined.

Frank Fulham: Do you want to have a look at the subsidence?

No Aboriginal stakeholders request to visit the Stage 1 area to view subsidence results.

Meaghan Russell: The information that MSEC have provided suggests that although the Stage 3 area will subside, sites like artefact scatters will only be affected by minor cracking of soils, such as along creeklines. By minor, MSEC predict that cracks will be no wider than 25mm, and instead of one single crack you are more likely to have multiple smaller cracks – like small ripples in the soil. Given that all the recorded artefact scatters are in open contexts and have been affected by bioturbation, erosion or human activity – many found on tracks – this type of soil cracking is not considered to be a major impact. It is recognised to be an impact – and all sites recorded are within the subsidence area so may be affected by cracking soils – but on the scale of impact, it is relatively low.

Frank Fulham: Cracking of soils might also occur at the top of slopes, as a result of the tensile strains.

Barry Anderson: Have you done drilling out here?

Frank Fulham: We have done some drilling in the area but it has depended on access agreement with landholders.

Barry Anderson: How wide are your longwalls in this area? and the chain pillars?

Frank Fulham: As a general rule, the chain pillars are one-tenth depth of cover. The longwalls are approximately 220 metres wide, and the chain pillars are about 45- 50 metres wide.

Christine Dever: *directed to Meaghan Russell:* Did you find anymore information in writing on those sites that may be in the area?

Meaghan Russell: For those who were not at past meetings, we found a book written by Bill Needham in 1981 on Aboriginal sites in the Cessnock-Wollombi area. Bill was a local teacher with an interest in Aboriginal heritage, and we understand that he had some contact with local Aboriginal people but do not know where his information actually came from. In the book he quotes local property owners and Percy Haslam from University of Newcastle as his source of information (who were not Aboriginal). This book stated that there was a ceremonial site in Quorrobolong Valley and two burial sites along Quorrobolong Creek. There is no information on the potential ceremonial site location, but at the last meeting, Tracey Skene commented on a known

ceremonial site in the area that is some distance from the Stage 3 area, so it is possible the book refers to this site. The only information about the location of the two burial sites comes from a map in the Needham book, which shows the sites to the south of Quorrobolong Creek before the creek changes direction and heads south. We have attempted to georeference the map, or work out site locations from creek lines but have had no luck as the map is not scaled and the creek lines are not in the correct location. However, we do know Quorrobolong Creek is to the east of Stage 3, and it does turn south before Stage 3. Although we think it is unlikely these burial sites are in the Stage 3 area due to this, we are conscious of burials as a broader issue, as the Needham book suggests burials could be found in alluvium along these major creek lines. The carved tree site that was recorded near Sandy Creek to the south of the Stage 3 area (now destroyed), also has to be considered, as carved trees are known to be associated with ceremonial or burial sites. The potential for burials to be within the Stage 3 area was further considered with reference to soil pH levels, and essentially we would not expect skeletal or organic materials to survive for any period of time in this area due to the acidity levels in the soils. So, back to the original question, we do not have any further information but we are conscious of burials as a potential issue, although it is considered highly unlikely that any will be found along the streams of the Stage 3 area.

Christine Dever: *Christine asks whether Austar will mention archaeological survey when talking to landholders.*

Frank Fulham: All the information will be given to landholders as part of the access agreement, and as part of developing management plans for properties.

Christine Dever: But will Aboriginal sites be mentioned. Sometimes people can have a bad reaction to us coming onto their properties.

Frank Fulham: Aboriginal heritage will be mentioned as part of the total package.

Meaghan Russell: We will now start to work through the management recommendations in the draft report. As I noted before, all recommendations are based on past discussions, so if anyone has any questions about the background to each recommendation, just ask.

The first management recommendation is for the preparation of an Aboriginal Cultural Heritage Management Plan for the Austar Coal Mine, which will be a policy document providing the mine with clear advice on all Aboriginal heritage requirements, including responsibilities and timeframes. This document will have protocols for management of all sites and issues, such as what to do if new sites are found, the works required for future site monitoring, cultural heritage awareness training, etc. This recommendation is fairly straightforward, but does anyone have any comment on the AHCMP?

No Aboriginal stakeholders provide comment on the recommendation.

The second management recommendation relates to the grinding

groove offset strategy. Just to provide some background – at the last two meetings, Aboriginal stakeholders in attendance have requested a monetary offset for potential impacts to the grinding groove site resulting from the Stage 3 project, which could go towards a cultural project or program (to be decided by Aboriginal stakeholders). At the January meeting, Austar offered $50,000 as the offset package, as this was the cost of engineering works that could have been done at the site. After an independent meeting, Aboriginal stakeholders then recommended – as read by Len Anderson of DECC – that the offset be increased to $100,000. After the meeting, Austar mailed a response to all Aboriginal stakeholders, agreeing that the offset would be increased to $100,000. There has not been any response to this so far – so would anyone like to comment on the offset strategy? Or comment on what cultural program or project the offset strategy could be used for?

Barry Anderson: The report says that the monetary contribution will be made once Austar have all necessary approvals and agreement. Does this mean agreement by Aboriginal stakeholders or by DoP?

Sarah Harvey: Government approval is the key here, because if we don't get government approval we won't be impacting on the site and then no offset strategy is needed.

Barry Anderson: I don't like this wording, it suggests payment for Aboriginal stakeholder approval. The wording should be changed to state government approval.

Frank Fulham: It is meant to be government approval, as we can't commence mining without sign off from the department.

Barry Anderson: I want government approval to be in there.

Meaghan Russell: This can be easily changed in the report, because it is meant to refer to government approvals. Are there any other comments about the monetary offset of $100,000 or what it could be used for?

Christine Dever: The Mindaribba Local Aboriginal Land Council represents 340 community members over the age of 18, and lots more children – and represents Wonnarua people as well as other local people. We provide a pre-school for 3-5 year olds to ensure our kids are as good as if not better than other kids when they go to school. This is partly funded by DOCS. We also have a museum which could always use money to upgrade. But this would require a lot of agreement from everybody here.

Frank Fulham: We do not want to mediate between all the stakeholders on this issue – it needs to be decided amongst stakeholders, to decide how best you can service your communities in relation to that aspect.

Christine Dever: You asked to comment so I am giving comment.

Meaghan Russell: There doesn't have to be a decision amongst stakeholders at this meeting, this issue was raised just to get the conversation started.

Christine Dever: Sometimes it gets lost in these discussions but a Land Council represents 340 adults and 1000 children.

Barry Anderson: I won't get into the politics of this, but as far as I am concerned the money should be used for cultural projects like fencing off the grinding groove site that is mentioned in the report. Perhaps other sites in the area could also be fenced.

Christine Dever: Then you need to negotiate with the landholder.

Sarah Harvey: It is an issue open for consideration.

Christine Dever: When we did survey along the major creek (Cony Creek), we were on private land and she would not want a fence to be put through her property.

Barry Anderson: This is the problem that we have now with surveys because there are so many groups involved, and not everyone is there on the same day and sees the same sites.

Adam Fletcher: Who is responsible for monitoring the sites? Does the mine monitor all of the land? You have miners accessing some land, and also general public that should not be on the land. There could be potential for vandalising sites. Do people go out and check everything is OK?

Frank Fulham: We are working in an area of private landhold – so will not go out to sites unless we have an agreement with them. We do have problems with people going onto mine land – they cut down the fences so they can ride motor bikes through the area. We do repair fences to stop this, but you cannot have a security guard everywhere.

Sarah Harvey: Landholders are going to be aware of the sites on their properties once we have access. Checks will be in place if we have to do drilling or any work that can disturb the land surface.

Meaghan Russell: Your question about public access is especially relevant to the grinding groove site, and at the last meeting that was talk of putting a fence around the site to protect it. Although the site is on NPWS land and people do bring bikes in, the site is about 70 metres from a track and there are no tracks near the site. It is pretty unlikely that anyone should find their way in and do damage, and some people did express concern that a fence would bring more attention to the site. Lennie Anderson was looking into this issue after the last meeting, because the request to fence the site was made to Glenn Morris and then Roger & Len. This decision would not be Austar's as it is NPWS land.

At the last meeting, placing any artefacts recovered from Stage 3 in the fenced grinding groove site was also raised by Len Anderson and discussed. Does anyone have any comment on this idea?

Barry Anderson: I am against it. It is up to Austar Coal Mine to provide a keeping place, it is the mine's responsibility to look after those artefacts unless the community comes to an agreement.

Meaghan Russell: I should also mention that at this time, there may never be future works like collection or salvage – it depends totally on whether remediation is needed. It may also be the case that only a small number of artefacts are recovered, for example 20, what are your thoughts on a keeping place for such a small number of artefacts?

Barry Anderson: It does not have to be major. For example, Coal & Allied has a single garage with a storage shed that meets NPWS guidelines and is accessible to the community. The money for a keeping place should not come from the $100,000 offset. The offset could be used to run a NAIDOC program for Cessnock for one year, or for a school Indigenous week or Aboriginal awareness talk, something like this.

Christine Dever: It could also be used to employ a youth worker for three years to work in the area, e.g. drug and alcohol workers.

Barry Anderson: Has Austar signed a Memorandum of Understanding like other mines in the Hunter Valley?

Frank Fulham: We are not a member of the Minerals Council, so have not signed their MOU. Back to the keeping place idea – what has happened with the shed Coal and Allied provided? Are artefacts eventually returned to their original locations?

Barry Anderson: They can be put back afterwards, if the mitigation works have been done and the sites are rehabilitated then artefacts can be put back. All their records are in that shed, all artefacts have been catalogued, so people can go and do research there. It can be used by Aboriginal people and also by archaeologists, if they are doing work in the area and need to look at artefacts from Austar. The opportunity is also there to take artefacts to the local schools.

Frank Fulham: Is that something the Aboriginal groups would do?

Barry Anderson: I have done it previously with schools and with Landcare. I would be happy to come along to one of your meetings with the community and have a discussion. It might be a better perspective coming from us instead of a mining company. There are other avenues there for that money to be used.

Sarah Harvey: They are all good ideas.

Barry Anderson: There are community groups that are involved but who are not here today. A proposal (on how to use the money) may need to go out to the groups as a letter, do you agree?

Frank Fulham: Isn't it something that you guys are going to tell us?

Barry Anderson: You will never get 100% agreement with the different groups and native title holders involved in these projects.

Frank Fulham: I don't want to be the mediator or arbitrator on this issue, you guys need to come to an agreement and then tell us what the money will be used for.

Sarah Harvey: Yes, you guys need to come to a decision on this issue.

Christine Dever: Do we have native title holders or claimants in the area? I thought we just had claimants.

Barry Anderson: There is one native title group that is a title holder and claimant

Meaghan Russell: Another recommendation put forward is the site monitoring program. Although the subsidence predictions suggest that sites will not be impacted, we need to monitor them at key points of the mining program to make sure that if sites are impacted, we can identify and manage this appropriately. The program would involve baseline recording of sites on accessible properties before mining, then we could go out after longwalls had been extracted to check whether sites had been affected. Accessibility of properties is the key issue here again, as we can only go onto properties where access is provided. At this stage, we do not know which properties we will be able to access – this will be organised by Austar as part of landholder agreements. The timing of the works will also depend on advice from engineers about when particular sites might be affected. As the angle of draw is so wide, removal of one longwall might have the potential to affect a few kilometres on the surface – we will need advice on this. Does anyone have comment on this recommendation?

No Aboriginal stakeholders provide comment on the recommendation.

Meaghan Russell: The next recommendation is for mitigation of future surface works. As we discussed before, if Austar need to do any works in the Stage 3 area, they will notify Aboriginal stakeholders and an archaeologist on the location and works required, and then we would advise what assessment or management is needed. There may be no need for management if the area was surveyed already and no sites were found; but if the area has not been surveyed – or if it is near a known site – an inspection would be required to work out how best to manage the site/work. The outcome of this could be a range of things, such as surface collection or salvage – we cannot know outcomes at this stage as depends entirely on the work planned and the area impacted. However, this process is in place to ensure that Aboriginal heritage is considered and managed appropriately. Would anyone like to comment on this recommendation.

No Aboriginal stakeholders provide comment on the recommendation.

Meaghan Russell: The report also includes a number of general recommendations. The first relates to cultural heritage awareness training, which would be provided by Aboriginal stakeholders to relevant Austar personnel – just to provide a better understanding of Aboriginal cultural heritage issues of the area. An archaeologist could be involved if requested by stakeholders, but otherwise would not need direct involvement. Any comments on this recommendation?

No Aboriginal stakeholders provide comment on the recommendation.

Meaghan Russell: The second general recommendation relates to the identification of any new sites within the Stage 3 project area, for example, if someone identifies a new site in the Aberdare State Forest. If this happens, Austar would advise Aboriginal stakeholders and an archaeologist, who would inspect the site and determine whether management is needed. Any comments on this recommendation?

No Aboriginal stakeholders provide comment on the recommendation.

Meaghan Russell: The third general recommendation relates to the discovery of bone that may be human within the Stage 3 area. If works were being done at the time, they would stop to allow forensic assessment of the bone, which would determine if they were human or animal. If they were human, DECC and Heritage Office guidelines would be followed, and this process would obviously involve Aboriginal stakeholders. Would anyone like to comment on this general recommendation?

No Aboriginal stakeholders provide comment on the recommendation.

Meaghan Russell: There are no more recommendations in the draft report to discuss – would anyone like to bring up any additional recommendations?

Christine Dever: There was talk of Aboriginal employment at the last meeting, and the Umwelt letter states that Austar should employ 15 local Wonnarua people at the mine. When we discussed this at the last meeting, I had said to Lennie Anderson that it should also include LALC members, not just local Wonnarua people. From the LALC point of view, I take issue with the recommendation in the letter, and would like to comment that it should be Aboriginal employment not just local Wonnarua employment. I want this noted now, because it was not a formal recommendation at the last meeting.

Sarah Harvey: Do we need to change the wording of this section in the report to say we would welcome anyone from any Aboriginal community?

Meaghan Russell: I can make that amendment in the report to reflect the MLALC comment, but would add that Austar has not committed to providing 15 positions for Aboriginal people, but has stated that they are an equal opportunity employer and would welcome Aboriginal people to apply for positions as they are advertised.

Christine Dever: The Land Councils should not be left out of this. I don't like to start a row in front of other people, but I want to say that the reason there was no comment was because I didn't realise that letter was going to come from Umwelt.

Meaghan Russell: I understand what you are saying, but just to make it clear again, Umwelt sent out the letter as the Aboriginal stakeholders at the last meeting requested us to do so – and those recommendations were presented at the last meeting by Len Anderson on behalf of Aboriginal stakeholders present. As you were not there for the final part of the meeting, I just want to be clear that the recommendations are not from Umwelt – but were from Aboriginal stakeholders.

Barry Anderson: I have a question about Appendix 6 in the report. It says in here that the artefacts will be returned to the fenced grinding groove site. If that area is fenced off and people do notice it is fenced, they will go into the area and if there are artefacts in there they will go missing.

Meaghan Russell: Lennie Anderson of DECC raised this issue at the last meeting after fencing of the site was suggested. There was some discussion of this in January, and it appeared to be agreed on at the time (as no one disagreed with Lennie), but I am conscious that the recommendation was not made by Aboriginal stakeholders for the project but by DECC. What do people think of this suggestion?

Barry Anderson: Would Austar be prepared to build a small shed on the site?

Frank Fulham: If we thought it was going to be used for the right purpose I would not say no, so long as it is used for education purposes or similar and it is not forgotten.

Barry Anderson: I would like to see Austar provide a keeping place on site if required.

Sarah Harvey: It could be a little ATCO hut or something similar, as long as it is lockable and secure.

Meaghan Russell: What does everyone else think about a small keeping place in the surface infrastructure site?

Christine Dever: I have concerns about a fence going around the grinding groove, it would draw attention to it.

Frank Fulham: It would not surprise me if people were aware of it. Another factor is that signs would have to be put up to warn people of the fenced area. I think you are better off not telling people

Meaghan Russell: Does anyone else have a thought on fencing of the grinding groove site?

Barry Stair: Don't fence it.

Sarah Harvey: At the moment it is public land, and you know it is there and can go out and access it. It would be better if other people do not know it is there. The site would probably be safer.

Frank Fulham: Is there a belief that once mining has been conducted and mining has ceased that the artefacts are then returned to their home?

Barry Anderson: That is what I would like to see instead of artefacts going into a cabinet at the museum. This way, you can pick up the artefacts before mining starts, they can stay out there while works are happening, and then they can be returned at the end.

Meaghan Russell: I should note that we have not recommended collection of artefacts before mining starts, because at this stage, engineers have advised that artefact scatters will not be affected by works (only minor cracking of soils). There is a process in place to collect artefacts should sites actually require remediation after subsidence, but there

is no collection of artefacts at the start of the project.

Barry Anderson: The areas that we haven't surveyed we don't know what is in there. I want it noted that any future monitoring of those other longwall sections that if subsidence is at 1.8 metres that something is done to future longwalls before it is mined.

Frank Fulham: That will depend on whether we own the land or have an agreement with the landholder. We cannot guarantee that at this stage.

Sarah Harvey: If it turns out that we need to salvage, then we can review our strategy at that stage.

Frank Fulham: To look into it, you might not have to acquire the land, if we own the land we could probably consider that and the fact we don't own the land it will be subject to that landholder agreement. We have to abide by that.

Sarah Harvey: I suppose by monitoring sites you will understand what is happening as a result of subsidence and we can review what is needed for that site. We need to leave it open to see how the subsidence effects the surface and therefore the artefacts. We are conscious of where they are, and they will be looked at.

Barry Anderson: We will work forward with this project, I don't think this document is complete without looking at those other properties, and I know there are issues with those other properties in talking to landholders and I would like to offer my services to go and talk to these people or attend a community meeting.

Christine Dever: That is a good idea, and the LALC would send someone as well.

Barry Anderson: It is a good idea, next time you do go out there to speak with people I could come along.

Frank Fulham: I welcome your feedback.

Meaghan Russell: We have now talked through all of the recommendations of the draft report, and discussed the key issues identified by the report. We will be finalising the report in the near future, so it is critical that people provide verbal or written comments on the project and draft report. If you are here representing a group, please take this back to your groups as we need to receive comments within the next few days.

Frank Fulham: We are submitting the Environmental Assessment by the end of July, and then it will be on display and from that point there will be information sessions for the community. There will be some discussions about how that is represented and when. You will be kept informed.

Barry Anderson: (*directed to Meaghan Russell*) I will put something in writing and mail it to you by the 10th.

Meaghan Russell: As the report will be finalised soon, comments really will be needed no later than the 10th July. Can you all communicate this back to your groups?

Christine Dever	*Requests that a copy of the meeting minutes be faxed to the Land Council when they are ready.*
Meaghan Russell:	We can do that, they will probably be ready by Thursday. The minutes will also be in the final report that everyone should receive in a week or so. Does anyone else want notes faxed through before the final report arrives? *All other Aboriginal stakeholders present do not request an independent copy of the meeting notes.*
Barry Anderson:	Frank, for the Cultural Awareness Program, if you want a proposal to be forwarded I will put one forward for you.
Meaghan Russell & Sarah Harvey:	Thank you to all who came to the meeting.

Appendix 1 – Consultation Log

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
16-11-06	MLALC		All organisations notified of Stage 3 Aboriginal cultural heritage assessment, with purpose of identifying any known Aboriginal stakeholders with an interest in the Austar Coal Mine project. Notification conducted in compliance with DECC Interim Guidelines (2004) policy. Responses requested by 6 December 2006.	Katie Sachs
	Native Title Services			
	Registrar of Aboriginal Owners			
	DECC			
	Cessnock City Council			
22-11-06	Local media advertising in *The Advertiser* and *The Koori Mail* for Aboriginal stakeholders with an interest in the Austar Coal Mine project. Closing date for registrants 6 December 2006.			Katie Sachs
23-11-06	MLALC	Rick Griffiths	Letter to Umwelt identifying that LHWC is only other Aboriginal stakeholder in area recognised by MLALC, with contact details provided. Notes that MLALC has met with Austar Coal Mine in the past about this project and that raised concerns about the lack of archaeological work conducted before mine recommenced work. Also noted an interest in the Stage 3 project, and recommends that archaeological work is done on the entire site.	Katie Sachs
04-12-06	AF	Arthur Fletcher	Letter received to register interest in the Austar Coal Mine project.	Katie Sachs
07-12-08	DECC	Brendan Diacono	DECC provides list of known Aboriginal parties in the region.	Katie Sachs
20-08-07	AF	Arthur Fletcher	Umwelt rang Arthur to discuss the details of his registration, ie, as organisation or as individual (as employment package soon to the mailed out, and up to three individuals can be nominated). Arthur advised he registered on behalf on his family.	Meaghan Russell
22-08-07	ANTC	John & Margaret Matthews	Aboriginal stakeholder list developed from above responses and also from previous registrations for work in the lower Hunter Valley with Umwelt. Project information mailed to all Aboriginal stakeholders, including: • Description of Stage 3 project and likely subsidence impacts (assessed by MSEC). Mapping of mine design attached. • Details of previous archaeological work in area, detailing sites recorded and current understanding of site patterning throughout assessment area. • Survey constraints, being access limited to five private properties within the Stage 3 area. • Survey strategy proposed by Umwelt, with invitation for all Aboriginal stakeholders to provide comment. Mapping of accessible properties/survey areas attached All registrants also provided with invitations to participate in archaeological survey, with six field positions per day available. (Engagement paperwork attached.) Return of comments on draft strategy, and submissions for fieldwork positions, requested by 11 September 2007.	Meaghan Russell & Peter Jamieson
	GC	Rodney Matthews		
	AF	Arthur Fletcher		
	HVCC	Christine Matthews		
	HVCS	Pansey Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	UHHC	Darrel Matthews		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
24-08-07	UHHC	Melissa Matthews	Submission received for fieldwork positions: Steven Rumble and John Matthews nominated.	Meaghan Russell
27-08-07	WWCCS	Des Hickey	Submission received for fieldwork positions: Des Hickey nominated.	Meaghan Russell
	GC	Rodney Matthews	Submission received for fieldwork positions: Michele Stair and Gay Horton nominated.	Meaghan Russell
	HVCS	Luke Hickey	Submission received for fieldwork positions: Luke Hickey, Paulette Ryan and Katrina Cavanagh nominated.	Meaghan Russell
	MC	Cheryl Matthews	Cheryl rang Umwelt to register an interest in the project, as had heard from Rodney Matthews that the survey was coming up. Meaghan took details and added Mingga to the registrant list for consultation – would be involved in the consultation process for the assessment from this point on, would have opportunity to identify sites/areas of cultural value, discuss their appropriate management and review draft report. Cheryl requested that Mingga be involved in survey – Meaghan responded that Austar only offered fieldwork positions to those stakeholders who registered from the outset of assessment (paperwork already gone out), and Mingga did not register.	Meaghan Russell
03-09-07	ANTC	John & Margaret Matthews	Meaghan called to notify of meeting, as being called at relatively short notice. Landline busy. Mobile not answered. Meaghan rang later in day – spoke to Margaret, who requested that information to be faxed to WLALC.	Meaghan Russell
	GC	Rodney Matthews	Meaghan called to notify of meeting, as being called at relatively short notice. Meaghan took fax number, will send through details tomorrow.	Meaghan Russell
	AF	Arthur Fletcher	Meaghan called to notify of meeting, as being called at relatively short notice. Discussed meeting, Arthur requested that meeting details be faxed.	Meaghan Russell
	HVCC	Christine Matthews	Meaghan called to notify of meeting, as being called at relatively short notice. Landline busy, mobile disconnected.	Meaghan Russell
	HVCS	Luke Hickey	Meaghan called to notify of meeting, as being called at relatively short notice. Discussed meeting, details to be faxed through tomorrow.	Meaghan Russell
	LHWC	Lee-Ann Miller	Meaghan called to notify of meeting, as being called at relatively short notice. No answer on landline or mobile. Return number left on mobile.	Meaghan Russell
	LWTC	Barry Anderson	Meaghan called to notify of meeting, as being called at relatively short notice. No answer on landline or mobile. Return number left on mobile.	Meaghan Russell
	MLALC	Rick Griffiths	Meaghan called to notify of meeting, as being called at relatively short notice. Discussed meeting, Meaghan to fax information to LALC office.	Meaghan Russell
	UHHC	Darrel Matthews	Meaghan called to notify of meeting, as being called at relatively short notice. Discussed	Meaghan

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
			meeting, Meaghan to fax information through.	Russell
	WWCCS	Des Hickey	Meaghan called to notify of meeting, as being called at relatively short notice. No answer.	Meaghan Russell
	WCH	Gordon Griffiths	Meaghan called to notify of meeting, as being called at relatively short notice. No fax – Gordon requests that Meaghan mail out details.	Meaghan Russell
	Y	Scott Franks	Meaghan called to notify of meeting, as being called at relatively short notice. Scott advises that is no longer involved in work in the Hunter – Barry McTaggart is administrative manager of Yarrawalk in Hunter, Meaghan, should contact him only to discuss project (mobile number provided). Barry will organise meetings and fieldwork involvement.	Meaghan Russell
	MC	Clifford Matthews	Meaghan called to notify of meeting, as being called at relatively short notice. Cliff and Cheryl not available – Meaghan left detailed message with family member.	Meaghan Russell
04-09-07	MC	Clifford Matthews	Meaghan faxed and mailed information to Mingga about Austar project, including draft survey strategy and associated mapping.	Meaghan Russell
	Y	Barry McTaggart	Meaghan faxed fieldwork submission paperwork for Barry to complete.	Meaghan Russell
	ANTC	John & Margaret Matthews	Faxes to all notifying of Austar project meeting on Monday 10 September (10am – 2pm). Meeting at Austar office near Paxton (map attached). DECC representatives also invited. Agenda and RSVP attached. Contact details provided if would like to discuss meeting agenda/issues prior to Monday. Payment of $300 per registrant (group) to cover meeting attendance costs, with details attached.	Meaghan Russell
	GC	Rodney Matthews		
	AF	Arthur Fletcher		
	HVCC	Christine Matthews		
	HVCS	Pansey Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	UHHC	Darrel Matthews		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
	MC	Clifford Matthews		

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Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
04-09-07	ANTC	Margaret Matthews	RSVP received for meeting on 10-09-07 – Margaret to attend.	Meaghan Russell
	GC	Rodney Matthews	RSVP received for meeting on 10-09-07 – Michele Stair to attend.	
	MLALC	Rick Griffiths	RSVP received for meeting on 10-09-07 – Rick Griffiths and Steve Talbot to attend.	
05-09-07	Y	Scott Franks	Scott rang to request contact details for an Austar representative – would like to talk directly to them about project – esp as not attending meeting on Monday (Marie Ward will attend as representative). Meaghan – will forward request onto Umwelt manager, will have Austar rep call back. Note – PO Box in Muswellbrook is automatically diverted to Sydney at the moment – Barry McTaggart not receiving Yarrawalk mail.	Meaghan Russell
	WWCCS	Des Hickey	RSVP for meeting on 10-09-07 received – Des to attend meeting.	Meaghan Russell
	Y	Barry McTaggart	RSVP for meeting on 10-09-07 received – Barry French to attend meeting.	Meaghan Russell
	AF	Arthur Fletcher	RSVP for meeting on 10-09-07 received – Arthur to attend meeting.	Meaghan Russell
	TS	Tracey Skene	Tracey called and emailed Umwelt to register an interest in the Austar project. Question about fieldwork involvement – Meaghan outlined that fieldwork positions already offered to those who registered at outset, but will be involved in project through consultation. Tracey mentioned that will probably be involved in survey through LHWC.	Meaghan Russell
06-09-07	Y	Barry McTaggart	Meaghan rang as had received fieldwork submission and RSVPs, but missing one page (fieldwork reps) – can re-fax? Barry will do so now. Questions about meeting location – off Middle Road, Paxton, left hand turn from Kurri Kurri.	Meaghan Russell
	HVCS	Luke Hickey	RSVP for meeting on 10-09-07 received – Luke to attend meeting.	Meaghan Russell
	HVCC	Christine Matthews	RSVP for meeting on 10-09-07 received – Colleen Stair to attend meeting.	Meaghan Russell
	MC	Clifford Matthews	RSVP for meeting on 10-09-07 received – Clifford to attend meeting.	Meaghan Russell
	LHWC	Lee-Ann Miller	Meaghan emailed Lea-Ann (no response on phone) as fieldwork submission not received, and requested confirmation that paperwork received and whether LHWC wished to participate in fieldwork.	Meaghan Russell

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Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
07-09-07	UHHC	Darrel Matthews	RSVP received for meeting on 10-09-07 – Darrel to attend.	Meaghan Russell
	MC	Cheryl Matthews	Cheryl rang regarding meeting on Monday – insurances needed? Meaghan – no, just meeting, will go out to site but will be escorted as visitor. Cheryl – will survey work be coming up after this? Meaghan – no, as discussed, fieldwork positions have gone to those who registered at the outset of the project, but meetings will allow all registrants to be involved.	
	WCH	Gordon Griffiths	Kym rang to discuss a number of Umwelt projects, including meeting attendance as no RSVP received. Gordon will be attending.	Kym McNamara
	LWTC	Barry Anderson	Kym rang to discuss a number of Umwelt projects, including meeting attendance as no RSVP received. Barry has not received any mail/invites – Meaghan can call on his mobile after 4pm.	Kym McNamara
	TS	Tracey Skene	Meaghan rang to discuss meeting attendance. Tracey is coming, but not yet had time to send RSVP.	Meaghan Russell
	WCH	Gordon Griffiths	Gordon rang as hasn't received meeting invitation in the mail. Meaghan gave all details – and wanted to confirm other mail (survey strategy) received. Gordon – may have been, but not seen it. Meaghan – will discuss further on Monday.	Meaghan Russell
	LWTC	Barry Anderson	Meaghan rang to confirm meeting attendance on Monday as not received an RSVP. (Barry also told Kym earlier that no mail received). Barry not able to attend meeting.	Kym McNamara & Meaghan Russell
09-09-07	WCH	Gordon Griffiths	Meaghan rang to confirm meeting attendance – Gordon will attend.	Meaghan Russell
	TS	Tracey Skene	Meaghan rang to confirm attendance at meeting – Tracey will be attending.	
10-09-07	ANTC	John Matthews, Margaret Matthews	Aboriginal Stakeholder Meeting held at Austar Coal Mine office in Paxton.	Peter Jamieson, Meaghan Russell & Kym McNamara
	UHHC	Justin Matthews		
	LHWC	Tracey Skene		
	WCH	Gordon Griffiths		
	Y	Barry French		
	GC	Michele Stair		
	WWCCS	Des Hickey		
	HVCS	Luke Hickey		
	HVCC	Colleen Stair		
	MLALC	Tom Miller		
	AF	Arthur Fletcher		

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
	MC	Clifford Matthews		
	TS	Tracey Skene (also LHWC rep)		
10-09-07	AF	Arthur Fletcher	Agrees with draft survey strategy. Further comment provided – that he would have liked to visit previously mined areas containing water courses during the site visit on 10-09-07. Further notes that 'all country that we belong to is highly significant to our peoples'.	Meaghan Russell
	GC	Michele Stair	Agrees with draft survey strategy. No further comment provided.	Meaghan Russell
	MC	Clifford Matthews	Agrees with draft survey strategy. No further comment provided.	Meaghan Russell
11-09-07	HVCS	Luke Hickey	Agrees in principal with the draft survey strategy, but notes that surveying should extend across a variety of landforms that may be impacted, and that all infrastructure should be surveyed. If sites have been recorded within the area previously, they should be inspected to confirm the locations on the ground. Issues that should be included in the assessment: shelters with art or deposit; axe grinding grooves; bora/ceremonial sites; rock engravings; scarred and carved trees; quarry sites (stone and ochre); fish traps; stone arrangements; and waterholes/wells.	Meaghan Russell
	UHHC	Darrel Matthews	Agrees with draft survey strategy. Further comment provided – UHHC would like to be involved with project from start to finish.	Meaghan Russell
	WWCCS	Des Hickey	Agrees with draft survey strategy. Further comment provided – WWCCS requests that the entire accessible properties be surveyed, as no significant Aboriginal sites should be overlooked.	Meaghan Russell
	LWTC	Barry Anderson	MR called to discuss whether LWTC had any comments on the draft survey strategy, or would like to participate in survey work, as comments/submissions due today. Barry Anderson states has not seen paperwork as has not checked mail (too busy), and requests information to be re-sent. MR faxed key documents mailed on 21 August, with note that fieldwork roster being developed for survey so will need to identify interest in involvement by tomorrow.	Meaghan Russell
12-09-07	ANTC	Margaret Matthews	Submitted comment form on draft survey strategy, but ticked all three boxes – I agree with the survey strategy, I disagree with the survey strategy, and I agree with the survey strategy but have the following comments. Later phone confirmed support for survey strategy.	Meaghan Russell
	HVCC	Christine Matthews	Submitted comment form on draft survey strategy – ticked agreement with survey strategy, but in between yes and no boxes. Meaghan rang to confirm HVCC supported survey strategy, but no answer.	Meaghan Russell
	WCH	Gordon Griffith	Agrees with the draft survey strategy. Further comment provided – that all groups that have an	Meaghan

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
			interest in the project should be involved in works.	Russell
13-09-07 to 18-09-07	All stakeholders participating in the Stage 3 Austar survey		Umwelt archaeologists spoke to all stakeholders participating in archaeological survey to organise field roster. Gordon Griffiths questioned the fieldwork roster as two reps for stakeholders was discussed at initial meeting on 10-09-07; but was happy with finalised roster. Arthur Fletcher and Barry French requested second session of fieldwork. Following all discussions, Aboriginal stakeholders agreed with roster developed.	Julian Travaglia
19-09-08	LHWC	Lee-Ann Miller	Letter to all with details of fieldwork roster, developed on rotational basis to provide all registrants with opportunity to be involved, and based on availability of individual representatives. Noted PPE requirements, and daily work hours.	Julian Travaglia
	ANTC	John & Margaret Matthews		
	WWCCS	Des Hickey		
	UHHC	Darrel Matthews		
	AF	Arthur Fletcher		
	Y	Scott Franks		
	MLALC	Rick Griffiths		
	WCH	Joseph and Gordon Griffiths		
	GC	Rodney Matthews		
	HVCS	Pansey & Luke Hickey		
	HVCC	Christine Matthews		
18-09-07	LHWC	Lee-Ann Miller	Email to Meaghan Russell (who is on leave) requesting information about fieldwork schedule – have not heard anything.	Meaghan Russell (on leave)
19-09-07	HVCS	Luke Hickey	Archaeological survey of Stage 3 project area.	Kym McNamara Julian Travaglia
	MLALC	Steven Talbot		
	WWCCS	Des Hickey		
	WCH	Shannon Griffiths		
	HVCC	Colleen Stair		
	GC	Barry Stair		

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Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
20-09-07	HVCC	Colleen Stair	Archaeological survey of Stage 3 project area.	Kym McNamara Julian Travaglia
	UHHC	Justin Matthews		
	ANTC	Margaret Matthews		
	GC	John Matthews		
	WCH	Shannon Griffiths		
	MLALC	Christine Dever		
21-09-07	ANTC	Margaret Matthews	Archaeological survey of Stage 3 project area.	Kym McNamara Julian Travaglia
	ANTC (Volunteer)	John Matthews		
	HVCC	Colleen Stair		
	WCH	Gordon Griffiths		
	UHHC	Justin Matthews		
	GC	Barry Stair		
	MLALC	Christine Dever		
03-10-07	GC	Colleen Stair	Archaeological survey of Stage 3 project area.	Kym McNamara Julian Travaglia
	LHWC	Tracey Skene		
	ANTC	Margaret Matthews		
	Y	Barry French		
	WWCCS	Des Hickey		
	AF	Arthur Fletcher		
	UHHC	John Matthews		
04-10-07	LHWC	Tracey Skene	Archaeological survey of Stage 3 project area.	Kym McNamara Julian Travaglia
	HVCS	Luke Hickey		
	Y	Barry French		
	WWCCS	Des Hickey		
	AF	Arthur Fletcher		
	ANTC	Margaret Matthews		
	UHHC	John Matthews		

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Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
05-10-07	HVCS	Luke Hickey	Archaeological survey of Stage 3 project area.	Kym McNamara Julian Travaglia
	Y	Barry French		
	MLALC	Christine Dever		
	LHWC	Tracey Skene		
	AF	Arthur Fletcher		
	WWCCS	Des Hickey		
	WCH	Shannon Griffiths		
23-11-07	ANTC	John & Margaret Matthews	Fax to all advising that Aboriginal Stakeholder Meeting to be held on Friday 30 November 2007. Purpose of the meeting is to: - discuss results of archaeological survey, and all Aboriginal heritage issues identified to date - provide further information on the predicted subsidence resulting from the Stage 3 proposal, with James Barbato from MSEC to attend - seek Aboriginal stakeholder input on appropriate management of sites/areas within Stage 3 area. Noted that DECC representatives Roger Mehr, Len Anderson and Glenn Morris also invited to attend. RSVP attached to fax, requested by 27 November 2007. Austar payment for meeting attendance is $300 (including travel) per registrant (group).	Meaghan Russell
	GC	Rodney Matthews		
	AF	Arthur Fletcher		
	HVCC	Christine Matthews		
	HVCS	Pansey Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	UHHC	Darrel Matthews		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
	Y	Barry McTaggart		
	MC	Clifford Matthews		
26-11-07	WLALC	Donna Sampson	RSVP for meeting 30-11-07- Donna Matthews to attend	
26-11-07	WLALC	Donna Sampson	Call to discuss Austar project as RSVP for meeting 30-11-07 received, call to make Donna aware project is in MLALC boundary. Donna said WLALC does not have interest in project; scrap RSVP.	Meaghan Russell
26-11-07	ANTC	Margaret Matthews	Verbal RSVP for meeting 30-11-07 – Margaret unable to attend, but will send another in her place	Meaghan Russell
26-11-07	ANTC	Margaret Matthews	RSVP for meeting 30-11-07- Michael Matthews to attend	
26-11-07	UHHC	Darrel Matthews	RSVP for meeting 30-11-07- Justin Matthews to attend	

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
26-11-07	MC	Clifford Matthews	RSVP for meeting 30-11-07- Clifford to attend	
26-11-07	HVCC		RSVP for meeting 30-11-07- Colleen Stair to attend	
26-11-07	GC	Michele Stair	RSVP for meeting 30-11-07- Michele Stair to attend	
27-11-07	HVCS	Luke Hickey	RSVP for meeting 30-11-07- P. Hickey to attend	Meaghan Russell
28-11-07	MLALC`	Rick Griffiths	RSVP for meeting 30-11-07- Christine Dever to attend	Meaghan Russell
28-11-07	ANTC	John & Margaret Matthews	Phone calls to all Aboriginal stakeholders as meeting on Friday being rescheduled, due to delay in obtaining results from engineering assessment work required to understand likely impact to grinding groove site. Expected that meeting will be held within the coming fortnight, details will be provided once engineering report is received. Faxes/emails also provided to stakeholders (where possible) to confirm cancellation in writing.	Meaghan Russell
	AF	Arthur Fletcher		
	GC	Rodney Matthews		
	HVCC	Christine Matthews		
	HVCS	Pansey & Luke Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	MC	Clifford Matthew		
	TS	Tracey Skene		
	UHHC	Darrel Matthews		
	WC	Barbara Foot		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
		Barry McTaggart		
05-12-08	ANTC	John & Margaret Matthews	Fax to all stakeholders advising that Aboriginal Stakeholder Meeting to be held at Austar Coal Mine on 11 December 2008. Purpose of the meeting is to: - discuss results of archaeological survey, and all Aboriginal heritage issues identified to date - provide further information on the predicted subsidence resulting from the Stage 3 proposal, with James Barbato from MSEC to attend	
	GC	Rodney Matthews		
	AF	Arthur Fletcher		
	HVCC	Christine Matthews		

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
	HVCS	Pansey Hickey	- seek Aboriginal stakeholder input on appropriate management of sites/areas within Stage 3 area. Noted that DECC representatives Roger Mehr, Len Anderson and Glenn Morris also invited to attend. RSVP attached to fax, requested by 7 December 2007. Austar payment for meeting attendance is $550 (including travel) per registrant (group).	
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	UHHC	Darrel Matthews		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
	Y	Barry McTaggart		
	TS	Tracey Skene		
	MC	Clifford Matthew		
06-12-08	Y	Barry McTaggart	RSVP for meeting received – Nicky Taggart to attend.	Meaghan Russell
	GC	Rodney Matthews	RSVP for meeting received – Michele Stair to attend.	
07-12-08	ANTC	John & Margaret Matthews	RSVP for meeting received – Michael Matthews to attend.	Meaghan Russell
	UHHC	Darrel Matthews	RSVP for meeting received – Cheryl Matthews to attend.	
	HVCC	Christine Matthews	RSVP for meeting received – Colleen Stair to attend.	
	WCH	Gordon Griffiths	RSVP for meeting received – Joseph Griffiths to attend.	
10-12-08	LHWC	Lea-Ann Ball	RSVP for meeting received – Tracey Skene to attend (after lunch only).	Meaghan Russell
	WWCCS	Des Hickey	RSVP for meeting received – Des to attend.	
	HVCS	Pansey & Luke Hickey	RSVP for meeting received – Luke to attend.	
	MLALC	Rick Griffiths	RSVP for meeting received – Christine Dever to attend.	
	AF	Arthur Fletcher	RSVP for meeting received – Arthur to attend (for one hour only)	
11-12-07	ANTC	Michael Matthews	Aboriginal Stakeholder Meeting held at Austar Coal Mine office in Paxton.	Peter Jamieson, Meaghan Russell, Julian Travaglia
	UHHC	Cheryl Matthews		
	LHWC	Tracey Skene		
	WCH	Gordon Griffiths		
	Y	Nicky Taggart		

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
	GC	Michele Stair		Austar:
	WWCCS	Des Hickey		
	HVCS	Luke Hickey		
	HVCC	Colleen Stair		
	MLALC	Christine Dever		
	AF	Arthur Fletcher		
	MC	Tony Matthews		
14-01-08	ANTC	John & Margaret Matthews	Fax sent to all stakeholders advising that Aboriginal Stakeholder Meeting to be held at Austar Coal Mine office in Paxton on Wednesday 30 January 2008. Purpose of the meeting is to continue discussions on Aboriginal heritage management strategies, particularly grinding groove management and offset strategy. Noted that DECC representatives Roger Mehr, Len Anderson and Glenn Morris also invited to attend. Austar payment of meeting attendance is $300 per registrant (group). RSVP attached, to be faxed to office by 25 January 2008.	
	GC	Rodney Matthews		
	AF	Arthur Fletcher		
	HVCC	Christine Matthews		
	HVCS	Pansey Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	UHHC	Darrel Matthews		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
	Y	Barry McTaggart		
	TS	Tracey Skene		
	MC	Clifford Matthew		
15-01-08	Y	Barry McTaggart	Letter mailed to all Aboriginal stakeholders confirming details of Aboriginal stakeholder meeting to be held at Austar Coal Mine in 30 January 2008. Copy of the SCT (2008) report and meeting RSVP attached.	Meaghan Russell
	WWCCS	Des Hickey		
	WCH	Joseph & Gordon Griffiths		
	UHHC	Darrel Matthews		
	MLALC	Rick Griffiths		

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
	MC	Clifford Matthews		
	HVCS	Pansey & Luke Hickey		
	HVCC	Christine Matthews		
	GC	Rodney Matthews		
	ANTC	John & Margaret Matthews		
	LHWC	Lee-Ann Ball		
	AF	Arthur Fletcher		
	TS	Tracey Skene		
15-01-08	Y	Barry McTaggart	RSVP for meeting on 30 January 2008 received – Nicki Taggart to attend.	
	GC	Rodney Matthews	RSVP for meeting on 30 January 2008 received – Michele Stair to attend.	
16-01-08	LHWC	Lea-Ann Ball	RSVP for meeting on 30 January 2008 received – Tom Miller to attend.	
	MC	Clifford Matthews	RSVP for meeting on 30 January 2008 received – Clifford to attend.	
22-01-08	AF	Arthur Fletcher	RSVP for meeting on 30 January 2008 received – Adam Fletcher to attend.	
23-01-08	ANTC	Margaret Matthews	RSVP for meeting on 30 January 2008 received – Margaret to attend.	
	UHHC	Darrel Matthews	RSVP for meeting on 30 January 2008 received – Darrel to attend.	
	HVCS	Christine Matthews	RSVP for meeting on 30 January 2008 received – Colleen Stair to attend.	
	WCH	Gordon Griffiths	Verbal RSVP for meeting on 30 January 2008 received – Gordon to attend.	
25-01-08	MLALC	Rick Griffiths	Fax from MLALC asking why the SCT report does not talk about site conservation as an option. Meaghan responded by email, noting that SCT report engineering options only, and noted that site conservation discussed by Austar and Aboriginal stakeholders at last meeting – to be continued in next meeting. Attached RSVP for meeting.	
29-01-08	WWCCS	Des Hickey	Phone call to say cannot make meeting of 30-01-08 and can it be on Friday instead, as there will be no one to make decisions. Meaghan responded that the meeting will be for Thursday as the DECC and RSVPs for most groups have been received, but that she recognised the need for all decision makers to be present to reduce management issues and she will call during the meeting. Meaghan notes that will speak to others about availability – difficult to find date that all can attend, so looking for majority of stakeholders in attendance. If date not possible for all, will reschedule.	Meaghan Russell
	MLALC	Rick Griffiths	Meaghan rang in response to fax on Friday – noted that SCT report is engineering assessment only, providing information requested by Umwelt on likely impact to site. Management of site	

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
			to be decided in consultation with Aboriginal stakeholders – engineering options are just for our information – not agreed management outcomes. Rick provides verbal RSVP for meeting on 30 January 2008 – Christine Dever to attend. Faxed RSCP follows in the afternoon.	
30-01-08	ANTC	Margaret Matthews	Aboriginal Stakeholder Meeting held at Austar Coal Mine office in Paxton.	Meaghan Russell, Julian Travaglia
	UHHC	Justin Matthews		
	LHWC	Tom Miller		
	WCH	Gordon Griffiths		
	Y	Nicky Taggart		
	GC	Michele Stair		
	HVCS	John Matthews		
	HVCC	Colleen Stair		
	MLALC	Christine Dever		
	AF	Arthur Fletcher		
	MC	Clifford Matthews		
04-02-08	ANTC	John & Margaret Matthews	All stakeholders provided with (by fax or email or letter) a copy of recommendations presented by Aboriginal stakeholders in attendance at 30 January 2008 meeting. Provided by Umwelt at the request of Aboriginal stakeholders at the meeting. Noted that Austar have committed to providing a response to these Aboriginal stakeholders recommendations, and will contact Aboriginal stakeholders directly. Contact phone number also provided for Austar personnel if Aboriginal stakeholders would like to discuss these recommendations directly.	Meaghan Russell
	GC	Rodney Matthews		
	AF	Arthur Fletcher		
	HVCC	Christine Matthews		
	HVCS	Pansey Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	UHHC	Darrel Matthews		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
	Y	Barry McTaggart		
	TS	Tracey Skene		
	MC	Clifford Matthew		

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
05-02-08	MLALC	Rick Griffiths	Rick rang Umwelt to request a copy of the Yarrawalk letter presented to Austar and DECC at January meeting. Umwelt not provided a copy, Meaghan emailed contact details for Austar onto Rick.	Meaghan Russell
18-03-08	MLALC	Rick Griffiths	Letter to Umwelt in response to letter (copy of Aboriginal stakeholder recommendations). Notes that Christine Dever who attended meeting disputes recommendations – as none were framed for meeting. However, does support recommendations for Aboriginal employment outcomes and that Aboriginal people should be on site whenever people (including archaeologists) visit Aboriginal sites. Letter also states that the grinding groove site does not have to be destroyed but that Austar Coal Mine considers it the easiest and least expensive way. MLALC also states that Umwelt appears to be supporting the destruction of the site *Umwelt note: Christine Dever left Aboriginal stakeholder meeting following lunch, did not participate in presentation of recommendations*	Meaghan Russell
14-04-08	ANTC	John & Margaret Matthews	Austar mails all stakeholders with formal response to Aboriginal stakeholder recommendations presented in 30 January 2008 meeting. Response is as follows: 1. Austar Coal will make a payment of $100,000 as the total cost of the grinding groove offset strategy to be contributed to an Aboriginal heritage or community project as decided by Aboriginal stakeholders. This amount to be paid upon Austar Coal receiving all necessary approvals and agreements to allow the commencement of mining in the area defined in the Stage 3 EA Review. 2. Austar Coal is an equal opportunity employer in accordance with NSW requirements. From time to time Austar Coal has vacancies for skilled and non-skilled employment and would welcome local Wonnarua people making application for those employment positions. 3. Austar Coal will use its best endeavours to have the grinding groove site fenced for its protection subject to approval from the National Parks and Wildlife Service and any restrictions imposed by the subject land being a conservation area. Funds for these works are part of the $100,000 offset strategy and will be available upon Austar Coal receiving all necessary approvals and agreements to allow the commencement of mining in the area defined in the Stage 3 EA Review. 4. Austar Coal is not in a position to permit access to private properties for survey and management of known sites but will use its best endeavours to obtain access to private properties for Aboriginal site management (noting that access cannot be guaranteed). 5. Austar Coal will commit to having Aboriginal stakeholders present for any future works required at registered Aboriginal sites. 6. Austar Coal will continue to pay half-day payment rates for attendance of up to 4 hours and full-day payment rates for attendance in excess of 4 hours for survey and meetings as	*No Umwelt involvement*
	GC	Rodney Matthews		
	AF	Arthur Fletcher		
	HVCC	Christine Matthews		
	HVCS	Pansey Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	UHHC	Darrel Matthews		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
	Y	Barry McTaggart		
	TS	Tracey Skene		
	MC	Clifford Matthew		

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
			required. 7. Austar Coal welcomes the opportunity to directly liaise with Aboriginal stakeholders, and this can be arranged by contacting the Senior Site Executive at Austar Coal who will appoint a suitable Aboriginal Liaison Representative	
24-04-08	WC	Barbara Foot	Barbara calls Umwelt to register an interest in the Austar Coal Mine project. Meaghan Russell provides an overview of the Stage 3 project (underground mining and surface infrastructure) and the results of the Aboriginal heritage assessment to date. As has an interest, will receive a copy of the draft report for review and comment, and will also have meeting at Austar (and probably individually) to discuss Aboriginal stakeholder comments. Barbara notes she would like to visit the grinding groove site if possible. Meaghan notes that can provide opportunity for this at Austar meeting, ie, visit in morning before meeting begins.	Meaghan Russell
13-06-08	ANTC	John & Margaret Matthews	Draft Aboriginal Heritage Assessment report mailed to all registered Aboriginal stakeholders for review and comment. Comments requested by 7 July 2008, allowing 21 days review and time for delivery. Cover letter requests that Aboriginal stakeholders provide comment on: • a statement of the cultural significance of all archaeological sites within the Stage 3 assessment area, and the cultural significance of any other areas/places within the assessment area; • a statement about how the Stage 3 proposal would impact on these culturally significant sites/places within the Stage 3 project area; and • whether the draft management recommendations are suitable; and what, if any, additional recommendations you would consider to be appropriate. Cover letter also notes that a meeting will be held at Austar Coal Mine to discuss Aboriginal stakeholder comments on draft report, details to be provided shortly. Contact details provided for Meaghan Russell if any stakeholders would like to discuss report.	Meaghan Russell / Jan Wilson
	AF	Arthur Fletcher		
	GC	Rodney Matthews		
	HVCC	Christine Matthews		
	HVCS	Pansey Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	MC	Clifford Matthew		
	TS	Tracey Skene		
	UHHC	Darrel Matthews		
	WC	Barbara Foot		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
		Barry McTaggart		

Appendix 1 – Consultation Log

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
27-06-08	ANTC	John & Margaret Matthews	Invitation faxes and letters provided to all registered Aboriginal stakeholders with details of Aboriginal stakeholder meeting to be held on Tuesday 8 July 2008 to discuss Aboriginal stakeholder comments on draft Aboriginal Heritage Assessment report. Meeting will commence at 11am, with representatives of DECC also invited to attend. RSVP attached, responses requested by cob 4 July 2008. Noted that Austar Coal Mine will pay for Aboriginal stakeholder meeting attendance - $300 per registrant including travel.	Meaghan Russell
	AF	Arthur Fletcher		
	GC	Rodney Matthews		
	HVCC	Christine Matthews		
	HVCS	Pansey & Luke Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	MC	Clifford Matthew		
	TS	Tracey Skene		
	UHHC	Darrel Matthews		
	WC	Barbara Foot		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Scott Franks		
		Barry McTaggart		
	DECC	Gary Davey	Details of Aboriginal stakeholder meeting mailed and faxed to Gary Davey, with invitation for DECC representatives to attend.	Meaghan Russell
29-06-08	GC	Michele Stair	RSVP for meeting on 08-07-08 received: Barry or Michele Stair to attend.	Meaghan Russell
01-07-08	HVCS	Luke Hickey	RSVP for meeting on 08-07-08 received: Luke to attend.	Meaghan Russell
02-07-08	MLALC	Rick Griffiths	RSVP for meeting on 08-07-08 received: Christine Dever to attend.	Meaghan Russell
03-07-08	AF	Arthur Fletcher	RSVP for meeting on 08-07-08 received: Adam Fletcher to attend.	Meaghan Russell
04-07-08	WWCCS	Des Hickey	RSVP for meeting on 08-07-08 received: Des to attend.	Meaghan Russell
	LWTC	Barry Anderson	Verbal RSVP for meeting on 08-07-08 received: Barry to attend.	
	TS	Tracey Skene	RSVP for meeting on 08-07-08 received: Mark Skene to attend.	

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
	ANTC	John & Margaret Matthews	All stakeholders faxed with a reminder that the Aboriginal stakeholder review period for the draft Stage 3 report ends on 7 July 2008. To ensure the report includes valuable information on cultural values and appropriate management, requested that Aboriginal stakeholders comment on the cultural significance of recorded sites/larger area, impact to cultural values resulting from Stage 3 and whether the management measures are appropriate. Noted that the draft will be finalised following 8 July 2008 meeting, so provision of comment by this time is critical. Umwelt contact details provided for discussion/return of comment. RSVP for meeting attendance attached for those who had not yet responded.	Meaghan Russell
	AF	Arthur Fletcher		
	GC	Rodney Matthews		
	HVCC	Christine Matthews		
	HVCS	Pansey & Luke Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	MC	Clifford Matthew		
	TS	Tracey Skene		
	UHHC	Darrel Matthews		
	WC	Barbara Foot		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Barry McTaggart		
07-07-08	WCH	Gordon Griffiths	Verbal RSVP for meeting on 08-07-08 received: Joseph Gordon to attend.	Meaghan Russell
	MC	Clifford Matthews	RSVP for meeting on 08-07-08 received: Clifford to attend.	
	TS	Tracey Skene	Tracey called Meaghan to discuss comment on draft report – may not be submitted by 5pm, but will be handed over during meeting. Meaghan notes this is no problem – and any comment on the project is greatly appreciated.	
	ANTC	Margaret Matthews	Meaghan calls to discuss meeting attendance as no RSVP received. Margaret states that RSVP was already faxed to office – has a family member attending. Meaghan notes that it was not received, but has listed ANTC as attending meeting.	
	UHHC	Darrell Matthews	Meaghan calls to discuss meeting attendance as no RSVP received. No answer, unable to leave message.	
	HVCC	Christine Matthews	Meaghan calls to discuss meeting attendance as no RSVP received. No answer, unable to leave message.	
	WC	Barbara Foot	Meaghan calls to discuss meeting attendance as no RSVP received. Barb has not been well and will not be attending meeting, and does not have anyone to send. Does not know whether	

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
			will be able to provide comment on the report. Meaghan left contact details, so if would like to discuss the project at another time, can call the Umwelt office.	
08-07-08	AF	Adam and Troy Fletcher	Aboriginal Stakeholder Meeting held at Austar Coal Mine office in Paxton.	Umwelt: Meaghan Russell, Julian Travaglia, Fran Davies Austar: Sarah Harvey, Frank Fulham
	ANTC	Michael Matthews		
	GC	Barry Stair		
	HVCC	Colleen Stair		
	LWTC	Barry Anderson		
	MC	Clifford Matthews		
	MLALC	Christine Dever		
	TS	Marie Waugh		
	UHHC	Tony Matthews		
	WCH	Joey Griffiths		
09-08-08	AF	Arthur Fletcher	Written comment on Stage 3 project and draft report received.	Jan Wilson
	ANTC	Margaret Matthews	Meaghan rang with reminder for comments on Stage 3 project and draft report. Meaghan advised that report will be finalised in the next few days – is critical that comments be provided. Margaret states that did not receive report, moved house a few weeks ago. Meaghan said report was mailed 3.5 weeks ago, so should have received it just before moving house – also the report was not returned to Umwelt office. Margaret states that may have report, cannot remember. Meaghan notes that reports also provided to Rodney, Darrel and Christine Matthews – should be able to look at their copies if cannot find hers. Margaret says is very busy, is not sure whether she can provide comment – is doing fieldwork this week. Meaghan states that comment could be put together on weekend and faxed to office. Meaghan also summarises results of Tuesday's meeting, as Margaret states that Michael has told her nothing about the meeting. New content discussed – some stakeholders did not want grinding groove site fenced, and some stakeholders suggested that Austar create keeping place (in surface infrastructure site) rather than leave artefacts at grinding groove site. Margaret states that Austar have the fence the grinding groove – it was agreed on in last meeting. Meaghan notes that it was discussed at last meeting, but that as it is NPWS land, NPWS have to approve fencing not Austar – although money for fencing can come from the offset strategy if is Aboriginal stakeholder agreement.	Meaghan Russell
	GC	Rodney Matthews	Meaghan rang with reminder for comments on Stage 3 project and draft report. No answer on home phone and mobile number disconnected.	Meaghan Russell

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
	HVCS	Luke Hickey	Meaghan rang with reminder for comments on Stage 3 project and draft report. Meaghan advised that report will be finalised in the next few days – is critical that comments be provided. Luke will provide comment tomorrow, is out on site at the moment. Meaghan and Luke also discussed Tuesday's meeting as Luke unable to attend (on fieldwork) – key issues grinding groove site to be fenced or not, and whether keeping place should be fenced site or shed at Austar office on Quorrobolong Rd.	Meaghan Russell
	LHWC	Lea-Ann Ball	Meaghan rang with reminder for comments on Stage 3 project and draft report. Message left on home phone.	Meaghan Russell
	UHHC	Darrel Matthews	Meaghan rang with reminder for comments on Stage 3 project and draft report. No answer, unable to leave a message.	Meaghan Russell
	WCH	Gordon Griffiths	Meaghan rang with reminder for comments on Stage 3 project and draft report. Meaghan advised that report will be finalised in the next few days – is critical that comments be provided. Gordon advises that will put comment together on weekend – will be faxed to office by Monday. Meaghan and Gordon discuss results of Tuesday's meeting – key issues fencing of grinding groove and keeping place. Gordon states artefacts should not be kept in office area, should be kept at Mindaribba LALC office or returned to site/s (ie, grinding groove site). Fencing of grinding groove site discussed, Gordon states site should not be fenced. Gordon also requests that Meaghan provide his contact details to Austar personnel, and request that they call Gordon to discuss the project.	Meaghan Russell
	WWCCS	Des Hickey	Meaghan rang with reminder for comments on Stage 3 project and draft report. Meaghan advised that report will be finalised in the next few days – is critical that comments be provided. Des will prepare comment on weekend (Sunday) and fax to office. Meaghan and Des discussed Tuesday's meeting as Des unable to attend – key issues fencing of grinding groove site and keeping place. Des also comments on how grinding groove offset fund will be managed. Meaghan notes that Austar very clear on this – Aboriginal stakeholders only decide on how money is best spent (they know the needs of their communities), need to come to some form of group agreement which Austar will then fund. Austar will play no role in decision making process. Des comments that Austar should fund a meeting for Aboriginal stakeholders in the coming months – need to come together as group to discuss. Meaghan notes will pass this onto Austar, agrees that such a meeting is a good strategy for putting all ideas on table and discussing best options.	Meaghan Russell
10-07-08	MC	Clifford Matthews	Written comment on Stage 3 project and draft report received.	Meaghan Russell
16-07	WWCCS	Des Hickey	Des leaves message for Meaghan Russell (on fieldwork, out of mobile range) that has misplaced the draft report and would like a summary faxed through so can provide comment.	Nicola Roche

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
22-07-08	ANTC	John & Margaret Matthews	Fax to all stakeholders identifying that draft report to be finalised this week, and that any comments received by 5pm Wednesday 22 July 2008 will be included in the final report. Any comments received past this time will be forwarded to Austar. To ensure that report includes necessary information on cultural value of the Stage 3 area and its appropriate management, requested that Aboriginal stakeholders comment on the cultural significance of individual archaeological sites and larger Stage 3 area, the impact to cultural values as a result of the Stage 3 project, and whether the management recommendations presented in the draft report are suitable. Contact details for written comment provided, and phone number listed if stakeholders would like to discuss project/draft report before providing comment. Executive summary and management section attached for WWCCS as requested.	Meaghan Russell
	GC	Rodney Matthews		
	HVCC	Christine Matthews		
	HVCS	Pansey & Luke Hickey		
	LHWC	Lee-Ann Miller		
	LWTC	Barry Anderson		
	MLALC	Rick Griffiths		
	TS	Tracey Skene		
	UHHC	Darrel Matthews		
	WC	Barbara Foot		
	WWCCS	Des Hickey		
	WCH	Gordon Griffiths		
	Y	Barry McTaggart		
	TS	Tracey Skene	Tracey emailed Meaghan to note that can provide comment, had not done so as thought had missed the deadline. Meaghan noted that comments needed by 5pm to be included in final report, but can still be sent through after this – will be provided to Austar and forwarded to DECC when considering Part 3A submission.	Meaghan Russell
	ANTC	John & Margaret Matthews	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. Margaret has new fax number – will be working from tomorrow afternoon. Meaghan advised that draft report being finalised this week, and any comments provided by 5pm tomorrow will be included in final report. After that, comments can be faxed through and will be forwarded to Austar. Margaret states that she has been very busy, and probably will not provide a comment on the draft report. Meaghan encouraged Margaret to provide comment as it crucial that Aboriginal stakeholder views are considered when Part 3A submission is being considered by government.	Meaghan Russell
	GC	Rodney Matthews	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. No answer, home phone. Mobile rang out.	Meaghan Russell
	HVCC	Christine Matthews	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. Mobile disconnected. No answer on home phone.	Meaghan Russell
	HVCS	Luke Hickey	Meaghan rang to provide reminder for comment on draft report, following fax being sent out.	Meaghan

Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
			Meaghan advised that draft report being finalised this week, and any comments provided by 5pm tomorrow will be included in final report. After that, comments can be faxed through and will be forwarded to Austar. Luke advised that will provide comment by tomorrow.	Russell
	LHWC	Lee-Ann Miller	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. Meaghan advised that draft report being finalised this week, and any comments provided by 5pm tomorrow will be included in final report. After that, comments can be faxed through and will be forwarded to Austar. Lea-Ann advises that will be in the office tomorrow, will email something through then.	Meaghan Russell
	LWTC	Barry Anderson	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. Meaghan advised that draft report being finalised this week, and any comments provided by 5pm tomorrow will be included in final report. After that, comments can be faxed through and will be forwarded to Austar. Barry stated that had started to prepare comments last week, but thought had missed deadline – but can complete and fax through comments by tomorrow. Meaghan noted that comments are always appreciated, even if reports are finalised – at least they can be forwarded onto DECC/client for consideration.	Meaghan Russell
	MC	Clifford Matthews	Meaghan rang to discuss MC comment on Stage 3 project and draft report. No answer on home phone, left detailed message on mobile thanking for provision of comment, but would also like to discuss if Cliff has comments on other management strategies as only commented on one issue. Number left with request to call Umwelt.	Meaghan Russell
	MLALC	Rick Griffiths	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. Rick unable to come to phone. Meaghan emails reminder through to MLALC office, noting draft report being finalised this week, and any comments provided by 5pm tomorrow will be included in final report. After that, comments can be faxed through and will be forwarded to Austar.	Meaghan Russell
	UHHC	Darrel Matthews	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. No answer on home phone, mobile rang out.	Meaghan Russell
	WC	Barbara Foot	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. No answer on home phone.	Meaghan Russell
	WWCCS	Des Hickey	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. Left detailed message on mobile advising that draft report being finalised this week, and any comments provided by 5pm tomorrow will be included in final report. After that, comments can be faxed through and will be forwarded to Austar.	Meaghan Russell
	WCH	Gordon Griffiths	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. Meaghan advised that draft report being finalised this week, and any comments provided by 5pm tomorrow will be included in final report. After that, comments can be faxed through and	Meaghan Russell

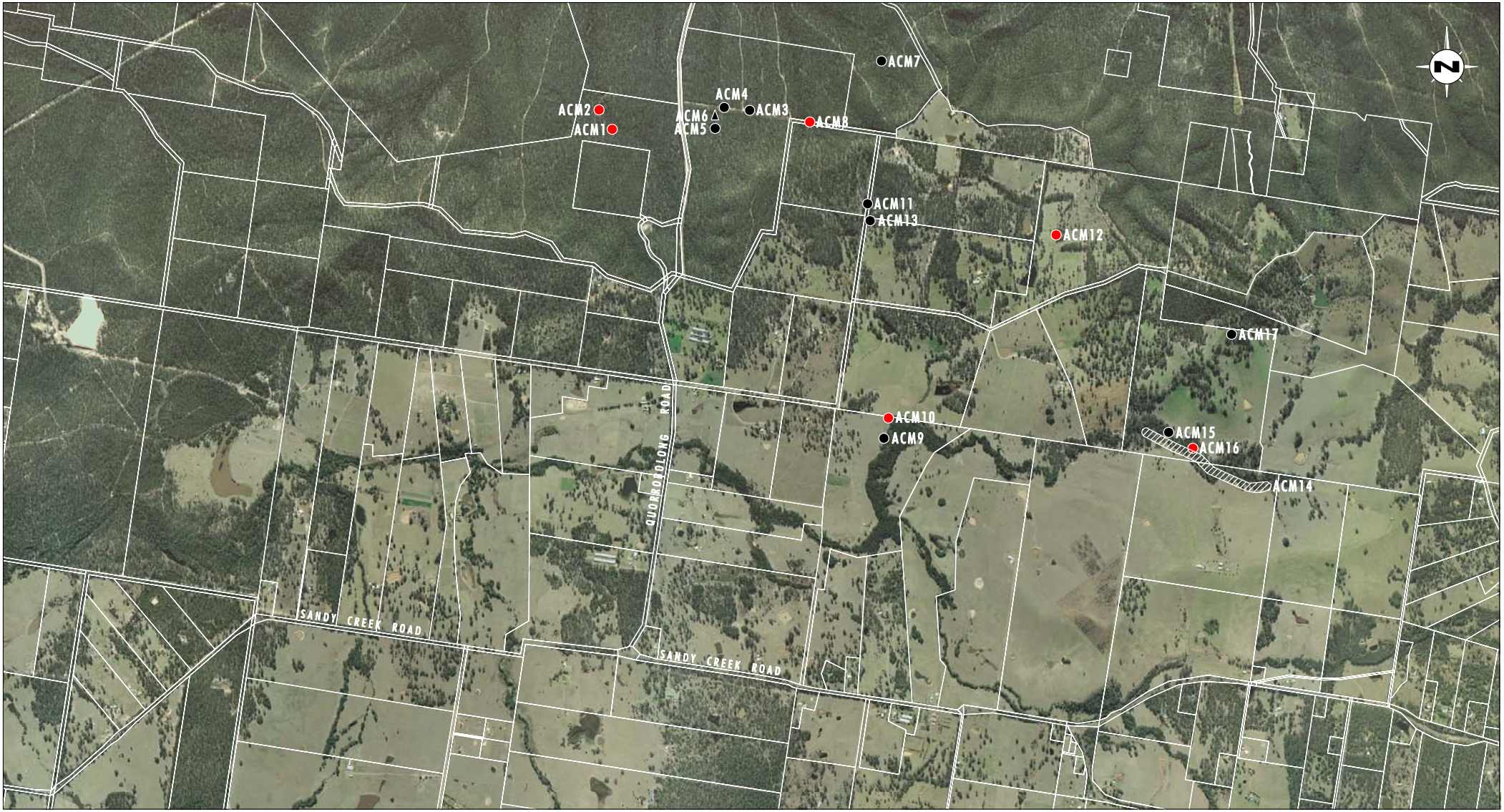
Date	Stakeholder	Contact	Summary of Consultation	Umwelt Contact
			will be forwarded to Austar. Gordon noted that will try to send something through to the office.	
	Y	Barry McTaggart	Meaghan rang to provide reminder for comment on draft report, following fax being sent out. Meaghan advised that draft report being finalised this week, and any comments provided by 5pm tomorrow will be included in final report. After that, comments can be faxed through and will be forwarded to Austar. Barry noted that has been very busy, will not have time to make written comment. Discussed the key management recommendations and Barry identified that he supported them. Barry requested that Meaghan fax a short summary of recommendations to office (leaving new fax number), which he could sign in agreement and fax back to Umwelt. Meaghan noted that independent comment is always preferable, but will fax through a summary as requested.	Meaghan Russell
22-07-08	LWTC	Barry Anderson	Written comment on Stage 3 project and draft report received.	Meaghan Russell
	WWCCS	Desk Hickey	Written comment on Stage 3 project and draft report received.	Meaghan Russell
23-07-08	GC	Rodney Matthews	Written comment on Stage 3 project and draft report received.	Meaghan Russell
	HVCS	Luke Hickey	Written comment on Stage 3 project and draft report received.	Jan Wilson

APPENDIX 2

AHIMS Site Cards

The attached map (Aboriginal Archaeological Site Locations: Austar Coal Mine (Stage 3)) shows site locations relevant to each of the following site cards in this appendix.

Umwelt
Environmental Consultants



Source: Cadastre: LPI NSW, Aerial Photography: AAM Hatch 2006

0 0.5 1 1.5km
1:32 000

Legend

- Artefact Scatter
- Isolated Find
- Grinding Groove & Isolated Find

Aboriginal Archaeological Site Locations:
Austar Coal Mine (Stage 3)

File Name (A4): R13_V1/2274_589.dgn

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM1	**NPWS Site Number**	
Owner/manager	NSW National Parks and Wildlife Service		
Owneraddress	PO Box A290 South Sydney NSW 1232		

LOCATION					
Location	Werakata State Conservation Area				
How to get to the site	Drive north along Quorrobolong Road (from the Quorrobolong Road, Sandy Creek Road intersection) for approximately 2.7km then turn left after rounding a sharp bend onto a dirt access track. Follow the 2nd order stream (tributary of Black Creek) closest to Quorrobolong Road north of the access track. Follow the stream to the north-east for approximately 700 metres. The site is located on a dirt track on the west bank of the stream, less than 15m from the stream channel.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	346735	**AMG Northing**	6359059
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.				**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Artefact Scatter	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM1 is located to the west of Quorrobolong Road in the Werakata State Conservation Area, on the west bank of Black Creek. The site consists of one silcrete broken core and two silcrete broken flakes, separated by approximately 15 metres. All artefacts are located on a vehicle access track on the west bank of the creek. The site boundary is defined by limits of an exposure along the vehicle access track, which measures approximately 16 metres by 3 metres. The track has been graded and is heavily eroded, and tyre marks suggest that the track continues to be used by recreational motorbike riders. (refer to Attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Stream Bank	**Aspect**	northern	**Slope**	Less than 2°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	State conservation area.		
Distance from drinking water	Less than 15 metres	**Source**	Black Creek		
Resource zone (eg. estuarine, river, forest)	Freshwater creek	**Vegetation**	Ironbark, spotted gum, native and introduced grasses		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, freshwater fish and shellfish.		
Other exploitable resources (eg. ochre)	Sandstone outcrops, variety of economic, food and medicinal plants/trees				
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	Poor	Site affected by recreational motorbike usage, fire trails, disused rail line (coal), erosion	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Hunter Valley Cultural Surveying - Luke Hickey - 297 Pioneer Road, Singleton, NSW 2330 Mindaribba Local Aboriginal Land Council – Stephen Talbot Lot 475 Chelmsford Drive, Metford, NSW 2323 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street, Singleton, NSW 2330 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Hunter Valley Cultural Consultants – Colleen Stair 40 Humphries Street, Muswellbrook, NSW 2333 Giwiirr Consultants – Barry Stair 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Four
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	19 September 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
Broken core (silcrete) at ACM1

PLATE 2
Broken flake (silcrete) at ACM1

PLATE 3
View south-east across site ACM1

PLATE 4
Broken flake (silcrete) at ACM1

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM2	**NPWS Site Number**	
Owner/manager	NSW National Parks and Wildlife Service		
Owneraddress	PO Box A290 South Sydney NSW 1232		

LOCATION					
Location	Werakata State Conservation Area				
How to get to the site	Drive north along Quorrobolong Road, Quorrobolong (from the Quorrobolong Road, Sandy Creek Road intersection) for approximately 2.7km then turn left after rounding a sharp bend onto a dirt access track. Follow the 2nd order stream (tributary of Black Creek) closest to Quorrobolong Road north of the access track. Follow the stream to the north-east for approximately 840 metres. The site is located on a dirt track on the west bank of the stream, less than 10m from the stream channel.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	346669	**AMG Northing**	6359152
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.				**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Artefact Scatter	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM2 is located to the west of Quorrobolong Road in the Werakata State Conservation Area, on the west bank of Black Creek. The site consists of one mudstone flake and one mudstone broken flake, both of which were identified on a vehicle access track on the west bank of the stream. The site is less than 10 metres south-east of Black Creek, and the artefacts are approximately 15 metres apart. The site boundary is defined by limits of an exposure on the vehicle access track, which measures approximately 20 metres by two metres. The vehicle access track has been graded and is heavily eroded, with tyre marks suggesting the track is subject to ongoing use by recreational motorbike riders. (refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT						
Land form	Stream Bank		**Aspect**	northern	**Slope**	Less than 2°
Mark position of the site						
Local rock type	Sandstone		**Land use/effect**	State conservation area.		
Distance from drinking water	Less than 10 metres		**Source**	Black Creek		
Resource zone (eg. estuarine, river, forest)	Freshwater creek		**Vegetation**	Ironbark, spotted gum, native and introduced grasses		
Edible plants			**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, freshwater fish and shellfish.		
Other exploitable resources (eg. ochre)	Sandstone outcrops, variety of economic, food and medicinal plants/trees					
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact scatter, isolated find, Grinding Groove	

SITE MANAGEMENT			
Site condition	Poor	Site affected by recreational motorbike usage, fire trails, disused rail line (coal) and erosion.	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Hunter Valley Cultural Surveying - Luke Hickey 297 Pioneer Road, Singleton, NSW 2330 Mindaribba Local Aboriginal Land Council – Stephen Talbot Lot 475 Chelmsford Drive, Metford, NSW 2323 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street, Singleton, NSW 2330 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Hunter Valley Cultural Consultants – Colleen Stair 40 Humphries Street, Muswellbrook, NSW 2333 Giwiirr Consultants – Barry Stair 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Three
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	19 September 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
View south-east across site ACM2

PLATE 2
Flake (mudstone) at ACM2

PLATE 3
Flake (mudstone) at ACM2

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM3	**NPWS Site Number**	
Owner/manager	NSW National Parks and Wildlife Service		
Owneraddress	PO Box A290 South Sydney NSW 1232		

LOCATION					
Location	Werakata State Conservation Area				
How to get to the site	Drive north along Quorrobolong Road, Quorrobolong (from the Quorrobolong Road, Sandy Creek Road intersection) for approximately 3.5km then turn right into a transmission line/access track. Continue for approximately 400 metres. The site is located on the northern verge of the transmission line/access track.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	347548	**AMG Northing**	6359171
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.				**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated Find	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM3 is located east of Quorrobolong Road in the Werakata State Conservation Area, within a power line easement on a mid hillslope that is also utilised as a vehicle track. The site consists of one mudstone broken flake. The site is situated between two first order streams and is less than 25 metres from a watercourse, with Black Creek approximately 900 metres to the west. The site boundary is defined by exposure limits within the power easement, which is approximately five metres by three metres. The easement exhibits varying levels of erosion from minor rill erosion to severe gully erosion to the east. (refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Mid-hillslope	**Aspect**	eastern	**Slope**	Less than 3°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	State conservation area.		
Distance from drinking water	Less than 25 metres	**Source**	4th Order stream Black Creek is approximately 900 metres to the west.		
Resource zone (eg. estuarine, river, forest)	Forest	**Vegetation**	Eucalypt, spotted gum, grass trees, native and introduced grasses		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals.		
Other exploitable resources (eg. ochre)	Sandstone outcrops, variety of economic, medicinal and food plants/trees				
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact scatter, isolated find, grinding groove with isolated find.

SITE MANAGEMENT			
Site condition	Poor	Site affected by transmission line, vehicle access track, fire break and erosion	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Hunter Valley Cultural Consultants – Colleen Stair 40 Humphries Street, Muswellbrook, NSW 2333 Upper Hunter Heritage Consultants – Justin Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Giwiirr Consultants – John Matthews 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	20 September 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
Broken flake (mudtone) at ACM3

PLATE 2
View north-north-east across site ACM3

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM4	**NPWS Site Number**	
Owner/manager	NSW National Parks and Wildlife Service		
Owneraddress	PO Box A290 South Sydney NSW 1232		

LOCATION					
Location	Werakata State Conservation Area				
How to get to the site	Drive north along Quorrobolong Road, Quorrobolong (from the Quorrobolong Road, Sandy Creek Road intersection) for approximately 3.5km then turn right into a transmission line/access track. Continue for approximately 260 metres. The site is located on the southern verge of the transmission line/access track.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	347398	**AMG Northing**	6359188
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.				**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated Find	**Site type code (NPWS use only)**	

Description of site and contents

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

ACM4 is located east of Quorrobolong Road in the Werakata State Conservation Area, within a power line easement on a lower hillslope that is also utilised as a vehicle track. The site consists of one silcrete broken flake, which is situated between two first order streams and is no more than 100 metres from a watercourse. Black Creek is approximately 800 metres to the west.

The site boundary is defined by the limits of an exposure along the power easement, measuring approximately five metres by three metres. The easement exhibits varying levels of erosion from minor rill erosion to severe gully erosion to the east.

(refer to Attached photos)

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

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Lower-hillslope	**Aspect**	western	**Slope**	Less than 5°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	State conservation area.		
Distance from drinking water	Less than 10 metres	**Source**	4th Order stream Black Creek is approximately 800 metres to the west.		
Resource zone (eg. estuarine, river, forest)	Forest	**Vegetation**	Eucalypt, spotted gum, grass trees, native and introduced grasses		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals.		
Other exploitable resources (eg. ochre)	Sandstone outcrops, variety of economic, medicinal and food plants/trees				
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact scatter, isolated find, grinding groove with isolated find.

SITE MANAGEMENT			
Site condition	Poor	Site affected by transmission line, vehicle access track, fire break and erosion	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Hunter Valley Cultural Consultants – Colleen Stair 40 Humphries Street, Muswellbrook, NSW 2333 Upper Hunter Heritage Consultants – Justin Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Giwiirr Consultants – John Matthews 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	20 September 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
Broken flake (silcrete) at ACM4

PLATE 2
View east-north-east across site ACM4

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM5	**NPWS Site Number**	
Owner/manager	NSW National Parks and Wildlife Service		
Owneraddress	PO Box A290 South Sydney NSW 1232		

LOCATION					
Location	Werakata State Conservation Area				
How to get to the site	Drive north along Quorrobolong Road, Quorrobolong (from the Quorrobolong Road, Sandy Creek Road intersection) for approximately 3.5km then turn right into a transmission line/access track. Continue for approximately 200 metres. Walk south from this point along a 4th order stream for approximately 120 metres.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	347344	**AMG Northing**	6359064
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.				**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated Find	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM5 is located east of Quorrobolong Road in the Werakata State Conservation Area. The site consists of one silcrete broken flake situated within a dry stream bed of a first order stream. Black Creek is approximately 650 metres to the west. The site boundary is defined by the limits of an erosion scour within the stream bed, which is approximately two metres by two metres. The stream bed is subject to regular alluvial movement, with water action resulting in rill erosion and depositing sediments downstream. It is considered likely that the stone artefact has been deposited within the stream in the recent past, and that the artefact will be subject to further post-depositional movement. (refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Stream Bank	**Aspect**	northern	**Slope**	0°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	State conservation area		
Distance from drinking water	In dry creekbed	**Source**	4th Order stream Black Creek is approximately 650 metres to the west.		
Resource zone (eg. estuarine, river, forest)	Forest	**Vegetation**	Eucalypt, spotted gum, paperbark, ironbark, grass trees, native and introduced grasses		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals.		
Other exploitable resources (eg. ochre)	Sandstone outcrops, variety of economic, medicinal and food plants/trees				
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact scatter, isolated find, grinding groove with isolated find.

SITE MANAGEMENT			
Site condition	Poor	Alluvial erosion	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Hunter Valley Cultural Consultants – Colleen Stair 40 Humphries Street, Muswellbrook, NSW 2333 Upper Hunter Heritage Consultants – Justin Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Giwiirr Consultants – John Matthews 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	One
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	20 September 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
Broken flake (silcrete) at ACM5

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM6	**NPWS Site Number**	
Owner/manager	NSW National Parks and Wildlife Service		
Owneraddress	PO Box A290 South Sydney NSW 1232		

LOCATION					
Location	Werakata State Conservation Area				
How to get to the site	Drive north along Quorrobolong Road, Quorrobolong (from the Quorrobolong Road, Sandy Creek Road intersection) for approximately 3.5km then turn right into a transmission line/access track. Continue for approximately 200 metres. Walk south from this point along a 4th order stream for approximately 60 metres.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	347343	**AMG Northing**	6359131
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.				**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Grinding Groove with Isolated Find	**Site type code (NPWS use only)**	

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Description of site and contents

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

ACM6 is located east of Quorrobolong Road in the Werakata State Conservation Area, within a first order stream alignment. The site maintains a northern aspect and is surrounded by heavy vegetation. Black Creek is approximately 650 metres to the west. The site has two components: a grinding groove and an isolated find.

The grinding groove is positioned on a sandstone conglomerate platform within the stream bed, measuring approximately 15 metres by six metres. The grinding groove is 320 millimetres by 35 millimetres in size, and is 8 millimetres deep. The platform also exhibits three circular depressions, which measure (approximately) 20 centimetres in diameter by 7 centimetres deep, 43 centimetres in diameter by 16 centimetres deep and 47 centimetres in diameter by 14 centimetres deep. At the time of survey, it could not be determined whether the depressions had been enlarged or utilised, as each was filled with water and leaf litter. No lids were identified at the site or in the surrounding landscape that could have been used to cover and retain water in each depression.

From the northern edge of the platform the stream bed level drops vertically approximately two metres and continues in a northerly direction, providing a northerly outlook downstream from the platform. The east and west banks of the stream also drop sharply approximately one to two metres to the stream bed as the stream continues north from the platform. The stream channel south of the platform is no more than two metres wide, and this expands up to three metres to the north of the platform. The hillslopes surrounding the stream are up to 10 per cent in gradient.

The sandstone conglomerate platform has been previously impacted by quarrying, with evidence of a drill mark and blasting on the northern ledge of the site. SCT (refer to Umwelt: 2008) identify that the northern end of the rockbar may have originally been an overhang rock shelf approximately 60 centimetres thick and up to four metres longer than present. Further inspection indicates that the overhang was more likely to be approximately 1 metre in length. A lense of mudstone 20 centimetres thick is found immediately beneath the sandstone, and has preferentially eroded to form a slight overhang (which was much larger before blasting). Another sandstone horizon underlies the mudstone. SCT (refer to Umwelt: 2008) estimate that the quarrying took place at least 30 years ago based on sedimentation of the plunge pool and vegetation regrowth.

The remaining sandtone platform is of moderate integrity being subject to continued erosion from alluvial action, and having a low-angle joint crossing the upper sandstone layer in the southern portion of the rockbar. This joint probably extends upstream to daylight over the central and southern parts of the rockbar, although no surface cracks or fractures are currently visible.

The isolated find is located approximately 10 metres to the north of the grinding groove site also positioned within the stream bed. The find consists of one mudstone broken flake within an area of erosion, approximately two metres by three metres in size. It is likely that the artefact was deposited in this location by alluvial action, and future post-depositional movement is likely with continued water flow in the stream.

(refer to attached photos)

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

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Creek Bed	**Aspect**	northern	**Slope**	Less than 10°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	State Conservation area		
Distance from drinking water	0 metres	**Source**	4th Order stream Black Creek is approximately 650 metres to the west.		
Resource zone (eg. estuarine, river, forest)	Forest	**Vegetation**	Eucalypt, spotted gum, paperbark, ironbark, grass trees, native and introduced grasses		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals.		
Other exploitable resources (eg. ochre)	Sandstone outcrops, variety of economic, medicinal and food plants/trees				
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact scatter, isolated find.

SITE MANAGEMENT			
Site condition	Poor	Area impacted by alluvial movement, past extraction of sandstone and continual erosion.	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Hunter Valley Cultural Consultants – Colleen Stair 40 Humphries Street, Muswellbrook, NSW 2333 Upper Hunter Heritage Consultants – Justin Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Giwiirr Consultants – John Matthews 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified the high importance of grinding grooves – and therefore this site – to the Aboriginal community.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Four
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	20 September 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
Grinding Groove at site ACM6

PLATE 2
Sandstone platform (grinding groove) at site ACM6

PLATE 3
Drill mark on northern edge of ACM6 rockbar

PLATE 4
Broken flake (mudstone) at ACM6

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM7	**NPWS Site Number**	
Owner/manager	NSW National Parks and Wildlife Service		
Owneraddress	PO Box A290 South Sydney NSW 1232		

LOCATION					
Location	Werakata State Conservation Area				
How to get to the site	Turn off Greta Street, Kitchener, south onto the Kitchener Trail and continue for approximately 825 metres. Turn left onto Bee Box Road and follow for approximately 200 metres. The site is located on the exposed access track.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	348328	**AMG Northing**	6359463
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.				**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated Find	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM7 is located east of Quorrobolong Road in the Werakata State Conservation Area, on a vehicle access track approximately 17 metres from a second order stream. The site consists of one mudstone flake, within an exposure approximately three metres by three metres in size. Black Creek is approximately 1.5 kilometres to the west. The site boundary is defined by the limits of erosion at this location, and it is considered likely that the artefact was deposited in this location through sheetwash erosion, and it is not *in situ*. (refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Lower-hillslope	**Aspect**	north-east	**Slope**	Less than 5°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	State conservation area		
Distance from drinking water	Less than 17 metres	**Source**	2nd Order stream Black Creek is approximately 1.5km to the west.		
Resource zone (eg. estuarine, river, forest)	Forest	**Vegetation**	Eucalypt, spotted gum, paperbark, ironbark, grass trees, native and introduced grasses		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals.		
Other exploitable resources (eg. ochre)	Sandstone outcrops, variety of economic, medicinal and food plants/trees				
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	Poor	Site affected by vehicle access tracks and alluvial erosion	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Gordon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Hunter Valley Cultural Consultants – Colleen Stair 40 Humphries Street, Muswellbrook, NSW 2333 Upper Hunter Heritage Consultants – Justin Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews and John Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Giwiirr Consultants – Barry Stair 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	2
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	21 September 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
Flake (mudstone) at ACM7

PLATE 2
View north-east across site ACM7

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM8	**NPWS Site Number**	
Owner/manager	NSW National Parks and Wildlife Service		
Owneraddress	PO Box A290 South Sydney NSW 1232		

LOCATION					
Location	Werakata State Conservation Area				
How to get to the site	Drive north along Quorrobolong Road, Quorrobolong (from the Quorrobolong Road, Sandy Creek Road intersection) for approximately 3.5km then turn right into a transmission line/access track. Continue for approximately 760 metres. The site is located on the exposed access track.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	347904	**AMG Northing**	6359102
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.				**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Artefact scatter	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM8 is located east of Quorrobolong Road in the Werakata State Conservation Area, along a vehicle access track extending across a lower hillslope. The track is situated less than five metres from a second order stream. Black Creek is approximately one kilometre to the west. The site consists of three mudstone flakes and one mudstone broken flake. The site boundary is defined by the extent of surface artefact distribution along the track, which measures approximately 10 metres by six metres. (refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Lower-hillslope	**Aspect**	west	**Slope**	Less than 5°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	State Conservation area		
Distance from drinking water	Less than 5 metres	**Source**	2nd Order stream Black Creek is approximately 1km to the west.		
Resource zone (eg. estuarine, river, forest)	Forest	**Vegetation**	Eucalypt, spotted gum, paperbark, ironbark, grass trees, native and introduced grasses		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals.		
Other exploitable resources (eg. ochre)	Sandstone outcrops, variety of economic, medicinal and food plants/trees				
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	Poor	Site affected by vehicle access track and extensive alluvial erosion	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Gordon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Hunter Valley Cultural Consultants – Colleen Stair 40 Humphries Street, Muswellbrook, NSW 2333 Upper Hunter Heritage Consultants – Justin Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews and John Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Giwiirr Consultants – Barry Stair 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Four
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	21 September 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
View east across site ACM8

PLATE 2
Flake (mudstone) at ACM8

PLATE 3
Flake (mudstone) at ACM8

PLATE 4
Flake (mudstone) at ACM8

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM9	**NPWS Site Number**	
Owner/manager	Messers Pw and Rl O'hearn (Private Property)		
Owneraddress	Lot 12 Cony Creek Lane Qurorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong				
How to get to the site	Turn north onto Quorrobolong Road from the intersection of Sandy Creek Road and Quorrobolong Road, Quorrobolong. Continue north for approximately 1.625km and turn right at Coney Creek Lane for 925 metres (will be a sharp 90° bend). Cross into the paddock to the south of a cattle yard. Follow the fenceline east-south-east for approximately 350 metres and turn to the south after reaching Cony Creek. Walk for approximately 140 metres south and the site is located on the west bank of Cony Creek on an exposure from an anthill.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	348341	**AMG Northing**	6357230
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 705614			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated Find	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM9 is located to the north of Sandy Creek Road, approximately 15 metres to the west of Cony Creek. The site consists of one mudstone flake, located on the northern extent of an ants' nest. The site boundary is defined by the ant nest exposure, which measures approximately two metres by 1.5 metres and is situated toward the base of a lower slope. The landscape flattens out as it continues toward the confluence of Cony Creek and Sandy Creek (approximately 460 metres south of the site). (refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

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Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Lower-hillslope	**Aspect**	east	**Slope**	Less than 1°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	Farming (private property)		
Distance from drinking water	Less than 15 metres	**Source**	Cony Creek		
Resource zone (eg. estuarine, river, forest)	Freshwater creek	**Vegetation**	Casuarina, pasture grasses, box tree		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes, freshwater fish/shellfish species.		
Other exploitable resources (eg. ochre)	Major permanent waterway and confluence area of Cony and Sandy Creek.				
Are there other sites in the locality	yes	**Are they in the Sites Register**	no	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	Poor	The site has been impacted by vegetation clearing, livestock trampling, European farming, bioturbation and erosional processes	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Upper Hunter Heritage Consultants – John Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Giwiirr Consultants – Colleen Stair 8 Fitzgerald Avenue, Muswellbrook, NSW 2333

Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	03 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

Version: June 1998	Data entered by:	Date entered:

PLATE 1
View south across site ACM9

PLATE 2
Flake (mudstone) at ACM9

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM10	**NPWS Site Number**	
Owner/manager	Messers Pw and Rl O'hearn (Private Property)		
Owneraddress	Lot 12 Cony Creek Lane Qurorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong				
How to get to the site	Turn north onto Quorrobolong Road from the intersection of Sandy Creek Road and Quorrobolong Road, Quorrobolong. Continue north for approximately 1.625km and turn right at Coney Creek Lane for 925 metres (will be a sharp 90° bend). Cross into the paddock to the south of a cattle yard. Follow the fenceline east-south-east for 350 metres and the site is located on the west bank of Cony Creek on an exposure from an anthill.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	348368	**AMG Northing**	6357350
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 705614			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Artefact scatter	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM10 is situated west of Cony Creek approximately 10 metres west of the stream bed. The site consists of one mudstone flaked piece and one mudstone flake, identified on an ants' nest. The surrounding landscape is generally cleared farming land. The site boundary is defined by the ants' nest exposure, which measures approximately seven metres by four metres and is situated toward the base of a lower slope. The landscape flattens out as it continues toward the confluence of Cony Creek and Sandy Creek (approximately 600 metres south of the site). The site is also located approximately 140 metres north-north-east of ACM9. (refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Lower-hillslope	**Aspect**	east	**Slope**	Less than 1°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	Farmining (private property)		
Distance from drinking water	Less than 10 metres	**Source**	Cony Creek		
Resource zone (eg. estuarine, river, forest)	Freshwater creek	**Vegetation**	Casuarina, pasture grasses, box tree		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes, freshwater fish/shellfish species.		
Other exploitable resources (eg. ochre)	Major permanent waterway and confluence area of Cony and Sandy Creek.				
Are there other sites in the locality	yes	**Are they in the Sites Register**	no	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	Poor	The site has been impacted by vegetation clearing, livestock trampling, European farming, bioturbation and erosional processes.	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Upper Hunter Heritage Consultants – John Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Giwiirr Consultants – Colleen Stair 8 Fitzgerald Avenue, Muswellbrook, NSW 2333
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	03 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
View north-east across site ACM10

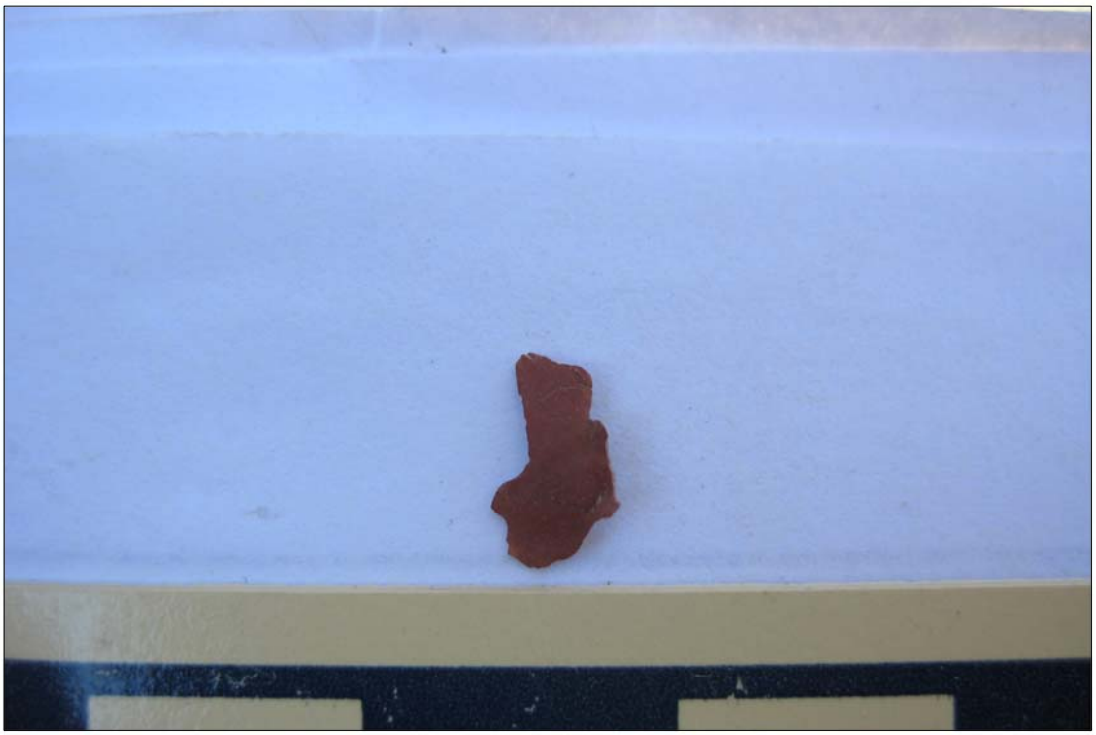

PLATE 2
Flakes piece (mudstone) at ACM10

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM11	**NPWS Site Number**	
Owner/manager	Mr G & Mrs Aj Leigh (Private Property)		
Owneraddress	259 Quorrobolong Road, Quorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong, adjoining the Werakata State Conservation Area				
How to get to the site	Head east along Greta Street, Kitchener and turn right onto Southhams Road. Continue for approximately 1.18km and turn right onto Big Hill Road and drive to end. From property gate head south-west for approximately 175 metres to the start of a 4th order stream. Head south along this stream for approximately 240 metres. The site is located on the west side of the stream.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	348245	**AMG Northing**	6358617
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 996145			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated find	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM11 is located to the east of Quorrobolong Road on private land to the south of the Werakata State Conservation Area. The site consists of one quartzite flake, located on a vehicle track (with 100 per cent visibility) extending across a lower hillslope. The track has not been graded but has become established by regular vehicle movement. The flake is on the northern edge of the track and is seven metres west of a first order stream. (Refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

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Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Lower-hillslope	**Aspect**	south	**Slope**	Less than 1°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	Farming (private property)		
Distance from drinking water	Less than 7 metres from an ephemeral creek	**Source**	Cony creek approx. 1.4km to the south-south-east		
Resource zone (eg. estuarine, river, forest)	Forest	**Vegetation**	Melaleuca, pasture grasses, box tree, stringy bark, spotted gum		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes.		
Other exploitable resources (eg. ochre)					
Are there other sites in the locality	yes	**Are they in the Sites Register**	no	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	Poor	The site has been impacted by vegetation clearing, livestock trampling, vehicle movement and erosional processes.	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Upper Hunter Heritage Consultants – John Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Hunter Valley Cultural Surveying – Luke Hickey 297 Pioneer Road Singleton, NSW 2330

Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	04 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
View across site ACM11

PLATE 2
Flake (quartzite) at ACM11

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM12	**NPWS Site Number**	
Owner/manager	Mrs JD Mears & Mr JW Rayner (Private Property)		
Owneraddress	Joenjie, 223 Coney Creek Lane, Quorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong				
How to get to the site	From Quorrobolong Road, Quorrobolong, turn onto Coney Creek Lane and continue for approx. 2.3km and turn left into the *Joenjie* property. Follow the dirt track east to a large dam and turn north for approximately 375 metres. One of the artefacts is located on a concrete culvert and the second artefact is approximately 18 metres to the north.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	349360	**AMG Northing**	6358433
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 575428			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Artefact scatter	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM12 consists of one chert retouched flake and one silcrete core located on a lower slope, with the site located less than five metres from a watercourse. The site is located on an unsealed, raised vehicle track on private land to the north of Coney Creek Lane. The track has not been graded; rather, it is constructed of fill brought to the site. The chert retouched flake is located on top of the raised track and likely to have been bought in with fill used in track construction. The silcrete core is located approximately 18 metres to the south of the retouched flake on the eastern edge of a concrete culvert associated with the track. The core has either been brought in with fill or has eroded from the adjoining landscape and been deposited on the culvert through alluvial movement. The site boundary is defined by surface artefact distribution along the vehicle track, which is contained to an area 18 metres by three metres. (refer to attached photo) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT						
Land form	Lower-hillslope		**Aspect**	South-west	**Slope**	Less than 3°
Mark position of the site						
Local rock type	Sandstone		**Land use/effect**	Farming (private property)		
Distance from drinking water	Less than 10 metres from an ephemeral creek		**Source**	Cony creek approx. 1.2km to the south-south-east		
Resource zone (eg. estuarine, river, forest)	Rolling hills		**Vegetation**	Ironbarks, pasture grasses, spotted gum		
Edible plants			**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes.		
Other exploitable resources (eg. ochre)						
Are there other sites in the locality	Yes	**Are they in the Sites Register**	No	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove	

SITE MANAGEMENT			
Site condition	Poor	The site has been impacted by vegetation clearing, livestock trampling, track construction, vehicle movement and erosional processes	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Upper Hunter Heritage Consultants – John Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Hunter Valley Cultural Surveying – Luke Hickey 297 Pioneer Road Singleton, NSW 2330

Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	04 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

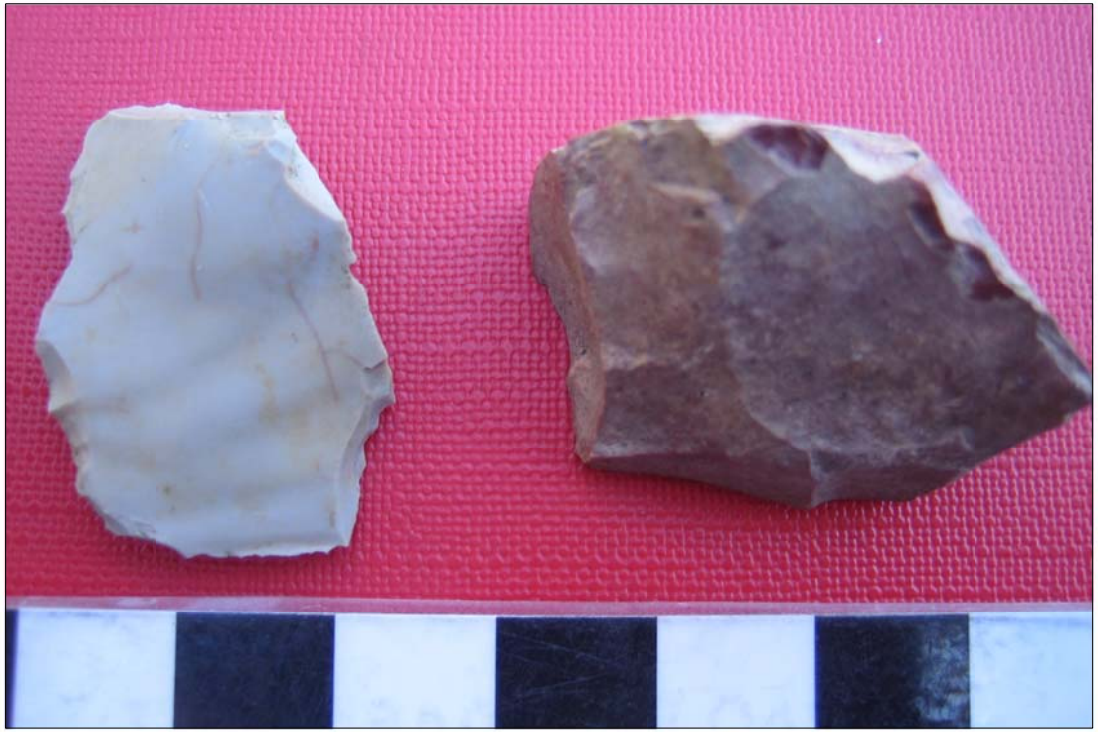

PLATE 1
Retouched flake (chert) and core (silcrete) at ACM12

PLATE 2
View south-south-east across site ACM12

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM13	**NPWS Site Number**	
Owner/manager	Mrs JD Mears & Mr JW Rayner (Private Property)		
Owneraddress	Joenjie, 223 Coney Creek Lane, Quorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong/Kitchener				
How to get to the site	From Quorrobolong Road, Quorrobolong, turn onto Coney Creek Lane and continue for approx. 1.6km (will be at a 90° bend). Go through gate and continue north along a dirt vehicle track for approximately 480 metres. The site is just to the east of the track on an ants nest exposure.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	348260	**AMG Northing**	6358517
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 1093269			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated find	**Site type code (NPWS use only)**	

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

ACM13 is located on private land to the south of Werakata State Conservation Area, and is situated on a mid hillslope. The site consists of one mudstone flake used as a core, recorded within an ants nest exposure approximately three metres by two metres in size.

The site is less than 20 metres from a second order stream, and Black Creek is approximately 1.2 kilometres to the west.The site boundary is defined by the surface artefact location within the ants' nest exposure.

(refer to attached photos)

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

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Mid-hillslope	**Aspect**	west	**Slope**	Less than 5°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	Farming (private property)		
Distance from drinking water	Less than 20 metres from an ephemeral creek	**Source**	Cony creek approx. 1.2km to the south-south-east		
Resource zone (eg. estuarine, river, forest)	Forest	**Vegetation**	Eucalypts, pasture grasses, spotted gum		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes.		
Other exploitable resources (eg. ochre)					
Are there other sites in the locality	yes	**Are they in the Sites Register**	no	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	Poor	The site has been impacted by vegetation clearing, livestock trampling and bioturbation.	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Upper Hunter Heritage Consultants – John Matthews 160 Sydney Street, Muswellbrook, NSW 2333 Aboriginal Native Title Consultants – Margaret Matthews 69 Tobruk Avenue, Muswellbrook, NSW 2333 Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Hunter Valley Cultural Surveying – Luke Hickey 297 Pioneer Road Singleton, NSW 2330

Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	04 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
View south-south-east across site ACM13

PLATE 2
Flake used as core (mudstone) at ACM13

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM14	**NPWS Site Number**	
Owner/manager	Boolaroo Land Co. Pty Ltd (Private Property)		
Owneraddress	894 Sandy Creek Road, Quorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong				
How to get to the site	Turn off Sandy Creek Road, Quorrobolong at 894 Sandy Creek Road. Continue north along the dirt vehicle track over and down the crest (passess adjacent to the private residence) for approximately 1.3km to Cony Creek). The site is located along the south bank. Note: The GPS co-ordinate provided is the eastern extremity of the site.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	350601	**AMG Northing**	6356944
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 950221 and 798955			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Artefact scatter	**Site type code (NPWS use only)**	

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Description of site and contents

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

ACM14 is an artefact scatter extending along the southern bank of Cony Creek approximately 1.8 kilometres to the east of the confluence of Cony and Sandy Creeks. The site consists of 24 artefacts recorded in ten discrete locations along 700 metres of creek bank (refer to Table below). All artefacts are located within ten metres of the creek bank.

Table 7.10 - Discovery 14 Artefact Locations

Location #	Location (MGA)		No. of Artefacts	Artefact Type	Raw Material
	Easting	Northing			
1	350706	6357134	3	Broken Flake	Silcrete
			2	Flake	Mudstone
2	350655	6357124	1	Broken Flake	Mudstone
3	350611	6357127	1	Flaked Piece	Mudstone
4	350613	6357141	2	Flake	Silcrete
5	350387	6357224	1	Core	Silcrete
			1	Broken Flake	Mudstone
			2	Flake	Silcrete
6	350367	6357238	1	Broken Flake	Silcrete
7	350375	6357213	1	Flake	Silcrete
8	350274	6357361	1	Broken Flake	Mudstone
			1	Flake	Silcrete
			1	Flake	Mudstone
9	350160	6357371	1	Flake	Silcrete
			1	Core	Silcrete
10	349999	6357454	4	Broken Flake	Silcrete

The site boundary has been defined by landform (flat), with the southern creek bank of Cony Creek (up to ten metres) included in the ACM14 site area. The adjoining slope leading down to the site is less than five per cent and has a northerly aspect. The site has a moderate level of visibility along its length and rises approximately two to five metres above the bed of Cony Creek.

ACM14 is located in an area of likely Aboriginal occupation. Situated within 10 metres of a freshwater source and accompanying flora and fauna resources, the flat would have also provided a suitable location for camping (dry and elevated). Artefactual material recorded along the length of the site are in seven distinct find locations, with no more than four artefacts recorded in any one location.

(refer to attached photos)

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

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Flat	**Aspect**	North	**Slope**	Less than 1°
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	Farming (private property)		
Distance from drinking water	Less than 10 metres	**Source**	Cony Creek		
Resource zone (eg. estuarine, river, forest)	Freshwater	**Vegetation**	Ironbarks, pasture grasses, eucalypts		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes.		
Other exploitable resources (eg. ochre)					
Are there other sites in the locality	yes	**Are they in the Sites Register**	no	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	Poor to Moderate	Site impacted by vegetation clearing, livestock trampling, vehicle movement and erosional processes	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Hunter Valley Cultural Surveying – Luke Hickey 297 Pioneer Road Singleton, NSW 2330
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that this area would have been an area of high occupation and use, and as such, was culturally significant.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Four
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	05 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
View west across site ACM14 (find # 1 and 2)

PLATE 2
Flake (mudstone) at site ACM14 (find # 1 and 2)

PLATE 3
View west across site ACM14 (find # 7, 8, 9, 10 and 11)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM15	**NPWS Site Number**	
Owner/manager	Boolaroo Land Co. Pty Ltd (Private Property)		
Owneraddress	894 Sandy Creek Road, Quorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong				
How to get to the site	Turn off Sandy Creek Road, Quorrobolong at 894 Sandy Creek Road. Continue north along the dirt vehicle track over and down the crest (passess adjacent to the private residence) for approximately 1.3km to Cony Creek). The site is located on the north bank approximately 160 metres north-west of a vehicle track that crosses Cony Creek.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	350026	**AMG Northing**	6357265
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 798955			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated Find	**Site type code (NPWS use only)**	

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

ACM15 is located on the northern bank of Cony Creek opposite ACM14, and consists of one mudstone broken flake. The site is within five metres of the creek.

The site is defined by surface artefact distribution, with the isolated find found in an exposure approximately four metres by four metres.

(refer to attached photo)

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

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT						
Land form	Flat		**Aspect**	south	**Slope**	Less than 5°
Mark position of the site						
Local rock type	Sandstone		**Land use/effect**	Farming (private property)		
Distance from drinking water	Less than 5 metres		**Source**	Cony creek		
Resource zone (eg. estuarine, river, forest)	Freshwater		**Vegetation**	Ironbarks, pasture grasses, eucalypts		
Edible plants			**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes.		
Other exploitable resources (eg. ochre)						
Are there other sites in the locality	yes	**Are they in the Sites Register**	Yes	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove	

SITE MANAGEMENT			
Site condition	Poor	Site is impacted by vegetation clearing, livestock trampling, vehicle movement and erosional processes	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Hunter Valley Cultural Surveying – Luke Hickey 297 Pioneer Road Singleton, NSW 2330
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that this area would have been an area of high occupation and use, and as such, was culturally significant.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	05 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

Version: June 1998	Data entered by:	Date entered:

PLATE 1
View north-east across site ACM15

PLATE 2
Broken flake (mudstone) at ACM15

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM16	**NPWS Site Number**	
Owner/manager	Boolaroo Land Co. Pty Ltd (Private Property)		
Owneraddress	894 Sandy Creek Road, Quorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong				
How to get to the site	Turn off Sandy Creek Road, Quorrobolong at 894 Sandy Creek Road. Continue north along the dirt vehicle track over and down the crest (passess adjacent to the private residence) for approximately 1.3km to Cony Creek). The site is located on the north bank at the point where a vehicle track crosses Cony Creek.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	350203	**AMG Northing**	6357112
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 798955			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Artefact scatter	**Site type code (NPWS use only)**	

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

ACM16 is located on the northern bank of Cony Creek opposite ACM14, approximately 180 metres west of ACM15. The site consists of one mudstone flake and one chert core, both of which are located within five metres of the creek. The artefacts were recorded on a vehicle track that has been cut across Cony Creek and is highly disturbed and eroded.

The site is defined by the surface distribution of artefacts along the access track, which measures approximately five metres by two metres.

(refer to attached photos)

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

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT						
Land form	Flat		**Aspect**	south	**Slope**	Less than 5°
Mark position of the site						
Local rock type	Sandstone		**Land use/effect**	Farming (private property)		
Distance from drinking water	Less than 5 metres		**Source**	Cony Creek		
Resource zone (eg. estuarine, river, forest)	Freshwater		**Vegetation**	Ironbarks, pasture grasses, eucalypts		
Edible plants			**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes.		
Other exploitable resources (eg. ochre)						
Are there other sites in the locality	yes	**Are they in the Sites Register**	no	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove	

SITE MANAGEMENT			
Site condition	poor	Site is impacted by vegetation clearing, livestock trampling, vehicle movement and erosional processes	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Hunter Valley Cultural Surveying – Luke Hickey 297 Pioneer Road Singleton, NSW 2330
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that this area would have been an area of high occupation and use, and as such, was culturally significant.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Three
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	05 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
View est across site ACM16

PLATE 2
Core (chert) at ACM16

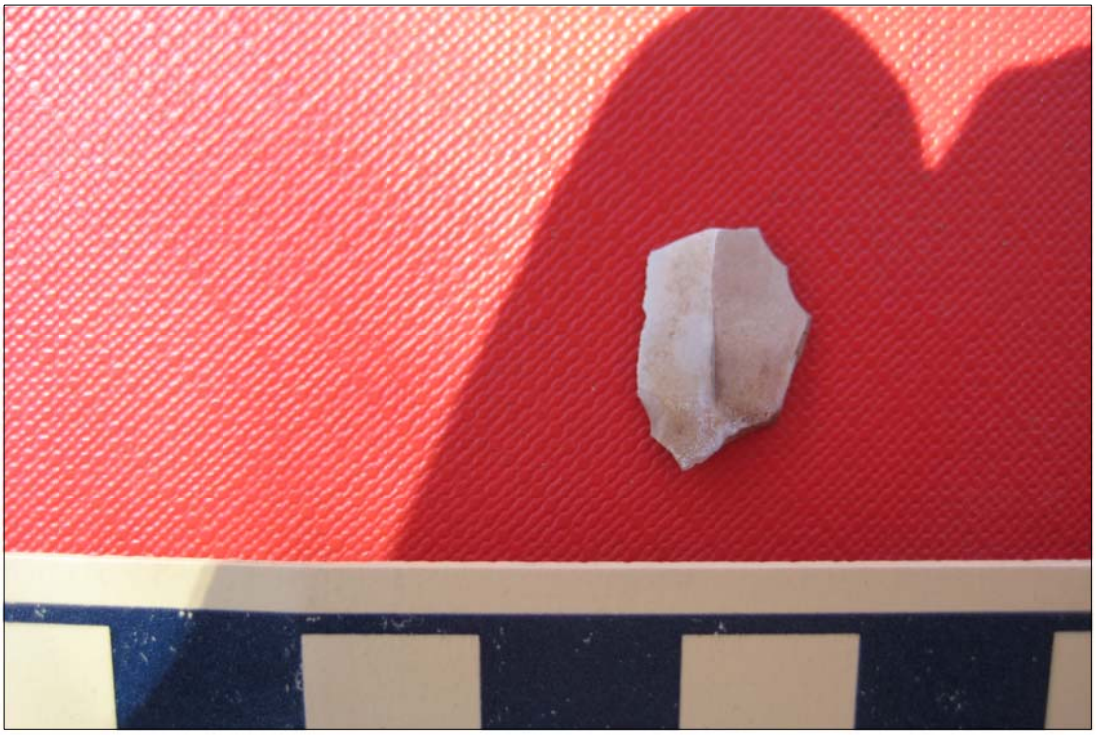

PLATE 3
Flake (mudstone) at site ACM16

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION			
Site name	ACM17	**NPWS Site Number**	
Owner/manager	Boolaroo Land Co. Pty Ltd (Private Property)		
Owneraddress	894 Sandy Creek Road, Quorrobolong, NSW 2325		

LOCATION					
Location	Quorrobolong				
How to get to the site	Turn off Sandy Creek Road, Quorrobolong at 894 Sandy Creek Road. Continue north along the dirt vehicle track over and down the crest (passess adjacent to the private residence) for approximately 1.3km to Cony Creek. Cross Cony Creek at a dirt vehicle crossing and continue across paddock to the north-north-east for approximately 700 metres.				
1:250,000 map name	Quorrobolong			**NPWS map code**	9132-2S (3rd Ed.)
AMG Zone	56	**AMG Easting**	350398	**AMG Northing**	6357845
Method for grid reference	Handheld GPS	**Map scale (if method = map)**	1:25 000	**Map name**	Quorrobolong
NPWS District Name (see map)	North-east			**NPWS Zone (see map)**	
Portion no.	DP: 798955			**Parish**	Munro

SITE DESCRIPTION			
Site type(s)	Isolated find	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, densiiy & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	ACM17 is located on private property and is positioned on the southern verge of a crest within 30 metres of a watercourse. The site consists of one quartz flake located in gully erosion. Cony Creek is approximately 700 metres to the south-south-east. The site boundary is defined by surface artefact distribution, being within an exposure approximately six metres by four metres (with internal 50 per cent visibility). (refer to attached photos) **Attach photographs and sketches, eg. plan & section of shelter.** **Do NOT dig, disturb or damage site or contents.**		

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT					
Land form	Crest	**Aspect**	south	**Slope**	30° from crest
Mark position of the site					
Local rock type	Sandstone	**Land use/effect**	Farming (private property)		
Distance from drinking water	Less than 30 metres	**Source**	2nd Order stream Cony creek is approximately 700m to the south		
Resource zone (eg. estuarine, river, forest)	Freshwater	**Vegetation**	Spotted gums, pasture grasses, eucalypts		
Edible plants		**Faunal resources** (include shellfish)	Kangaroo, Lace monitor, Echidna, small mammals, snakes.		
Other exploitable resources (eg. ochre)					
Are there other sites in the locality	yes	**Are they in the Sites Register**	no	**Other site types include**	Artefact Scatter, Isolated Find and Grinding Groove

SITE MANAGEMENT			
Site condition	poor	Site is impacted by vegetation clearing, livestock trampling, vehicle movement and erosional processes	
Management recommendations	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)		
Have artefacts been removed from site	No	**When**	N/A
By whom	N/A	**Deposited at**	N/A
Consent applied for	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**Consent issued**	
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING	
Reason for investigation	Aboriginal heritage assessment for Austar Coal Mine Stage 3 (Umwelt 2008)

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Were local Aborigines contacted or present for the recording	Yes	**Names and addresses**	Yarrawalk Enterprises – Barry French PO Box 906 Muswellbrook, NSW 2333 Wattaka Wonnarua Cultural Consultants Services – Des Hickey 4 Kennedy Street Singleton, NSW 2330 Wonn1 Contracting – Arthur Fletcher 619 Main Road Glendale, NSW 2285 Mindaribba Local Aboriginal Land Council – Christine Dever Lot 475 Chelmsford Drive, Metford, NSW 2323 Wonnaruah Culture Heritage – Shannon Griffiths 19 O'Donnell Crescent, Metford, NSW 2323 Lower Hunter Wonnarua Council – Tracey Skene Shop 2, 145 Lang Street Kurri Kurri, NSW 2323 Hunter Valley Cultural Surveying – Luke Hickey 297 Pioneer Road Singleton, NSW 2330
Is the site important to local Aborigines	During the survey, Aboriginal stakeholder representatives identified that all Aboriginal sites are culturally important, but did not identify that this site had any specific cultural associations.		
Verbal/written reference sources	Refer to: Aboriginal Heritage Assessment, Austar Coal Mine Project, Stage 3 (Umwelt 2008)	**ASR report number(s) (or title)**	
Photographs taken	Yes	**No. of Photos attached**	Two
Site recorded by	Umwelt (Australia) Pty Limited	**Date of recording**	05 October 2007
Address/institution	2/20 The Boulevarde, Toronto NSW 2283		

PLATE 1
View north-east across ACM17

PLATE 2
Flake (quartz) at ACM17

APPENDIX 3

Site Inspection Report for Aboriginal Grinding Groove Site ACM6 (SCT Operations 2007)

SCT Operations Pty Ltd
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6 December 2007

Meaghan Russell
Senior Archaeologist
Umwelt (Australia) Pty Limited
PO Box 838
TORONTO NSW 2283

Dear Meaghan,

SITE INSPECTION REPORT FOR ABORIGINAL GRINDING GROOVE SITE D6

Further to our site inspection on Tuesday, 4 December 2007, please find herein our assessment of the potential for perceptible subsidence impacts at the Aboriginal grinding groove site D6 and options available to mitigate these impacts. Our assessment indicates that there is a 10-30% chance of perceptible mining induced cracking somewhere within the 50m^2 of rockbar exposed at the site when Longwalls A7 and A8 are mined. The chances of cracking through the grinding groove itself are somewhat less. Various options are available to mitigate mining induced cracks. All involve creating strain relief slots adjacent to the site to absorb horizontal subsidence movements caused by valley closure.

1. INTRODUCTION

Austar Coal Mine is planning to mine Longwalls A7 and A8 below an Aboriginal grinding groove site known as D6. The mine, through Umwelt (Australia) Pty Limited, commissioned SCT Operations to visit the site, to assess the potential for mining induced subsidence impact, and describe options to mitigate these impacts. This report presents the results of our assessment.

The report is structured to provide a description of the site, detail of the subsidence movements predicted at the site by Mine Subsidence Engineering Consultants (MSEC), an assessment of the potential for mining induced subsidence impacts, and options to mitigate these impacts.

2. SITE DESCRIPTION

Figure 1 shows a plan of the mine and the Aboriginal grinding groove site superimposed onto a 1:25,000 topographic series map of the area. The site is located on a rock shelf in an unnamed ephemeral tributary of Black Creek at MGA coordinates E347337, N6359320. The site has not been allocated a Department of Environment and Climate Change (DECC) reference number yet and is referred to as D6.

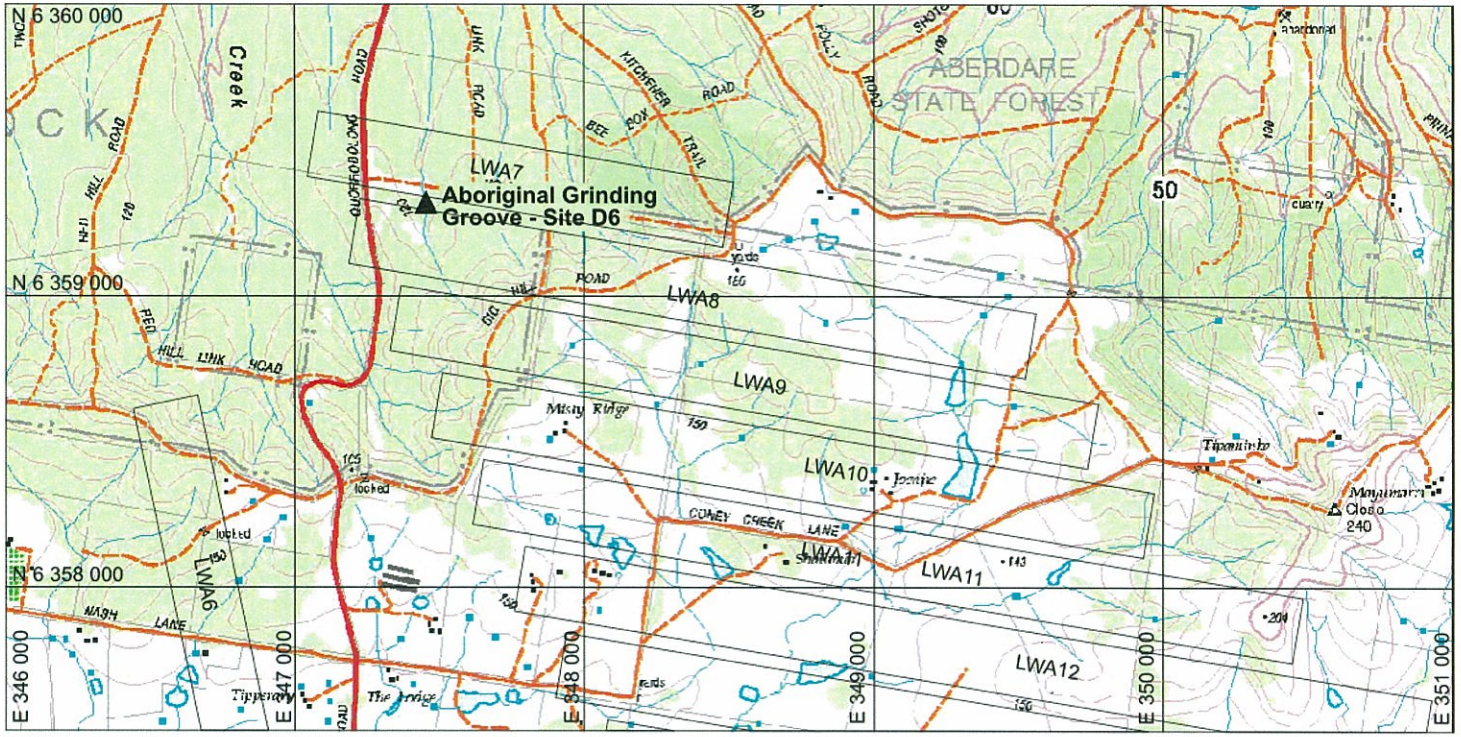

Figure 1 Site plan showing location of Aboriginal Grinding Groove Site D6.

At this site, overburden depth is approximately 460m, longwall panels have a nominal void width of 227m, and solid coal chain pillars are nominally 45m wide. The longwall top coal caving (LTCC) method of mining is used at Austar Coal Mine enables extraction of up to approximately 6m over the central part of each longwall panel tapering to approximately 3m at the edges of the panel.

Figure 2 shows a photograph of the grinding groove site and the grinding groove itself. The bare rock area is approximately 6m wide by 7m long. The single grinding groove is located in the south western part of the rockbar. The downstream end of the rockbar appears to have originally been an overhanging rock shelf approximately 0.6m thick with up to 4m of overhang. This downstream ledge has been removed by blasting, probably as a source of aggregate, at a time estimated from regrowth in the original downstream plunge pool to have been at least 30 years ago.

Figure 3 shows a photograph of the stratigraphy exposed on the downstream lip of the rockbar. A 0.6m thick sandstone layer with conglomerate size particles forms the surface of the rockbar. A 0.2m thick fine grained mudstone layer immediately below the sandstone layer has preferentially eroded to form a slight overhang that would have been much larger prior to blasting. Another sandstone horizon underlies the mudstone.

A low angle joint on the southern side of the rockbar crosses the upper sandstone layer and appears likely to extend upstream to daylight over the central and southern parts of the rockbar, although the end of the crack is not evident on the top surface of the rockbar.

The slopes on either side of the rockbar comprise a silt and clay material that is likely to be the upper part of a weathering profile of the underlying rock strata.

3. Subsidence Predictions

The subsidence behaviour at the site is likely to be dominated by subsidence associated with compression of the rock strata above and below the chain pillars with low levels of sag subsidence across individual panels. A broad subsidence trough is expected to develop across all the panels, rather than isolated subsidence troughs above each individual panel. The location of the site above a chain pillar is not expected to significantly reduce the level of subsidence movements.

MSEC predicts subsidence of up to 1.4m with a maximum upper bound of 2.3m possible if the rock strata above individual chain pillars becomes destabilised. The predicted systematic tilts are 3.6mm/m with an upper bound of 5.3mm/m. The predicted systematic compressive strains are 1.9mm/m with an upper bound of 2.6mm/m. The predicted systematic tensile strains are 0.5mm/m with an upper bound of 0.8mm/m. Systematic subsidence movements are the movements that would be expected to occur

in flat terrain. They are calculated from consideration of the curvature of the subsidence profile and should be considered indicative rather than absolute.

a) Rockbar.

b) Closeup of the grinding groove.

Figure 2 Photographs of grinding groove site.

Figure 3 Exposed stratigraphy of face of rockbar.

In addition to systematic movements, a process called valley closure is recognised to cause compressive subsidence movements in the bottom of valleys that are additional to the horizontal subsidence movements observed in flat terrain. MSEC has developed an empirical technique for estimating valley closure that provides an estimate of the upper bound of the valley closure based on considerations of valley geometry and subsidence magnitude. MSEC estimates that for a valley height of 10m and the predicted levels of subsidence, an upper bound on valley closure is 85mm. This level of closure has potential to cause an estimated 120mm of upsidence.

MSEC estimates that 30-50% of the total valley closure movements are likely to be associated with extraction of Longwall A7, although it is recognised that movements can be stored up during mining of the first panel, so this value is considered an upper bound of the movement likely to be associated with Longwall A7.

4. Subsidence Impacts

Intact rock strata is commonly observed to fracture in laboratory tests at horizontal compression strains of 1-3mm/m (1000-3000μS). Movements on naturally fractured rock strata may occur at lower strains along pre-existing joints. For the predicted systematic strains of 1.9mm/m (2.6mm/m as an upper bound), there is considered to be potential for the onset of rock fracturing if the compressive strain peaks coincide with the location of the rockbar.

With predicted valley closure of up to 85mm, there is potential for a large part of the valley closure to be concentrated across the base of the valley. Assuming that the valley base is approximately 10m wide and 50-60% of the valley closure is concentrated in this area, there is potential for valley closure related horizontal strains of 4-5mm/m additional to any systematic strains that may occur.

These calculations indicate that there is likely to be sufficient horizontal compression available to fracture rock as a result of the total predicted subsidence. Mining of Longwall A7 is expected to cause up to 30-50% of the total valley closure movements and a lower proportion of the systematic subsidence movements. Therefore rock fracturing at the rockbar may not occur when Longwall A7 is mined, but is more likely once Longwall A8 is mined.

When rock strata is overloaded in compression, the fracturing tends to take advantage of natural defects if these are favourably aligned. The strength of fractured rock is less than the strength of intact rock, so once fracturing occurs at a particular location, further movements tend to become localised at this location.

The probability of the exposed part of the rockbar being perceptibly fractured is therefore a combination of how likely rock fracturing is based on the predicted movements and if fracturing does occur, what is the probability that it will be concentrated at the rockbar rather than under the flanks of the valley where it is not typically perceptible.

Based on the general experience that rockbar fracturing tends to be less perceptible than the strain levels would tend to indicate, I estimate that the potential for perceptible rock fracturing to occur on the surface of the rockbar as a result of mining Longwalls A7 and A8 is in the range 10-30%. The potential for perceptible fracturing from Longwall A7 is likely to be at the lower end of this range, while the potential from Longwall A8 is likely to be at the upper end of the range.

Natural jointing at the site is such that initial fracturing is most likely to occur along the projected location of the low angle joint visible on the southern side of the downstream rockbar.

5. OPTIONS

The options available to mitigate mining induced subsidence cracking on the rockbar surface primarily involve providing a space within the rock mass for the horizontal subsidence movements to be accommodated without causing rock fracturing. One or more slots created adjacent to the site in the areas of soil cover on the flanks of the valley provide a practical method of creating space within the rock mass that can absorb horizontal subsidence movements. The optimum solution comes down to a balance between the level of disturbance associated with slot construction and the benefits of various slot geometries.

5.1 Do Nothing

Recognising that the site has been significantly impacted in the past by blasting in what appears to have been a quarrying operation, some potential for additional impact associated with mining may be an acceptable outcome, particularly since it would mean no additional impacts to the site from slot construction. Given there is only 10%-30% likelihood that damage may occur at the rockbar site during mining (and less for the grinding groove itself), it may be considered preferable not to disturb the site further.

5.2 Removal and Replacement of Grinding Groove by Coring the Rockbar

It would be possible to drill a large diameter hole perhaps 300mm in diameter to a depth of about 0.6m directly over the grinding groove itself. A plug of rock with the grinding groove in it could then be removed and either replaced at the end of mining with appropriate natural grout or displayed off site. This is the most economic mitigation option and would require a truck mounted drill rig to be mobilised onto the rock bar. An access track and relatively level

pad adjacent to the grinding groove would need to be prepared to accommodate the drill rig.

If the small pool immediately adjacent to the grinding groove is also required to be protected, a 2m x 2m x 0.6m cube of rock could be excavated. The suggested approach would involve using a diamond saw to excavate the cube down to the mudstone, drilling and inserting 4 x lifting loops into the corners of the cube, and lifting the cube out of the rock bar. The excavated hole could be filled with coarse aggregate for the duration of mining impacts (approximately 2 years), with the cube containing the grinding groove removed to an adjacent safe location. On completion of mining subsidence, the aggregate can be removed from site, the cube replaced in its original position and the slots and drill holes restored with appropriate natural coloured grout.

5.3 Creating a Stress Relieving Slot within the Rockbar

In all the slot options, drilling of an exploration hole up to approximately 20m deep adjacent to the site is recommended to confirm the nature of the rock strata below the rockbar to assist with design of the slot. A portable drilling machine with compressed air and water supplied overland in pipes from the nearby road would reduce impacts to low levels.

A low impact slot option would involve drilling holes immediately upstream and downstream of the site some 1-4m from the edge of the rockbar with a portable drilling machine and using diamond wire to create slots approximately 10m long between pairs of holes. The diamond wire is run down to the bottom of one hole and back up again, across the surface and down the second hole and back up again. A loop is formed with a driving mechanism and loop take up system that can tension the wire. As the wire is dragged across the surface and tension is applied, a slot is cut between the two holes.

Diamond wire can typically only cut slots that are 12-15mm in width, so to accommodate 85mm of horizontal subsidence movements, it may be necessary to cut 6-8 individual slots, or perhaps 2-4 prior to Longwall A7 and the remainder prior to Longwall A8 depending on the closure observed. The impacts of the diamond wire option on the rockbar are likely to be comparatively minor. Some soil material would need to be removed with a small backhoe or similar, but it is anticipated that the slots could be constructed without undue disturbance to the site. A temporary access track would be required to enable equipment to be transported.

An alternative could involve a machine using a diamond wire cutting bar capable of cutting a 10m deep 100mm wide slot as a single pass operation.

Another option involves using a circular cutting disc attached to a backhoe to cut a slot up to about 1m deep. Such a slot could be formed with some minor disturbance to the site and surrounding area. Access to the site from the road using a small backhoe on rubber tracks would cause much lower impact than other machine options, but the depth of the slot would also be much

less. Figure 4 shows a photograph of the type of machinery that would be required. The main impacts from this approach would relate to getting the machinery to and from the grinding groove site. The effectiveness of the slot would be limited by its depth, but given the presence of the mudstone unit within about 0.6m of the surface, this may be effective.

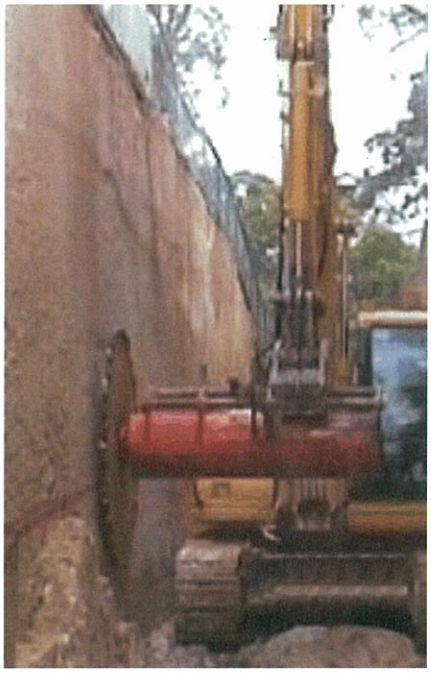

Figure 4 Backhoe mounted cutting wheel.

Another way of forming the slot would involve a cable laying excavator with a rock cutting bar on it. This has the capacity to cut a slot 1-2m deep and 200-300mm wide. Such a slot could be formed adjacent to the rockbar without difficulty, but earthworks and an access track would be required to get the machine on site. Figure 5 shows the type of machinery that would be involved. Some greater level of earthworks would be required to get the machine on site and to create the slot.

Each of the proposed options necessitates some disturbance of the site to implement the mitigation strategy. All options will require clearing of a temporary access track to the site for a medium sized excavator or dozer. The operations will take approximately 1-2 days including the temporary rehabilitation of the site. The site would be monitored during mining and final rehabilitation of the site undertaken at the completion of subsidence.

Each option has a similar indicative cost in the vicinity of $30,000-$50,000. The exception to this is the single 300mm diameter core x 600mm deep extraction of the grinding groove which would cost approximately $10,000-$20,000.

Figure 5 Trenching machine.

It should be noted that the grinding groove is located on a thin wedge of rock as a result of the natural low angle joint within the rock mass. As such the grinding groove could easily be damaged during any of the mitigation works. The natural low angle joint does provide a natural slip plane upon which the relative rock plates could be expected to move if strain concentrates at the site.

If you have any queries or would like clarification of any of these issues, please do not hesitate to contact me.

Regards

(For) Ken Mills
Senior Geotechnical Engineer

APPENDIX 4

Aboriginal Cultural Heritage Management Plan Requirements

Appendix 4 - Aboriginal Cultural Heritage Management Plan Requirements

Introduction

Austar will prepare an Aboriginal Cultural Heritage Management Plan (ACHMP) for Stage 3 of the Austar Coal Mine project. The ACHMP will provide for the management of Aboriginal heritage sites and areas located within the Stage 3 project area, as identified by this report, and will provide management strategies for any future surface works required within the Stage 3 project area. The ACHMP will also incorporate Aboriginal heritage management requirements from previous consents and approvals, to provide Austar Coal Mine with a framework for managing Aboriginal heritage responsibilities for all approved operations.

Management Plan Requirements

The ACHMP will be prepared prior to the commencement of Stage 3 operations after Project Approval. The ACHMP will be prepared in consultation with Department of Environment and Climate Change (DECC) and Aboriginal stakeholders, as identified below, and will address the Conditions of Consent detailed in the Project Approval for Stage 3 of the Austar Coal Mine project and the *Austar Coal Mine (Stage 3) Environmental Assessment*; specifically the management recommendations detailed in the *Aboriginal Heritage Assessment*.

The ACHMP will be designed to provide guidance to Austar Coal Mine in relation to management requirements for all Aboriginal sites and areas within the Stage 3 project area. The ACHMP will also detail a timeframe for the necessary tasks and clearly indicate the roles and responsibilities of Austar management and employees to ensure the appropriate management of Aboriginal heritage within the Stage 3 project area.

The ACHMP will address all Conditions of Consent within the Project Approval, including but not limited to:

1. grinding groove offset strategy as developed by Austar and Aboriginal stakeholders;

2. management requirements for all known sites within the Stage 3 project area (on accessible properties);

3. management strategies for future surface works or remediation works (if required);

4. management strategies for any artefacts recovered from the Stage 3 project area as a result of future works (if required);

5. Aboriginal Cultural Heritage Awareness Training for relevant Austar employees and subcontractors;

6. reporting schedule for completion of ACHMP tasks; and

7. involvement of archaeologists and Aboriginal stakeholder(s) in the preparation and implementation of the ACHMP.

An outline of ACHMP requirements for each of the above is provided below.

Grinding Groove Offset Strategy

In recognition that Stage 3 of the Austar Coal Mine could impact a site of high cultural significance, Austar and Aboriginal stakeholders developed an appropriate grinding groove offset strategy during the course of the *Aboriginal Heritage Assessment*. This consisted of Austar providing Aboriginal stakeholders with $100,000 to be used for an Aboriginal heritage or community project as determined by Aboriginal stakeholders. Aboriginal stakeholders also requested that the ACM6 grinding groove site be fenced for its protection, and that money for this should come from Austar's monetary contribution. Fencing of the grinding groove site, which is contained within Werakata State Conservation Area, will require approval from the NSW National Parks and Wildlife Service.

The ACHMP will outline the details of grinding groove offset agreement reached by Austar and Aboriginal stakeholders, including the timeframe of the monetary contribution and the project to which the contribution will be made.

Management Requirements – Known Archaeological Sites

To ensure that any impacts to known archaeological sites from subsidence, are identified and appropriately managed, the *Aboriginal Heritage Assessment* has recommended that Aboriginal archaeological sites on accessible properties are included in a monitoring program. This monitoring program will involve baseline recording of archaeological sites on accessible properties prior to commencement of Stage 3 mining to document existing content, condition and integrity, and then monitoring of the sites following subsidence.

The ACHMP will outline the requirements of the monitoring program in detail, including identification of sites on accessible properties, recording standards for baseline recording and monitoring following subsidence and timing of works. Archaeological methods for this task are outlined in the *Research Design and Methodology* attached as **Appendix 5**.

Management Strategies – Future Surface Works (If Required)

Current subsidence predictions indicate that remediation works in response to surface disturbance are unlikely; however, to ensure that potential impacts on Aboriginal heritage as a result of future surface works (if required) are managed appropriately, the *Aboriginal Heritage Assessmen*t has recommended a procedure for identification and management of potential impacts.

The ACHMP will outline the procedure for the identification and mitigation of potential impacts on Aboriginal heritage as a result of future surface works (if required). Archaeological methods for this task are outlined in the *Research Design and Methodology* attached as **Appendix 5**.

Management Strategies – Recovered Artefacts (If Required)

Should artefacts be recovered from the Stage 3 project area as a result of salvage prior to future archaeological impact mitigation works, the artefacts will temporarily be provided to a qualified archaeologist for recording and analysis. Following this, artefacts will be stored in a Keeping Place to be provided by Austar Coal Mine in the Stage 3 surface infrastructure site. This Keeping Place will take the form of a small secure shed with lockable cabinets for the storage of all recovered artefacts, with the assemblage able to be accessed by Aboriginal stakeholders and archaeologists.

The ACHMP will outline the management of any artefacts recovered from the Stage 3 project area. Archaeological methods for this task are outlined in the *Research Design and Methodology* attached as **Appendix 5**.

Aboriginal Cultural Heritage Awareness Training

The *Aboriginal Heritage Assessment* recommends that relevant Austar representatives attend a cultural heritage awareness training session, to be provided by Aboriginal stakeholder(s) and (if requested by Aboriginal stakeholders) an archaeologist. This training will be conducted prior to commencement of Stage 3 mining, with details to be included in the ACHMP.

Aboriginal Stakeholder Involvement

The following Aboriginal stakeholders registered an interest in Stage 3 of the Austar Coal Mine project, and should be involved in preparation of the ACHMP and implementation of all Aboriginal heritage management strategies:

- Aboriginal Native Title Consultants;
- Giwiirr Consultants;
- Arthur Fletcher;
- Hunter Valley Cultural Consultants;
- Hunter Valley Cultural Surveying;
- Lower Hunter Wonnarua Council;
- Lower Wonnarua Tribal Consultancy Pty Ltd;
- Mindaribba Local Aboriginal Land Council;
- Mingga Consultants;
- Tracey Skene (Culturally Aware);
- Upper Hunter Heritage Consultants;
- Wattaka Wonnarua Cultural Consultants Service;
- Wonnarua Culture Heritage;
- Wanaruah Custodians; and
- Yarrawalk.

Aboriginal stakeholder involvement should specifically include review of the draft ACHMP, opportunity to participate in any future Aboriginal heritage fieldwork such as baseline recording and monitoring of known sites on accessible properties, and (if required) activities such as inspection of surface work locations, surface artefact collection and archaeological excavation.

APPENDIX 5

Research Design and Methodology

Appendix 5 - Research Design and Methodology

1.0 Introduction

The *Stage 3 Aboriginal Heritage Assessment* recommends baseline recording and monitoring of known sites on accessible properties within the Stage 3 project area, and identifies that future archaeological works such as survey, surface artefact collection, excavation and monitoring may be required should future surface works such as remediation be necessary. This document outlines a research design and methodology for the range of future archaeological works that may possibly be required for the Stage 3 project and also outlines the processes by which the appropriate archaeological mitigation work(s) will be determined.

2.0 Background Information

The *Stage 3 Aboriginal Heritage Assessment* provides the required context for this research design and methodology, specifically **Section 5** (archaeological, environmental, ethnohistoric and land use context), **Section 7** (identified Aboriginal heritage sites and areas), **Section 8** (the scientific and cultural significance of known Aboriginal archaeological sites), **Section 9** (heritage impact assessment) and **Section 11** (management strategies).

3.0 Aboriginal Stakeholder Consultation and Involvement

Aboriginal stakeholders are the primary determinants of the significance of their heritage (DEC 2004:3), and therefore should have a direct and central role in in the identification, assessment and management of Aboriginal heritage sites and places. The following Aboriginal stakeholders have registered an interest in the Stage 3 Austar Coal Mine project, and should therefore be directly involved in the decision making process for all future Aboriginal heritage works identified in **Section 5**.

- Aboriginal Native Title Consultants;
- Arthur Fletcher (Wonn1 Sites Officer);
- Giwiirr Consultants;
- Hunter Valley Cultural Consultants;
- Hunter Valley Cultural Surveying;
- Lower Hunter Wonnarua Council;
- Lower Wonnarua Tribal Consultancy Pty Ltd;
- Mindaribba Local Aboriginal Land Council;
- Mingga Consultants;
- Tracey Skene (Culturally Aware);
- Upper Hunter Heritage Consultants;

- Wanaruah Custodians;
- Wattaka Wonnarua Cultural Consultants Service;
- Wonnarua Culture Heritage; and
- Yarrawalk.

4.0 Research Design

Should archaeological works be required in the future to mitigate potential impacts from surface works, this research design will provide a framework for the analysis of results and therefore the recovery of valuable information regarding past Aboriginal occupation and use of the Stage 3 project area.

The aim of the works outlined below is to recover information on past Aboriginal occupation of the Stage 3 project area, through excavation of sites with archaeological research potential, and to recover archaeological materials (stone artefacts) of cultural value to Aboriginal stakeholders.

The following research questions reflect key research themes in the Hunter Valley and aim to recover valuable data regarding when, how and why Aboriginal hunter-gatherers used the landscape of the Stage 3 project area, and further, and how this may differ from other areas within the Hunter Valley.

1. What resources – water, food and stone – were available to the Aboriginal people using the Sandy Creek and Cony Creek catchments within the Stage 3 project area?

2. What stone resources were transported into the Stage 3 project area and from where?

3. Are the assemblages found within the Stage 3 project area similar or different to those assemblages previously found in the Cessnock area?

4. Do the differences/similarities in the assemblages found in the Stage 3 project area and in the Cessnock area suggest different or similar patterns of landscape and resource utilisation?

5. Is there evidence that Aboriginal people were heat treating/using heat treated stone in the Stage 3 project area?

6. Can seasonal use of the Stage 3 project area be determined from plant residues on artefacts salvaged from this area?

7. Are there features such as hearths, heat treatment pits or ovens in the Stage 3 project area that can provide absolute dates for Aboriginal occupation of the area? If so, how does this date/these dates compare with those from the broader Hunter Valley?

8. If there are hearths, do they contain remains (animal/plant) that may indicate what people were cooking/eating?

Note that the ability to respond to each of the above research questions is dependent on the recovery of information through subsurface testing and/or archaeological salvage, and the nature of any assemblage recovered by these works. Further, the potentially staged nature of Stage 3 mitigation works (if required) may limit the potential of individual assemblages to respond to the general research questions posed above.

5.0 Methods

The following sections outline field methods for the management of Aboriginal heritage sites and areas within the Stage 3 project area, spanning: baseline recording and monitoring of known archaeological sites on accessible properties; surface artefact collection; subsurface testing; salvage; and management of recovered artefacts. At this stage, there is no recognised need for activities such as surface collection, archaeological testing or salvage, as current subsidence predictions indicate that surface disturbance and remediation works are unlikely to be needed. However, should archaeological mitigation works be required at any stage, the following sections also outline procedures to enable the future identification, assessment and management of Aboriginal heritage sites and places.

5.1 Baseline Recording and Monitoring

The *Aboriginal Heritage Assessment* recommends that known Aboriginal archaeological sites within the Stage 3 area, on accessible properties, are included in a monitoring program to ensure potential impacts to site content, condition or integrity from subsidence are detected and managed appropriately. **Table 1** lists all known Aboriginal archaeological sites within the Stage 3 area.

Table 1 - Known Aboriginal Archaeological Sites

Site #	Site Type	MGA		Artefacts Recorded		Site Area[1], m^2
		Easting	Northing	#	Type/Material	
ACM1	Artefact Scatter	346839	6359248	3	2 silcrete broken flakes. 1 silcrete core	48
ACM 2	Artefact Scatter	346773	6359341	2	1 mudstone flake	40
		346761	6359363		1 mudstone broken flake	
ACM 3	Isolated Find	347652	6359360	1	1 mudstone broken flake	1 (15)
ACM 4	Isolated Find	347502	6359377	1	1 silcrete broken flake	1 (15)
ACM 5	Isolated Find	347448	6359253	1	1 silcrete broken flake	1 (4)
ACM 6	Grinding Groove & Isolated Find	347447	6359320	1	1 grinding grove	90
		347444	6359333		1 mudstone broken flake	
ACM 7	Isolated Find	348432	6359652	1	1 mudstone flake	1 (9)
ACM 8	Artefact Scatter	348008	6359291	4	3 mudstone flakes. 1 mudstone broken flake	60
ACM 9	Isolated Find	348446	6357420	1	1 mudstone flake	1 (3)
ACM 10	Artefact Scatter	348473	6357540	2	1 mudstone flake. 1 mudstone flaked piece.	28
ACM 11	Isolated Find	348350	6358807	1	1 quartzite flake	1 (100)
ACM 12	Artefact Scatter	349465	6358623	2	1 retouched chert flake. 1 silcrete core	54
ACM 13	Isolated Find	348365	6358707	1	1 mudstone flake used as a core	1 (6)

[1] The site area for all isolated finds is $1m^2$ based on archaeological distribution. Where the isolated find occurs within an exposure, the exposed area is listed in brackets.

Table 1 - Known Aboriginal Archaeological Sites (cont)

Site #	Site Type	MGA		Artefacts Recorded		Site Area[2], m^2
		Easting	Northing	#	Type/Material	
ACM 14	Artefact Scatter	350706	6357134	24	3 silcrete broken flakes. 2 mudstone flakes	7000
		350655	6357124		1 mudstone broken flake	
		350611	6357127		2 silcrete flakes. 1 mudstone flaked piece	
		350387	6357224		3 silcrete flakes. 1 silcrete core. 1 silcrete broken flake. 1 mudstone broken flake	
		350274	6357361		1 mudstone broken flake. 1 mudstone flake. 1 silcrete flake	
		350160	6357371		1 silcrete flake. 1 silcrete core	
		349999	6357454		4 quartzite broken flakes	
ACM 15	Isolated Find	350131	6357455	1	1 mudstone broken flake	1 (16)
ACM 16	Artefact Scatter	350308	6357302	2	1 mudstone flake. 1 chert core	10
ACM 17	Isolated Find	350503	6358035	1	1 quartz flake	1 (24)

It is noted that all sites listed in **Table 1** are on property not owned or managed by Austar, with eight sites recorded within the Werakata State Conservation Area that is managed by NSW National Parks and Wildlife Service and nine sites recorded on privately owned properties. Access to all known archaeological sites for baseline recording and monitoring is therefore reliant upon approval from individual landholders. Access to sites listed in **Table 1** will need to be revisited prior to monitoring taking place.

It is envisaged that mining in Stage 3 will begin in 2011, commencing with Longwall A6 and will progress in accordance with the numerical order to Longwall A17. At least six months prior to commencement of Stage 3 mining, baseline recording of known archaeological sites on accessible properties will be conducted. The timing of monitoring of known sites on accessible properties will be determined by the mining schedule, with monitoring of sites within the angle of draw of individual longwalls able to begin at a minimum of three months after longwall extraction.

Methodology for baseline recording is as follows:

- inspection of the site area by a field team consisting of an archaeologist and Aboriginal stakeholder representative(s). To ensure thorough coverage, the area should be inspected in systematic transects with survey team members no more than five metres apart;

- flagging of all surface artefacts with high visibility survey markers;

[2] The site area for all isolated finds is $1m^2$ based on archaeological distribution. Where the isolated find occurs within an exposure, the exposed area is listed in brackets.

- it should be noted that previously recorded artefacts may not be located due to changes in the site since recording (i.e. post depositional artefact movement) or varying ground surface visibility. However, these processes may expose additional artefacts not identified in the original recording;

- recording of surface artefact locations using a handheld GPS, with a record of each artefact made (artefact type and raw material). Photographs of each individual artefact will also be taken;

- production of a scaled site plan identifying the location of all surface artefacts; and

- photographic records of the site location, with artefact locations identified by high visibility survey markers.

Methodology for monitoring is as follows:

- inspection of the site area by a field team consisting of an archaeologist and Aboriginal stakeholder representative(s). To ensure thorough coverage, the area should be inspected in systematic transects with survey team members no more than five metres apart;

- flagging of all surface artefacts with high visibility survey markers;

- recording of surface artefact locations using a handheld GPS, with a record of each artefact made (artefact type and raw material). Photographs of each individual artefact will also be taken;

- production of a scaled site plan identifying the location of all surface artefacts;

- photographic records of the site location, with artefact locations identified by high visibility survey markers; and

- on-site and off-site analysis of movement of surface artefacts, and any other changes in the site area, since baseline recording.

Should movement of surface artefacts or other changes to the site be detected, the survey team (archaeologist and Aboriginal stakeholders) will discuss the nature of changes detected and the how these changes affect the scientific and cultural value of the site. On this basis, the need for archaeological mitigation works (and selection of appropriate mitigation works) will be identified. Should not all Aboriginal stakeholders be present at the site inspection, a brief letter report on the inspection and discussion results will be prepared and provided to all stakeholders, with ten days provided for review and return of comments. **Sections 5.3** to **5.5** identify archaeological methods for tasks that may be required, such as surface artefact collection, subsurface testing and salvage.

It is noted that artefacts are subject to natural geomorphic processes such as erosion and bioturbation, and that changes to known sites may be detected during the monitoring program as a result of these processes. However, as the aim of the monitoring program is to identify and mitigate any subsidence impacts, movement of stone artefacts resulting from erosion and bioturbation will not trigger mitigation works.

5.2 Archaeological Survey

The purpose of further archaeological survey (if required) will be to identify Aboriginal archaeological sites or areas that may be impacted by future surface works.

The need for archaeological survey will be identified as a result of the following process:

- on identifying the need for surface works, Austar will seek advice from an archaeologist regarding the status of the locality, specifically, whether the locality has been previously surveyed and assessed. In response, the archaeologist will identify one of the three options below:

    1. if the surface work location was not surveyed as part of the *Stage 3 Aboriginal Heritage Assessment*, an archaeologist and Aboriginal stakeholder representative(s) will be required to inspect the works location to identify any potential Aboriginal heritage impacts prior to the commencement of works;

    2. if the surface work location was surveyed as part of the *Stage 3 Aboriginal Heritage Assessment*, and no archaeological sites/areas were identified, no further Aboriginal heritage works will be required prior to the commencement of works; and

    3. if the surface work location was surveyed as part of the *Stage 3 Aboriginal Heritage Assessment*, and an archaeological site or area of high archaeological potential was identified, an archaeologist and Aboriginal stakeholder representative(s) will be required to inspect the works location to identify any potential Aboriginal heritage impacts prior to the commencement of works.

Should an inspection of the works locality be required, Aboriginal stakeholders will be notified at least 10 days prior to the inspection and invited to participate.

The following field methodology is proposed:

- inspection of the entire works area by a field team consisting of an archaeologist and Aboriginal stakeholder representative(s);

- to ensure thorough coverage, the area should be inspected in systematic transects with survey team members no more than five metres apart;

- flagging of all identified surface artefacts with high visibility survey markers;

- inspection of all mature, native vegetation observed to identify any cultural scarring;

- inspection of all creek beds to identify any sandstone exposures or rockbars, which may have been used for ground edge implement production or reduction; and

- recording of the area inspected and any artefacts identified, including written descriptions, photographic records and a site plan.

Following survey, an evaluation of the significance of the identified site/s should be made by a qualified archaeologist and Aboriginal stakeholders, which will inform the determination of appropriate management of the site/s. A brief letter report on the inspection and discussion results will be prepared and provided to all stakeholders, with 10 days provided for review and return of comments. However, it is possible that subsurface testing may be required to obtain further information about the site/s to determine their significance prior to determining appropriate management. If this requirement is identified by the archaeologist and Aboriginal stakeholders the process outlined in **Section 5.4** will be undertaken.

5.3 Surface Artefact Collection

The purpose of surface artefact collection (if required) will be to recover Aboriginal archaeological material of scientific and cultural significance that may be impacted by future surface works. The need for this would be determined by a qualified archaeologist and Aboriginal stakeholders following site inspection, based on impacts posed from surface works required and the significance of the site/area. Surface artefact collection would be a suitable mitigation strategy for a heavily disturbed or eroded site/area with little to no potential for subsurface deposits that would retain stratigraphic or spatial integrity. However, should the site also have potential for subsurface archaeological materials that may retain stratigraphic or spatial integrity or that may by their study add to the current understanding of the Aboriginal use of the landscape (as identified by a qualified archaeologist and Aboriginal stakeholders), surface collection may be conducted in conjunction with subsurface testing and/or subsurface salvage.

Methodology for surface artefact collection (if required) is as follows:

- inspection of the designated collection area by a field team consisting of an archaeologist and Aboriginal stakeholder representative(s). To ensure thorough coverage, the area should be inspected in systematic transects with survey team members no more than five metres apart;
- flagging of all identified surface artefacts with high visibility survey markers;
- recording of surface artefact locations using a handheld GPS. A site plan will also be made to document distribution of artefacts within the collection area;
- photographic records of the site location, with artefact locations identified by high visibility survey markers; and
- bagging and labelling all collected artefacts on site.

5.4 Archaeological Subsurface Testing

The purpose of subsurface testing (if required) will be to determine the extent and nature of archaeological sites within the Stage 3 project area that will be affected by surface works. Subsurface testing may further aim to establish the geomorphic context and therefore archaeological integrity and/or antiquity of individual sites. This information will be used to determine the most appropriate salvage strategy to be used for archaeological sites that may be impacted by future surface works (if required).

The need for subsurface testing would be determined by a qualified archaeologist and Aboriginal stakeholder(s) following site inspection. The extent of the subsurface testing will be based on the nature and extent of the impacts posed from the surface works required, the area assessed as having potential for subsurface archaeological deposits and the significance of the site/area. Subsurface testing would be a suitable mitigation strategy for a site/area with potential for subsurface archaeological materials that may retain stratigraphic or spatial integrity or artefact assemblages that by their study may add to the understanding of the use of the landscape by Aboriginal people.

The exact methodology to be utilised for subsurface testing at individual sites will be influenced by factors such as the presence or absence of surface artefacts, the integrity of the locality and the predicted area of subsurface archaeological potential. Accordingly, the appropriate testing methodology can only be identified by archaeologists and Aboriginal

stakeholders at the time of impacts from surface works being identified. To ensure the archaeological subsurface testing methodology proposed is suitable, it will be formulated in consultation with the DECC.

5.5 Archaeological Salvage

The purpose of salvage excavation (if required) will be to recover the archaeological resource of a site prior to impact from surface works. The need for archaeological salvage would be determined by a qualified archaeologist and Aboriginal stakeholder(s) following subsurface testing, based on the extent of and nature of the identified subsurface deposit, the impacts posed from surface works required, and the significance of the site/area. Salvage would be a suitable mitigation strategy for a site/area with cultural or scientific value, such as sites with stratigraphic integrity and/or spatial integrity, sites with a high density subsurface archaeological material or containing datable cultural features such as hearths.

The exact methodology to be utilised for archaeological salvage at individual sites will be influenced by factors such as the nature of the archaeological deposit, the density of archaeological material, the research potential of the site and the cultural value of the site. Accordingly, the appropriate salvage methodology can not be determined at this time. To ensure any future salvage methodology proposed is suitable, it will be prepared in consultation with the DECC.

5.6 Recovered Artefact Management

Should artefacts be recovered from the Stage 3 project area as a result of salvage prior to future impact mitigation works, the following management of recovered artefacts is proposed:

- following recovery, artefacts will be provided to a qualified archaeologist for recording and analysis. A catalogue of recovered artefacts will be developed by the archaeologist, a copy of which is to be provided to DECC, Austar and Aboriginal stakeholders for their records; and

- following recording and cataloguing, artefacts will be stored in a Keeping Place to be provided by Austar Coal Mine in the Stage 3 surface infrastructure site.. This Keeping Place will take the form of a small secure shed with lockable cabinets for the storage of all recovered artefacts, with the assemblage able to be accessed by Aboriginal stakeholders and archaeologists.

6.0 Evaluation and Reporting

A qualified archaeologist will conduct the technical recording and analysis of all stone artefacts recovered form the Stage 3 project area ahead of impact by mitigation works. Stone artefact analysis will record artefact type, raw material and the technological attributes of flakes, cores and retouched artefacts.

As mitigation works may be required over a period of many years, it is proposed that an annual report is generated for Austar and Aboriginal stakeholders identifying all archaeological works (if any) conducted and the methods and results of those works undertaken in the preceding year. Comment on the evaluation of archaeological results against the research questions posed in **Section 3** could be provided in this annual report, but as previously stated, the ability to respond to research questions relies on the nature of works conducted and the nature of the assemblage recovered. If there has been no

requirement for any mitigation works related to Aboriginal sites in the preceding year then there will be no requirement for a report.

7.0 Procedure for Handling Human Remains

The potential for Aboriginal burial sites and/or skeletal remains to occur within the Stage 3 project area is recognised by this assessment, although the likelihood of these sites being found is considered remote. This section outlines the procedure for handling human remains in accordance with the *Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office 1998) and the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1997).

In the event that human skeletal material is exposed within the Stage 3 area, the following procedure is to be followed:

1. as soon as remains are exposed, work is to halt immediately to allow assessment and management;

2. contact police;

3. contact DECC and the Heritage Office;

4. a physical or forensic anthropologist should inspect the remains *in situ*, and make a determination of ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or forensic);

5. if the remains are identified as forensic the area is deemed as crime scene; or

6. if the remains are identified as Aboriginal, the site is to be secured and DECC and all Aboriginal stakeholders are to be notified in writing; or

7. if the remains are as non-Aboriginal (historical) remains, the site is to be secured and the Heritage Office is to be contacted.

The above process functions only to appropriately identify the remains and secure the site. From this time, the management of the remains is to be determined through liaison with DECC and Aboriginal stakeholders.