Werris Creek Coal Pty Limited
ABN:69 107 169 103

Proposed Modification to the Werris Creek Coal Mine

Aboriginal Heritage Assessment

Prepared by

Archaeological Surveys and Reports Pty Ltd

March, 2009

Specialist Consultant Studies Compendium: Part 6

Aboriginal Heritage Assessment

of the

Proposed Modification to the Werris Creek Coal Mine

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1 INTRODUCTION

This investigation was performed for R.W. Corkery & Co. Pty Limited (RWC) on behalf of Werris Creek Coal Pty Limited (WCC), the owner and operator of the Werris Creek Coal Mine ("the mine"). WCC is applying to modify Development Consent DA-172-7-2004, issued by the Minister for Planning on 18 February 2005, to enable a variation to the mining area layout of the open cut area and overburden emplacement for the final three years of the current mine life. The proposed modification to the mining area layout would require an extension of the open cut and overburden emplacement to the northeast and northwest of the currently approved limit, with a small northern portion of the approved open cut area to remain undisturbed.

RWC commissioned Archaeological Surveys & Reports Pty Ltd (ASR) to undertake a review of the previous archaeological investigation for Indigenous sites for the mine in 2004, to determine whether or not the modified mining area layout had been included in the 2004 archaeological investigation, whether further investigation was necessary and what impact on Indigenous (if any) the proposed modification would have. This assessment has been completed to support a Statement of Environmental Effects being prepared by RWC to accompany the application for the proposed modification, sought under Section 96(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.1 Scope, Objectives and Report Format

1.1.1 Scope

The scope of works was for Archaeological Surveys & Reports Pty Ltd (ASR) to conduct a review of a previous investigation of the coal mine site undertaken in 2004, to determine whether or not the extension area had been included in the 2004 archaeological investigation, or whether further investigation was necessary. The results of the review were to be presented in a report, which was to include an assessment of the significance of any cultural relics or places identified, an appraisal of the options and opportunities arising from the discoveries, and clear recommendations for the management of those cultural resources.

1.1.2 Report Objectives

The objectives of this report are to describe the archaeological review of the report of the previous investigation of the coal mine site undertaken in 2004, to determine whether or not the extension area had been included in the 2004 archaeological investigation, and whether further investigation is necessary.

1.1.3 Report Format

The report is presented in the following format:

i Executive summary
ii Contents

1. Introduction
2. Aboriginal Consultation
3. The Environmental Context
4. The Archaeological Record
5. Models for Site Location
6. Review of previous investigations on the site
7. Discussion
8. Significance Assessment
9. Recommendations.

Sections of this report have been transcribed from the 2004 report where appropriate.

1.2 The Mine Site and Overview of the Proposed Modification

The Werris Creek Coal Mine is an open cut coal mine located approximately 4 km south of Werris Creek and 11 km north-northwest of Quirindi in central northern New South Wales. All mining and associated operations are restricted to Mining Lease 1563 (ML 1563), a 679 ha area that incorporates the "Narrawolga" property and parts of the "Eurunderee" and "Cintra" properties. **Figure 1** places the mine in its regional context while **Figure 2** places the mine site in its local setting through detail from a topographic map of the area.

The proposed modification, if approved, would involve the following activities, the locations of which are shown on **Figure 3** (presenting the proposed modifications on a topographic plan of the mine site) and **Figure 4** (presenting the proposed modifications on an aerial photograph).

- Modification to the open cut area. The northern extent of the open cut area would be widened such that the eastern perimeter corresponds with the eastern extent of the sub-cropping coal seams.
- Dewatering the underground workings of the former Werris Creek Colliery to enable open cut mining through part of these workings.
- Construction of four surface dams to store the water pumped from the underground workings.
- Extension of the out-of-pit overburden emplacement to the north along the modified eastern perimeter of the open cut area.
- Modification to the overall shape of the overburden emplacement, with the height increased to approximately 445m AHD to accommodate the increased volume of overburden and revised mine plan associated with the modified open cut design.
- Construction of an additional train loading bin and conveyor at the rail load-out facility to facilitate the separation of product coal for specific markets and therefore increase the efficiency of train loading.

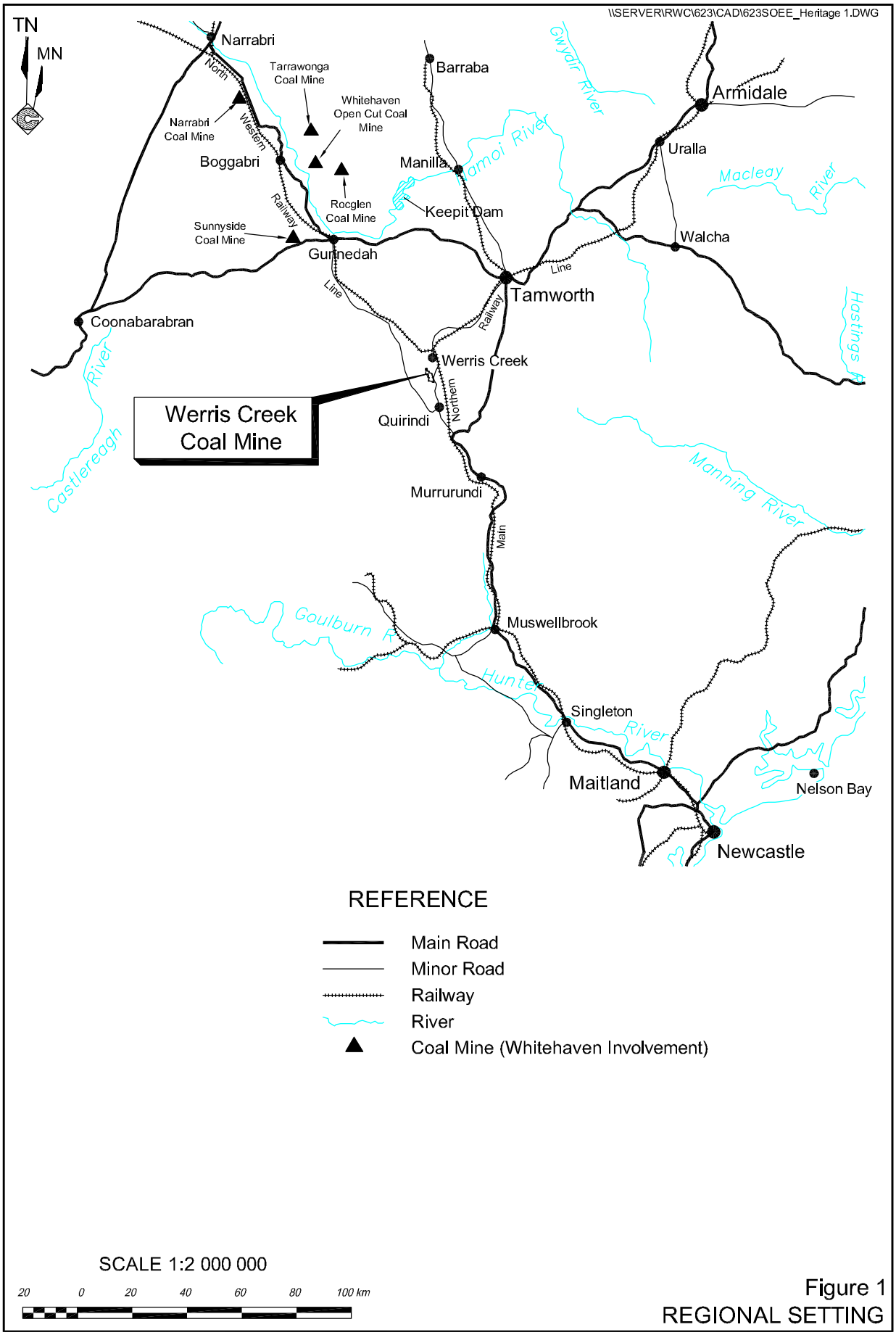

Figure 1
REGIONAL SETTING

Note: A colour version of this figure is available on the Project CD

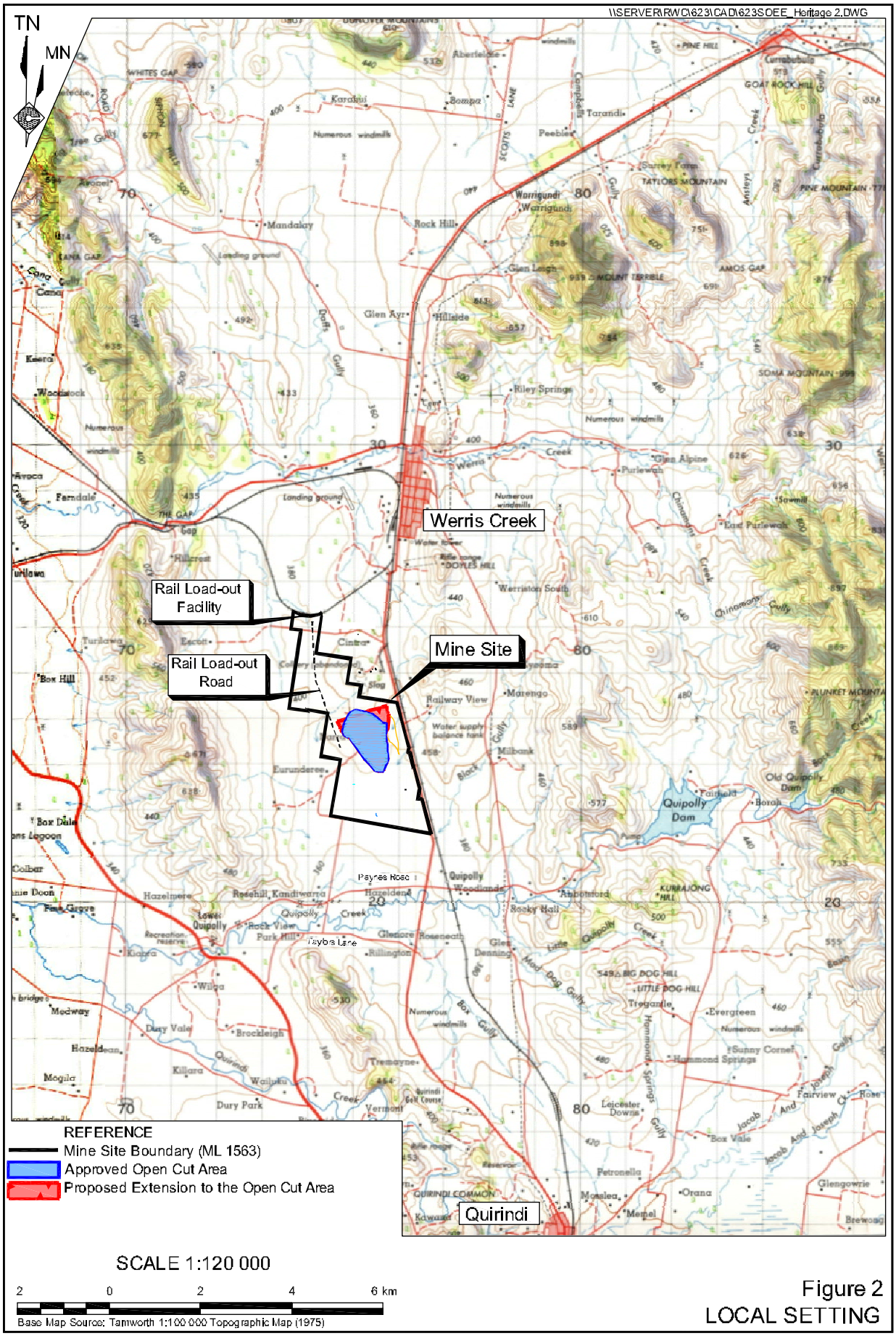

Figure 2
LOCAL SETTING

Note: A colour version of this figure is available on the Project CD

The rehabilitation objectives and methods would remain consistent within those currently implemented at the Werris Creek Coal Mine, although the proposed sequence of rehabilitation, and designated land use on the final landform has been modified slightly to provide for additional areas of native woodland establishment and conservation.

1.3 The Study Area

The Study Area for this investigation has been restricted to those areas of the mine site that would be modified from the approved mining operations of DA 172-7-2004, ie. the areas shaded pink on **Figures 3** and **4**. Notably, this Study Area was included in a previous archaeological investigation of the site of the then proposed Werris Creek Coal Mine completed in August 2004 (Appleton 2004) (see **Figure 5**). John Appleton (ASR) performed the 2004 field survey, accompanied by Messrs Peter Allan and Shane Allan, Sites Officers, Nungaroo Local Aboriginal Land Council (LALC).

The Appleton (2004) survey, findings and subsequent management resultant from Appleton (2004) is discussed in further detail in the relevant sections of this report.

1.4 Potential Impact of the Proposed Modification

There is a potential for any archaeological contexts occurring within the modified disturbance footprint of the mine, including any new roads or supporting infrastructure, to be severely impacted upon.

Following from the 2004 survey, and the subsequent granting of DA 172-7-2004, it was considered unlikely that the same area would ever be surveyed again. Thus from an archaeological perspective, the current investigation provides an opportunity to review the 2004 survey findings, observe and record any additional sites that might be present, and to propose a strategy for the management of any known or potential archaeological and/or cultural material in the future development of the area.

2 ABORIGINAL CONSULTATION

As the proposed area of modified operations was included within the 2004 survey area (see **Figure 5**), no further formal field investigation was necessary. That is, reliance has been placed on the field survey, and associated consultation, completed as part of the Appleton (2004) investigation. Consequently no Aboriginal organisation was contacted for this investigation.

3 THE ENVIRONMENTAL CONTEXT

Any discussion of the likely presence of Aboriginal cultural remains or of the basis why such remains might be discovered must be within the context of the environment and the resources that would have been available to any Aboriginal occupants of the area.

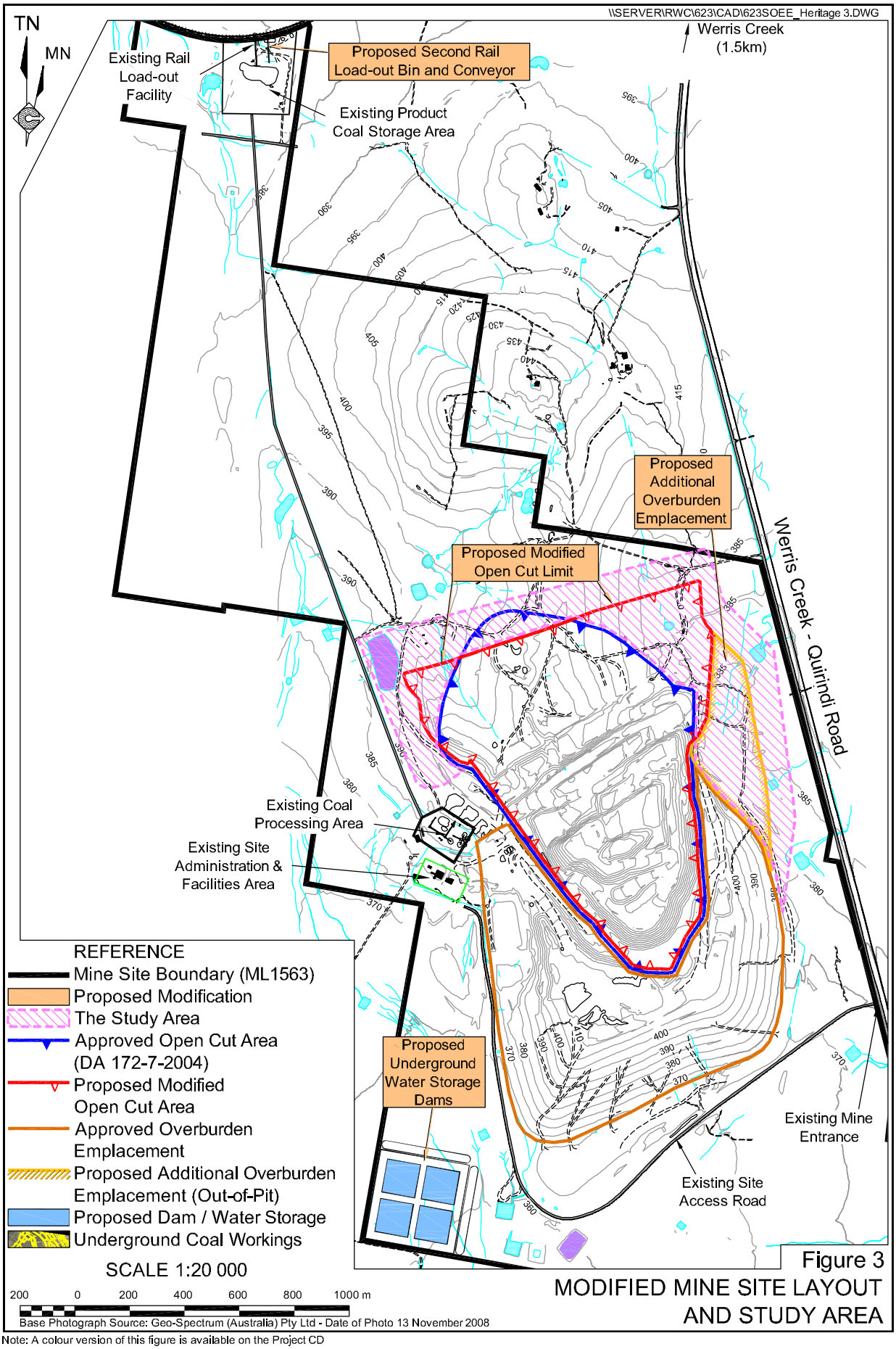

Figure 3
MODIFIED MINE SITE LAYOUT AND STUDY AREA

Note: A colour version of this figure is available on the Project CD

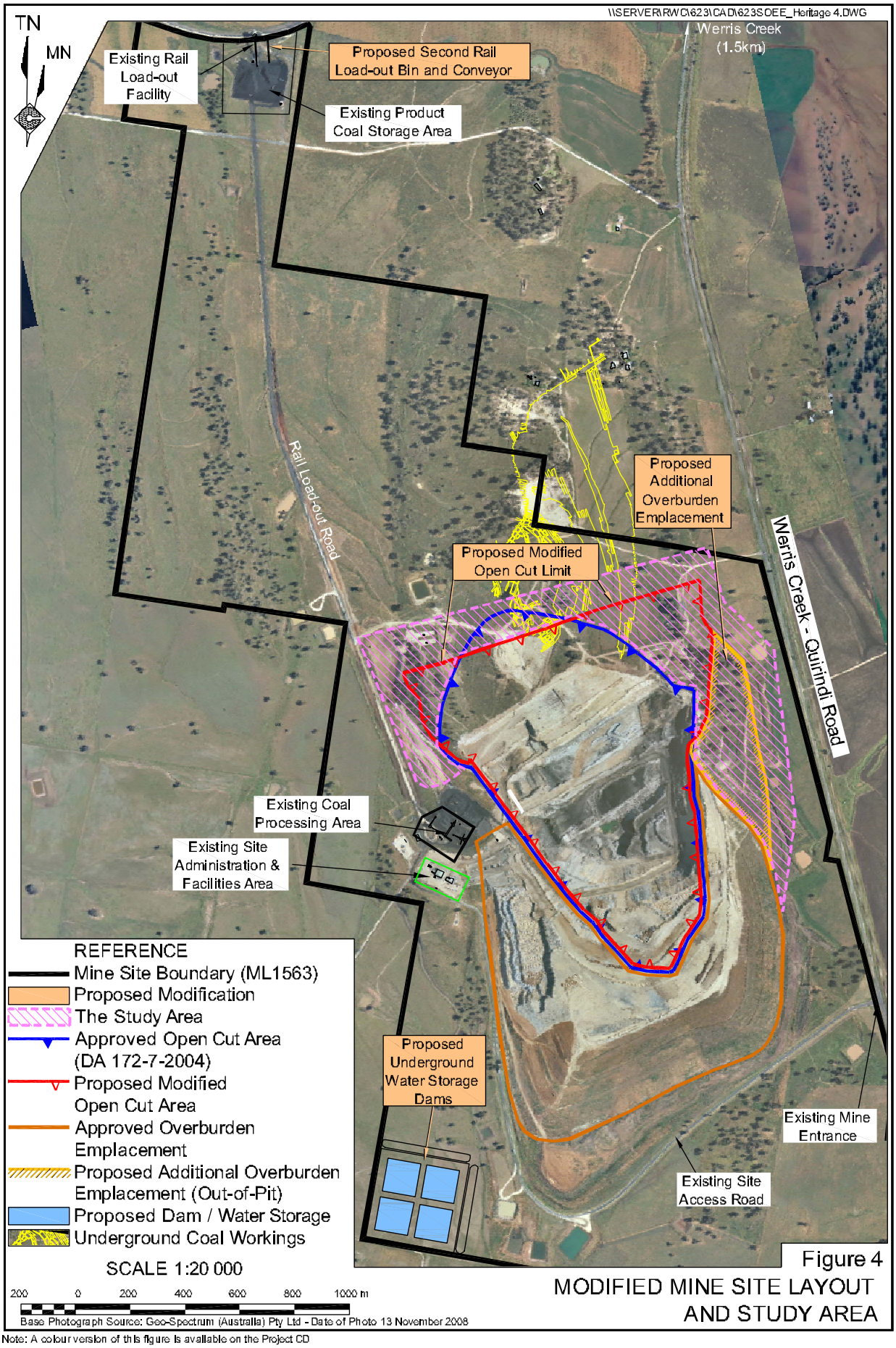

Figure 4
MODIFIED MINE SITE LAYOUT AND STUDY AREA

Note: A colour version of this figure is available on the Project CD

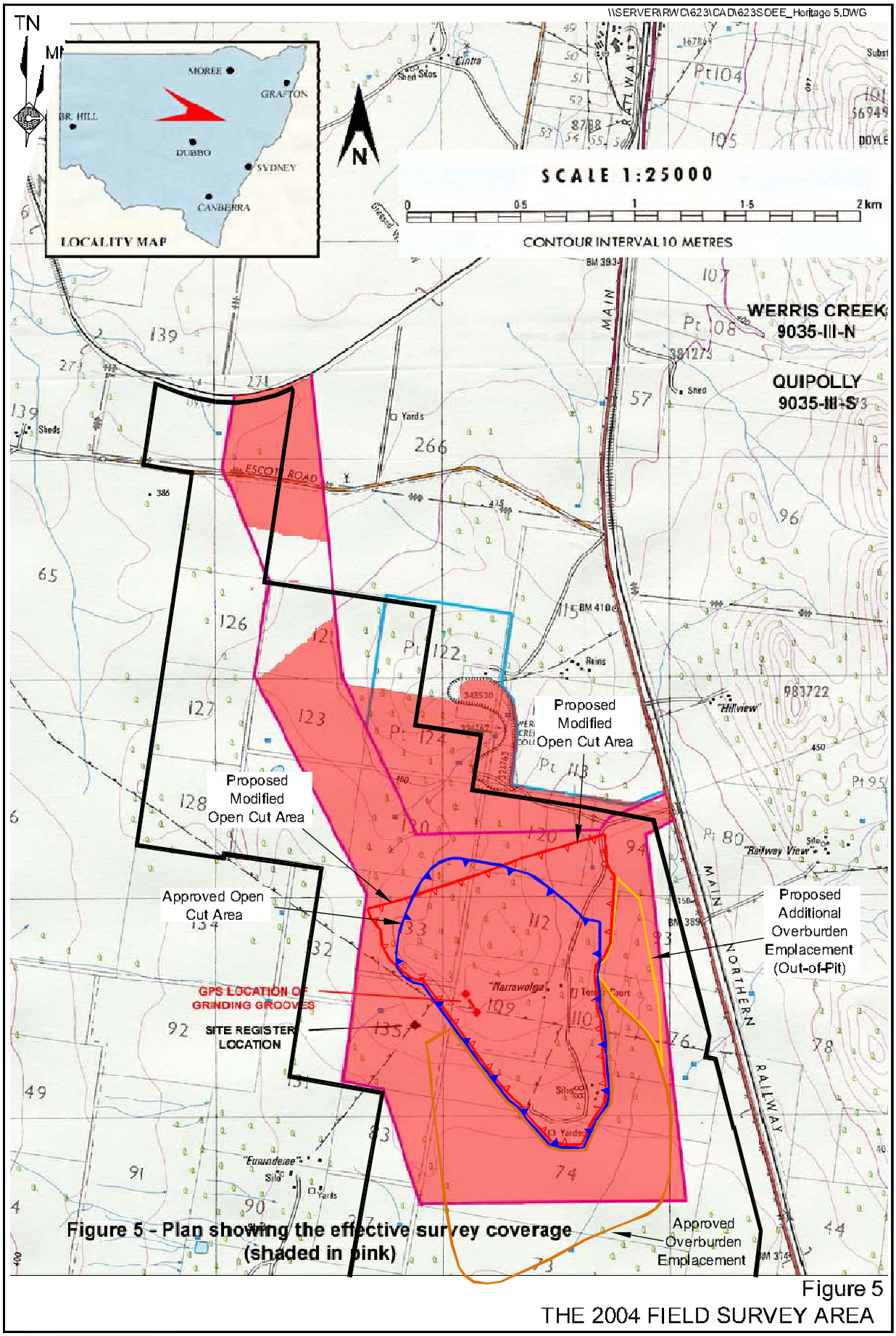

Figure 5
THE 2004 FIELD SURVEY AREA

3.1 The General Geology and Topography

The Werris Creek Coal Mine is located within the Sydney-Bowen Basin, a major structural basin, which extends from Batemans Bay in the south, to Collinsville, Queensland in the north. The New South Wales portion of the basin is divided into northern and southern sections by a transverse structural high to the north of Narrabri. The southern section of the Sydney-Bowen Basin has been divided into two lower category structural basins, the Sydney Basin and the Gunnedah Basin (Menzies 1974). The study area (see **Figure 3**, **4** and **5**) occurs in the Gunnedah Basin.

The coal resource of the mine forms part of the Werris Creek Coal Measures in the Werrie Basin. The structure occurs at the southern end of the Gunnedah coal deposits, which occur in the eastern half of the Gunnedah Basin, and extend from just north of Narrabri south-eastwards to Murrurundi. The Gunnedah Basin is in the initial stages of development as a source of export coal, and in terms of resources, is second only to the Hunter Region, but current production is quite small by comparison (Department of Mineral Resources 1985).

The mine site generally straddles the southern half of a north-west to south-east trending ridgeline, with the rail load-out road (for the transport of coal between the Coal Processing Area and Rail Load-out Facility) running from the foot of the western slopes of the ridge, via a low saddle, to the railway line north of Escott Road.

The soils in the study area generally comprise of fine to medium grained weathered sandstone, some of which was covered with a very shallow layer of humic soils, derived from woodland detritus and past agricultural activities.

No stone suitable for knapping into stone tools was observed anywhere in the study area of Appleton (2004), however, the presence of metasedimentary pebbles in the ploughed paddocks of ML 1563 suggests it is possible there may be other conglomerate lag deposits in the paddocks, which were concealed by grasses and crops at the time of the 2004 survey.

3.2 Vegetation

As can be observed on **Figure 4**, most of the additional areas to be disturbed by the proposed modification have been cleared or been severely impacted upon by pasture improvement and grazing. However, there are several remnants of woodland that suggest that prior to clearing, the area supported a robust and mature dry sclerophyll woodland, probably with areas of open grassland where the soils were too shallow to support shrubs or trees. White Box (*Eucalyptus albens*) is and probably was the predominant species, with Blakely's Red Gum (*E. blakelyi*) also found on open slopes.

In terms of potential resources to Aboriginal people the box woodland would have been the habitat of possums, koalas, snakes, bats, goannas, birds (and eggs), native bees (and 'sugarbag' or honeycomb), insects and grubs; and the grasslands the habitat of kangaroos, wallabies, echidnas, snakes, birds, and insects – as well as being a source for seeds, nectar and bark.

3.3 Water Resources

The mine site straddles a low sandstone ridge on which there are only minor drainage depressions, and the nearest perennial watercourses are Werris Creek, 5 km north of the limit of open cut mining, and Quipolly Creek which flows 2.5 km to the south.

There was no evidence of any surface water in the mine site at the time of the 2004 survey, although a narrow gully descended the western slopes in the south-western corner of ML 1563. It is unlikely that this gully was ever a reliable source of water, however, the presence of grinding grooves associated with this gully (see Section 4) is interesting in that while it is possible to grind an edge onto stone without water, it is very difficult and a not very efficient method and one not likely to have been common practice. Water must therefore either have been available nearby or brought to the site. In any event, the presence of the axe-grinding grooves suggests that the apparent absence of water within the immediate environs was not a constraint to Aboriginal use of the area.

3.4 Stone Resources

As referred to previously, very little stone was observed within the 2004 study area that would have been suitable for knapping into tools or implements. There appeared to be some lag conglomerates on the middle and lower slopes to the south and south-west of the ridge on the western side of the mine site, however, it should be noted that not all conglomerates include material suitable for knapping. In the apparent absence of a suitable knapping material occurring naturally in the study area any artefacts that might be present might have been sourced from elsewhere.

3.5 Previous Impacts

As the photographic record shows the mine site has been subject to a number of impacts. The primary impact has been from tree clearing and pasture improvement, and several well-worn tracks.

4 THE ARCHAEOLOGICAL RECORD

4.1 Pre-2004 Survey Records

Prior to undertaking the field survey in 2004, a search was made on the Aboriginal Sites Register (Aboriginal Heritage Information Management System – AHIMS) for all sites within a 10 km by 10 km square centred on the mine site, defined by Eastings: 270000-280000, Northings 6519000-6529000. The result of the search showed that three sites had been recorded within the area, of which only one occurred within the survey area of Appleton (2004) (see **Figure 5**). Details of the search are included as **Appendix v**. Two of the sites comprised open artefact scatters, and the third of axe-grinding grooves.

The low density of recorded sites in the general area, however, should not be seen to represent the typical density or distribution of sites generally in the area. Most sites are recorded during investigations required to support development applications etc, or because they are well known or are readily visible. It follows that in areas where there has been little development, or in which there are few distinctive geological features, and particularly in areas where there has been clearing, ploughing, grazing or cropping, there are few occasions when sites will firstly be observable, and secondly recorded. The low density of sites therefore, reflects in part the fact that in the absence of development and therefore no targeted surveys, and secondly, that crops and pasture grasses are a constraint to archaeological visibility, and sites such as artefact scatters and isolated artefacts may not be observable. However, having recognised that based on the availability of resources, history of land use, and likely archaeological visibility, there is a potential for other sites to exist, it is reasonable to suppose that an investigation of the total 10 km by 10 km search area might not yield any additional sites (see the Predictive Model of Section 5.2).

4.2 Appleton (2004) Survey Records

As noted in Section 3.2, the field survey of Appleton (2004) identified a site containing 25 or more axe-grinding grooves on the western side of the open cut area (see **Figure 5**). The site covered an area of approximately 90m x 35m at its widest point and is interesting due to the absence of any nearby perennial water source.

Initially, the open cut area was modified to avoid disturbing the site of the grinding grooves, however, following consultation with the Nungaroo LALC and the approval of a modification to DA 172-7-2004, the grinding grooves were removed and transported to a safe and protected storage area. The removal, translocation and ongoing management of the site was and continues to be undertaken in accordance with a Cultural Heritage Management Plan (CHMP) prepared as a condition of the modified approval (Appleton, 2008). In accordance with the CHMP, the grinding grooves will be rehabilitated to their original location once the mining has been completed and the original location restored.

5 MODELS FOR SITE LOCATION

5.1 Site Types and Location

In order to design an investigative strategy it is firstly necessary to develop a predictive model for site location. This is not to determine where the investigation should be conducted, but to establish a theoretical model for the distribution of archaeological material against which the effectiveness and subsequent analysis of the survey results can be tested, compared and reasoned. The basis upon which the predictive model is derived must however be one of consideration of which archaeological material might realistically be expected to not only be present, but also detectable.

The first objective of any archaeological investigation must be to observe and record sufficient of the archaeological record that is present to be able to propose that it is representative of the record as a whole.

The investigative strategy is therefore directed and designed to detect that which is representative of the record in the particular study area, and naturally, as different study areas will comprise variations in environment, vegetation, topography, etc., so the investigative strategy must be designed to best suit the circumstances. The objective must be to detect material evidence, and so it is necessary to consider the extent to which artefactual material may be present, and the degree to which it is visible or might be discovered.

There are several factors, which are likely to affect, firstly, where Aboriginal people are most likely to have been, secondly, where they have left evidence of their activities, and thirdly, the degree to which that evidence is observable in the present record.

People visited places mainly to obtain resources, and in general places that were richest in resources were more likely to have been visited by people than those places with fewer resources. Important resources were permanent water, ephemeral water, food resources, stone raw material sources, shelter (from sun, wind, and rain), and perhaps suitable surfaces for rock art, and proximity to mythological natural features. Those resources may have been a factor in the suitability of a location for particular ceremonial activities but cultural boundaries also influenced the choice of ceremonial grounds. Alternatively, sites frequently occurred along preferred access routes and particularly where that route coincided with a watercourse.

However, the attractions of such an environment frequently resulted in the archaeological record becoming discontinuous or significantly disturbed, as stock and vehicles impacted upon it in the post-European contact phase.

Frequency of visits and use of particular locations was also determined by the 'accessibility' or freedom from environmental constraints in the area. For example, whether there were alternative, preferred or easier ways to travel around or over natural barriers, be they geological, geographical, cultural, or imposed by fauna or flora, or whether they were only seasonally accessible, such as mounds on flood terraces, or the availability of water during periods of drought, or whether or not floods, fire or snow hindered access.

Few past Aboriginal activities are represented by surviving material evidence. This in part is because many activities did not leave material evidence (e.g. tools were reused), but it is also because very little cultural material survived. An exception to this was shellfish, which was very durable.

The survival of material that is durable was also affected by recent European land use. Cultivation has destroyed many archaeological sites. However, cultivation can also help expose sites that might otherwise be covered. This brings us to the other important point about site distribution, which is that to a great extent site distribution recorded by archaeologists reflects the distribution of places where the ground surface is sufficiently eroded to expose artefactual material.

By far the majority of recorded sites have been stone artefact scatters or isolated stone artefacts, and in the vast majority of sites they were found in one or more of the following contexts:

i) On or adjacent to deposits containing quartz, quartzite, jasper, silcrete, chert, chalcedony, metamorphosed greywacke, and other indurated or siliceous sedimentary rocks, or redeposited fine-grained volcanics, or

ii) On river banks or adjacent to river banks where the watercourse contains river pebbles of quartz, quartzite, jasper, silcrete, chert, fine-grained volcanics, basalts, etc., and particularly at the junctions of watercourses, or

iii) On ridges and spurs overlooking watercourses or on high vantage points affording uninterrupted views of swamps, water holes, saddles, passes, and any other likely access path into the observer's area, or

iv) In the vicinity of outcrops of suitable raw material such as basalt, silcrete, chert, or other highly silicified sedimentary rock.

Other site types do occur and perhaps because of their lower and less predictable profile, are present in far greater numbers than we are aware of. People die but there are few recorded burials. One reason may be that in many instances the soils are too acid for the preservation of bone, but a far more likely reason is simply that burial frequently entailed subsurface internment, and a surface survey will only discover a burial where there has been erosion of significant disturbance to the surface deposits. As a consequence many burials have only been discovered when exposed by erosion of a sand body or river terrace.

Other site types such as carved trees, scarred trees, stone arrangements, Bora rings, etc., may once have been present, but are unlikely to have survived in easily accessible country from the attention of non-indigenous people. Thus, much of what might have existed is now lost or destroyed, and the archaeological record has become biased by the post-contact utilisation of resources, and by the selective exploitation and preservation of particular environments.

Other factors which affect the degree to which sites are recorded during an investigation include the time of year at which the fieldwork is performed (the seasonality of some vegetation growth) and the conditions under which the survey is performed – (wet, dry, cold, windy, poor light, etc.).

A brief description of site types such as isolated artefacts, open scatters, camp sites, knapping floors, quarries, middens, mounds, hearths, carved trees, scarred trees, stone arrangements, Bora rings, burials, engravings, paintings, grinding grooves, occupation deposits (and PADs), and ceremonial and mythological sites is included as Appendix vii.

5.2 A Predictive Model for the Study Area

Considering the information summarised in Section 5.1, the following model for site distribution was proposed for the 2004 study area, in which there was likely to be shelving sandstone outcrops on the slopes, particularly towards the edge of the ridge, but in which there was very little water and no apparent source of useful knapping material.

- Isolated artefacts may be present and visible in erosion features.
- Low-density artefact scatters may be present and visible in erosion features, but it is unlikely that any debitage will be visible.
- There is a potential for trees more than 150 years old to exhibit scarred surfaces.

- There is a potential for any trees more than 150 years old to exhibit carved surfaces.
- There may be engravings, and/or grinding grooves wherever there is outcropping sandstone.
- There will be no shelters and therefore no art sites.
- There will be no shelters and therefore no intact occupation deposits.
- There will be no stone quarries.
- There will be no shell middens.
- There will be no visible evidence of burials.
- There will be no surviving Bora rings.
- There will be no surviving stone arrangements.
- There are no known cultural associations with the area.

The predictive model remains relevant to the restricted Study Area of the current investigation.

6 FIELD SURVEY

6.1 Introduction

Reliance is placed on the field survey conducted in August 2004, with the following sub-sections describing the survey strategy, site recording and coverage of this survey. Where relevant, information on a supplementary field inspection completed by Appleton in December 2008 to confirm the continued applicability of the 2004 survey is provided.

6.2 The Survey Strategy

Prior to the 2004 investigation it was decided that as the survey area was not large (see **Figure 5**) it would be possible to undertake a comprehensive survey of the entire survey area. In effect, the grass ground cover was so dense in most of the cleared areas that it was only possible to perform a sample survey. As a consequence the survey strategy entailed walking tracks, and targeting rock and soil exposures, erosion features, drainage lines, and any tree that appeared to be old growth.

In December 2008, Appleton returned to the mine site, and accompanied the Werris Creek Coal Mine Environmental Officer, Lynden Cini, revisited the survey area of the current investigation to determine whether the area had been part of the larger area surveyed in the 2004 investigation. Having determined that the proposed modifications to the mining area layout occur within the area that had been surveyed previously, Appleton concluded that it would be unnecessary to resurvey the area.

6.3 Details of the 2004 Survey

The survey was undertaken by ASR, assisted by Peter Allan and Shane Allan representing the Nungaroo LALC. The survey was made on foot, in dry conditions under a partly cloudy sky, but in light ideal for observing any artefactual material present and observable.

All of the areas shown shaded in red on **Figure 5** were surveyed on foot in a preliminary investigation in 2003, and in the subsequent comprehensive investigation in 2004 (Appleton, 2004).

6.4 Site Recording

All relevant observations as to the topography, vegetation cover, and conditions, were recorded in a field-log, and photographs taken with an Olympus Camedia C-3030 Zoom Digital Camera to witness survey conditions.

6.5 Effectiveness of the Survey Technique

There was a dense grass cover in most cleared areas but there was sufficient ground surface exposure, and in the tracks, and in erosion features, and in environments in which artefactual material was most likely to be present if at all, for an effective sampling of the survey area. In addition to the more obvious ground surface exposures some areas contained minor erosion features, which provided samples of those environments least likely to contain artefactual material. Also, there was direct access to the few extant old growth trees and so the survey in respect of identifying scarred or carved trees was highly effective.

The survey technique was the most appropriate one to use in the circumstances, and the results are believed to be generally representative of the archaeological record in the survey area, in which it was predicted there would be very little artefactual material, primarily because of the absence of a suitable knapping material. Although the entire area was sample surveyed, the groundcover was a constraint to the effectiveness of the survey.

6.6 Effectiveness Coverage

The table on the following page, is divided into units delimited by observed topographical features, environments, and/or land use, briefly described in terms of 'horizontal' or map area, soil, and archaeological visibility, and the percentage of the area actually surveyed.

Figure 5 shows the effective survey coverage based on the assumption that most artefactual material if exposed and visible can be observed for up to 5 metres to either side of the path of the observer. Clearly this would vary significantly between a path walked through dense vegetation, and a path across a claypan, and is given as a guide only.

Plates 1 and **2** show two aspects of the additional areas of disturbance proposed by the modification to the mining area layout (as photographed in 2004).

7 THE RESULTS

No sites or places of archaeological or Indigenous cultural significance or locations of Potential Archaeological Deposits (PADs) were identified in the survey area of the current investigation.

8 DISCUSSION

The absence of sites within the survey area for the proposed modification was not surprising given that most of it comprised of gentle slopes that have been cleared, harrowed, ploughed and contoured, for pasture. As identified on **Plate 2**, an ephemeral drainage line is aligned north to south along the eastern margin of the modified open cut area, but this area too has been partially cleared and harrowed for pasture. Repeated stock use of the creek has significantly altered the banks which had become covered with colluvial deposits loosened by the clearing of vegetation on the slopes of the catchment area.

In summary, although the survey area occurred in a region in which there is a potential for sites to occur, there was only a very low potential for the area to contain archaeological material. If however archaeological material was present, it was likely to consist of very small isolated artefacts, none of which would be observed other than by chance.

9 SIGNIFICANCE ASSESSMENT

9.1 Assessing Significance

The DECC policy to safeguard all sites, Aboriginal places, and archaeological material of significance wherever possible requires that some means of assessing the significance of the sites is necessary. This is not only for the purpose of determining whether the proposed development can proceed as proposed, but also to provide Cultural Resource Managers with the information for future management of the area.

9.2 Cultural Significance

The Aboriginal or cultural significance of Aboriginal relics and sites can only be assessed by the Aboriginal community, and in particular, the Elders. It is the responsibility of the archaeologist to ensure that the Elders or elected representatives of the Aboriginal community are advised of the survey results, and are consulted as to their knowledge and opinion of the significance of the area, and to transcribe and present those expressions in report form.

In this instance the Nungaroo LALC was directly involved in the consultation process for the 2004 investigation, and other than recommending that the axe-grinding groove site should be salvaged, was satisfied that there were no other constraints on Indigenous cultural grounds to the coal mine proceeding as proposed at that time, which at the time, included all of the area investigated (as shown in **Figure 5**).

Plate 1: Looking southwards down the eastern edge of the proposed extension area

Plate 2: Looking northwards towards the north-eastern corner of the proposed extension area

9.3 Research Potential

In the absence of any archaeological remains in the proposed extension area there is no potential for further investigation, and no potential for future research in the area.

10 RECOMMENDATIONS

On the basis of the 2004 field survey and archaeological investigation, and a review of this in relation to the proposed modification, there are no archaeological or cultural constraints to the modified operation proceeding as proposed.

However, the Applicant is advised that they are legally obliged to comply with the following provisions of the National Parks and Wildlife Act 1974 (as amended), which state that:

> "*The owners, and their employees, earthmoving contractors, subcontractors, machine operators and their representatives, whether working in the survey area or elsewhere, should be instructed that in the event of any bone or stone artefacts, or discrete distributions of shell, or any objects of cultural association, being unearthed during earthmoving, work should cease immediately in the area of the find.*
>
> *In the event that any bone cannot be clearly identified by a qualified archaeologist as being of animal remains the police are to be informed of its discovery, and officials and/or their representatives of the Nungaroo Local Aboriginal Land Council (LALC), and DECC advised that the bone is subject to police investigation.*
>
> *Work should not recommence in the area of the find, until both the police (if bone has been found) and those officials or representatives have given their permission to do so. Those failing to report a discovery and those responsible for the damage or destruction occasioned by unauthorised removal or alteration to a site or to archaeological material may be prosecuted under the National Parks and Wildlife Act 1974, as amended.*"

GENERAL GLOSSARY: The definitions that follow are for terms used in this and other reports written by the author, and do not necessarily apply to their use in different contexts.

ADZE : A modified flake with at least one steeply-retouched working edge. While all adzes are generally considered to be wood-working tools it is probable that some also served as cores and others as scrapers. Adzes with a uniform butt were frequently hafted to make a chisel-like tool, but the intended use of the adze determined the size of the adze and whether it was hafted (Flenniken and White, 1985).

AHD: Australian Height Datum

ARCHAEOLOGICAL DEPOSIT :
Sediments which contain evidence of past Aboriginal use of the place, such as artefacts, hearths, burials etc.

ARTEFACT : Any object that has attributes as a consequence of human activity (Dunnell, 1971). In this report 'artefacts' has been used generally to describe pieces of stone that have been modified to produce flakes, flaked pieces, cores, hammerstones, or axes.

BACKED BLADE :
A stone tool manufactured from a flake on which one margin has been modified by the removal of small flakes to blunt the edge or margin opposite the cutting edge.

BORA GROUND :
A ceremonial site comprising of one or two connected circles composed of compacted or mounded earth, or defined by an arrangement of stones, of 2 to 30m diameter, generally used in male initiation rites.

CAMPSITE : A place at which the density of artefacts and the variety of material indicates that people ‘frequently’ used the place as a stopping or resting place. Such places are also likely to contain or be close to water resources, food resources, or stone material resources. In this report a campsite is used to describe artefact scatters that are associated with hearths or fireplaces, as distinct from scatters that are not associated with hearths or fireplaces, which are described as Open Scatters.

CHALCEDONY :
A form of silica (partially translucent), which occurs as linings in cavities in rocks. When banded it is known as AGATE (Department of Mines, 1973). Chalcedony is uniformly coloured and agate has curved bands or zones of varying colour (Cook & Kirk, 1991).

CHERT : Another name for sedimentary chalcedony. It occurs most frequently in limestones, or in marine sedimentary rock, or as pebbles in sedimentary rock. In its depositional context it is often concentrated in bedding planes. Chert found in deep-water limestones is formed from radiolaria and diatoms (siliceous planktonic micro-organisms) (Cook & Kirk, 1991).
Chert is a form of amorphous or extremely fine-grained silica, partially hydrous, found in concertions and beds. It is classified as a chemical sedimentary rock although it may be precipitated both organically and inorganically (Department of Mineral Resources, n.d.).

CONGLOMERATE :
Naturally cemented gravel. Conglomerate is a coarse-grained clastic sedimentary rock composed of generally rounded fragments of other rock types larger than 2 mm in diameter, set in a fine-grained matrix of sand, silt, or any of the common natural cementing materials (Department of Mineral Resources, n.d.).

CORE : A piece of stone from which flakes have been removed, that cannot otherwise be described as a retouched or modified artefact.

CORTEX : The naturally altered surface of stone – eg. the water-worn surface of river pebbles.

DEBITAGE : The small waste material observed in knapping floors. Generally, waste material is described as all those fragments having a maximum dimension of less than 10mm

FLAKE : A fragment of stone exhibiting features indicating that it has been deliberately removed from a core piece. These features are evident as:

i) Platform: Plane or point at which a blow was delivered to remove the flake.
ii) Bulb of Percussion: Convex surface that occurs on the face or ventral surface of a flake, radiating from the point of impact, produced as a consequence of the force pattern.
iii) Eraillure: see below.

Other terms:

i) Dorsal: The back or outer face of a flake as it would have been prior to removal from a core. Frequently either ridged or exhibiting negative flake scars when removed in secondary flaking, with a natural weathered cortex when removed in primary flaking.
ii) Ventral: The 'chest' or inner face of a flake as it would have been prior to removal from the core. The surface upon which the Bulb of Percussion occurs.
iii) Platform Preparation: The removal of flakes from a surface to produce a level platform. May be evidenced by retouch scars to the platform.
iv) Retouch: The removal of small flakes from an edge or margin of an artefact to modify its shape or resharpen its edge.
v) Proximal: The end of a flake closest to the striking platform.
vi) Distal: The end of a flake furthest from the striking platform.
vii) Margin: The edge of an artefact.
viii) Eraillure: A small circular to elliptical negative flake scar occurring on the surface of the bulb of percussion on flakes of very fine-grained or highly silicified material. It occurs 'naturally' as a consequence of internal forces generated at the time of flake removal.
ix) Split Cone: Occurs when the flake splits down its axis frequently removing part of the striking platform. Generally believed to be produced by faulty knapping technique, but is also probably a consequence of flawed material.
x) Transverse Snap: Occurs when a flake snaps across its axis. Generally believed to be caused by post-depositional impacts such as human or stock treadage, or vehicular traffic.

FLAKED PIECE :

A fragment of stone exhibiting flake scars indicating that it is an artefact, but not displaying diagnostic features, such as a Bulb of Percussion, Striking Platform, or an Eraillure.

GREYWACKE :

A type of sandstone, grey or greenish-grey in colour, tough and well indurated and typically poorly sorted (Clark & Cook, 1986).

A generally poorly sorted, dark sandstone containing feldspar and sand-sized rock fragments of metamorphic or volcanic rocks (Department of Mineral Resources, n.d.).

Usually a dark and coarse-grained rock compared to mudstones and siltstones that are much finer-grained and better sorted.

HOLOCENE PERIOD :

The period from 10,000 years ago to the present.

IGNEOUS ROCK :

Rock formed by the cooling and solidification of magma on or below the earth's surface (Geography Dictionary, 1985).

In situ : In its original place – as deposited.

ISOLATED ARTEFACT :

A solitary stone artefact, at least 50m from its nearest neighbour. This is based on NPWS policy that two artefacts within 50m of each other constitute a site.

KNAPPING FLOOR:

A discrete scatter of artefacts in which at least two artefacts are recognisably of the same material, and derive from the same piece of stone. Also described as a stone tool manufacturing site or floor.

LOCATION : The place at which an artefact is found, or a place identified as having either archaeological or Aboriginal significance.

MEASUREMENT :

I) Flake:
   i) Length: Measured along the percussion axis at right angles to the platform.
   ii) Width: The greatest width measured at right angles to the percussion axis.
   iii) Thickness: The greatest thickness measured at right angles to the percussion axis.

II) Flaked piece:
   i) Length: The longest dimension
   ii) Width: The greatest width measured perpendicular to the length.
   iii) Thickness: The greatest thickness measured perpendicular to the length.

III) Core:
   i) Length: The longest dimension.
   ii) Width: The greatest width measured perpendicular to the length.
   iii) Thickness: The greatest thickness measured perpendicular to the length.

MIDDEN : A refuse heap or stratum of food remains, such as mollusc shells, and other occupational debris (Dortch, 1984 – see also Meehan, 1982).

MUDSTONE : A fine-grained detrital rock, usually quite massive and well consolidated. May be black through grey to off-white, browns, reds and dark blues/greens. Frequently found in association with sandstones (Cook & Kirk, 1991).
Identification is often aided by colour variations in layering. A source for stone material tool manufacturing material found as river pebbles in creek beds, and artefacts often display a water-worn cortex.

NEGATIVE FLAKE SCAR :

A concave surface resulting from the removal of a flake, occurring on the surface of the rock from which a flake has been removed.

PLEISTOCENE PERIOD :

The period from about 10,000 years ago to 2 million years ago.

POTENTIAL ARCHAEOLOGICAL DEPOSIT (PAD) :

Synonymous with Potentially Archaeologically Sensitive : Having the potential to contain archaeological material although none is visible.

QUARTZITE :

Quartzites are formed by the regional or contact metamorphism of quartz arenites, siltstones, and flints (cherts). They are composed essentially of quartz, and usually have a fine-grained granoblastic (grains are roughly the same size) texture. Generally massive, but may sometimes show sedimentary structures (Cook & Kirk, 1991).

ROTATION :

The removal of flakes from a core by blows directed at different angles, to different platforms. May be evident on the dorsal surface of a flake as negative flake scars, which do not follow the same direction as the percussion axis of the flake. This may be confused with scars produced during core preparation.

SCAT : The solid waste material produced by an animal – dung, droppings, manure (Triggs, 1985).

SCATTER : Two or more artefacts occurring within 50 metres. Scatter may also be used in the context of 'background scatter', meaning the general distribution of artefacts across the landscape that cannot be recognised as discrete concentrations.

SILCRETE : A near surface or surface siliceous induration (Desen & Peterson, 1992).
A conglomerate consisting of surficial sand and gravel cemented into a hard mass by silica.
A siliceous duricrust (Bates & Jackson, 1980).
Crusts may form as a result of low, infrequent rainfall, on reasonably flat surfaces. These are known as duricrusts – those cemented by silica are known as silcretes (Clark & Cook, 1986), sometimes referred to locally as 'billy' (Gentilli, 1968), or 'grey billy'.
Silcrete on the northern tablelands of NSW forms at the surface contact between sediments of the Sandon Beds and the Armidale Beds with overlying basalt, where groundwater (more rich in silica than surficial water) interacts with surficial water and precipitates new quartz as the matrix to the sediments (N.D.J. Cook, Dept. of Geophysics, UNE, pers. Comm.).
In softer formations of quartz sands, groundwater has apparently been responsible for the formation of concretionary layers of silcrete. Under altered climatic conditions, the less competent beds erode away leaving concretions. Since they are often the size of old-fashioned woolsacks and are greyish and white, they are popularly known as gray billy (slang for billy goat) (Fairbridge, 1968).

SITE : A discrete area or concentration of artefactual material, place of past Aboriginal activity, or place of significance to Aboriginal people.

SOIL SCIENCE TERMS (taken from Banks, 1995, and others as referenced).

BEDROCK : Outcrop of *in situ* rock material below the soil profile.

BENCH : A strip of relatively level earth or rock breaking the continuity of a slope.

BLOWOUT : A closed depression formed in the land surface by wind eroding sands and depositing them on adjacent land.

CHERT: A very fine-grained amorphous silicate sedimentary rock, commonly a layer of chemical precipitate or micro-organism skeletal remains (Milford 1999).

CLAY: Soil material composed of very fine particles less than 0.002 mm size. When used to describe a soil texture group, such a material contains more than 35% clay (Milford 1999).

CLAYPAN : A depression caused by the aeolian deflation of sediments, or by the presence of a prior lake.

CONGLOMERATE: A poorly-sorted detrital sedimentary rock composed of rounded gravels, stones or cobbles in a matrix of much finer material (Milford 1999).

DUNE : A ridge built up by wind action composed of sands, silts, or sand-sized aggregates of clay.

FLOODPLAIN : A large flat area, adjacent to a watercourse, characterised by frequent active erosion and aggradation by channelled and overbank stream flow.

GIBBER : A level surface covered by a thick deposit of gravel or broken siliceous pebbles, occurring in the more arid parts of the continent, thought to have been formed from the break-up of a siliceous (silcrete) surface crust, and termed gibber plains (Whittow, 1984) – see also silcrete.

GILGAI : Surface microrelief associated with soils containing shrink-swell clays. Gilgai consists of mounds and depressions, or irregularly distributed small mounds and subcircular depressions varying in size and spacing. Vertical interval usually <0.3m; horizontal interval usually 3-10m, and surface almost level. Sometimes called 'crab-hole' soils.

GREYWACKE: A tough, well-indurated type of sandstone distinguished by detrital quartz crystals and rock fragments set in a finer-grained matrix (Milford 1999).

GULLY : An open incised channel in the landscape generally greater than 30cm deep and characterised by moderately to very gently inclined floors and steep walls (Milford 1999).

HUMMOCK : A small raised feature above the general ground surface.

LANDFORM ELEMENTS :

Crest : Landform element standing above all points in the adjacent terrain.
Flat : Neither a crest or a depression <3% slope.
Upper slope : Adjacent to and below a crest or flat but not a depression.
Midslope : Not adjacent to a crest, a flat or a depression.
Lower slope : Adjacent to and above a flat or a depression but not a crest.

LITHOSOLS : Shallow soils showing minimal profile development and dominated by the presence of weathering rock and rock fragments.

METAMORPHIC: Rocks whose composition, texture and/or structure have been altered through tectonic pressure and/or heat (Milford 1999).

METASEDIMENTARY: Partially-metamorphosed sedimentary rock (Milford 1999).

MUDSTONE: A fine-grained dark-coloured sedimentary rock, formed from lithified mud; similar to shale but more massive (Milford 1999).

pH A measure of the acidity or alkalinity of a soil. A pH of 7.0 denotes neutrality, higher values indicate alkalinity, and lower values indicate acidity. The pH scale is logarithmic, i.e., a pH of 4.0 is ten times as acid as a pH of 5.0, and one hundred times as acid as a pH of 6.0. (DLWC 1999).

RILL : A small channel cut by concentrated runoff through which water flows during and immediately after rain.
A small ephemeral channel, generally no more than 30 cm deep, created by concentrated runoff (Milford 1999).

RUNOFF : That portion of precipitation not immediately absorbed into or detained upon the soil and which thus becomes surface flow.

SCARP/CLIFF : A steep slope terminating a plateau or any level upland surface.

SCRUB : vegetation structure consisting of shrubs 2-8m tall.

SHEET EROSION : The removal of the upper layers of soil by raindrop splash and/or runoff.

SOIL PROFILE :

"A HORIZON": The top layer of mineral soil. This may consist of two parts:
A_1 HORIZON: Surface soil and generally referred to as the topsoil.
A_2 HORIZON: similar in texture, but paler in colour, poorer in structure, and less fertile.

" B HORIZON": The layer below the A Horizon. This consists of 2 parts:
B_1 HORIZON: A transitional horizon dominated by properties characteristic of the underlying B_2 horizon.
B_2 HORIZON: typically contains concentrations of silicate clay and/or iron, and/or aluminium and/or translocated organic material.

"C HORIZON": The parent rock. Recognised by its lack of pedological development, and by the presence of remnants of geologic organization.

"R HORIZON": Hard rock that is continuous (Charman & Murphy, 1993; 350-1).

SPUR : A ridge which projects downwards from the crest of a mountain as a water-parting (Whittow, 1984).

SUBSOIL : Sub-surface material comprising the B and C Horizons of soil with distinct profiles; often having brighter colours and higher clay contrasts.

SURFACE CONDITION :

Gravelly : Over 60% of the surface consists of gravel (2-69mm).
Hardsetting : Soil is compact and hard.
Loose : Soil that is not cohesive.
Friable : Easily crumbled or cultivated.
Self-mulching : A loose surface mulch of very small peds forms when the soil dries out.

SWALE : A linear level-floored open depression excavated by wind or formed by the build-up of two adjacent ridges.

SWAMP : Watertable at or above the ground surface for most of the year.

TOPSOIL: The surficial layers of the soil profile, typically the A Horizon, which is usually darker, more fertile, better structured and contains more organic matter than underlying soil materials (Milford 1999).

TERRACE : A flat or gently inclined surface bounded by a steeper ascending slope on its inner margin and a steeper descending slope on its outer margin (Whittow, 1984).

TOPSOIL : A part of the soil profile, typically the A_1 horizon, containing material that is usually darker, more fertile and better structured than the underlying layers.

UNDERSTOREY : A layer of vegetation below the main canopy layer.

WEATHERING: The physical and chemical disintegration, alteration and decomposition of rocks and minerals at or near the earth's surface by atmospheric and biologic agents (Milford 1999).

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APPENDICES

Appendix I Results of the search of the AHIMS Site Register

Appendix II Site Types

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Appendix I

Results of the Search of the AHIMS Site Register

(No. of pages excluding this page = 3)

Your Ref:
Our Ref: AHIMS #8528

Archaeological Surveys and Reports
10 Roslyn Avenue
Armidale NSW 2350

Monday, 20 October 2003

Attention: John Appleton

Dear Sir or Madam:

NSW NATIONAL PARKS AND WILDLIFE SERVICE

ABN 30 841 387 271

Re: AHIMS Search for the following area at Werris Creek
Zone 56 Eastings: 270000-280000 Northings: 6519000-6529000

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW National Parks and Wildlife Service (NPWS) at the above location.

A search of the NPWS Aboriginal Heritage Information Management System (AHIMS) has shown that 3 Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to NPWS;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and NPWS assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the NPWS Director-General. An Aboriginal object is considered to be known if:

- It is registered on AHIMS;
- It is known to the Aboriginal community; or
- It is located during an investigation of the area conducted for a development application.

Head Office
43 Bridge Street
PO Box 1967
Hurstville NSW
2220 Australia
Tel: (02) 9585 6444
Fax: (02) 9585 6555
www.npws.nsw.gov.au

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If you are considering undertaking a development activity in the area subject to the AHIMS search, NPWS would recommend that an Aboriginal Heritage Assessment be undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely

Vanessa Kendall
Aboriginal Information Officer
Information Systems Unit
Cultural Heritage Division
Phone: (02) 9585 6345
Fax: (02) 9585 6325

List of Sites (List - Short)

ahims#8528

Grid Reference Type = AMG Zone = 56 Easting From = 270000 Easting to = 280000 Northing From = 6519000 Northing to = 6529000 Feature Search Type = AHIMS Features

Site ID	Site Name	Grid.Ref Type	Zone	Easting	Northing	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)
29-2-0004	Escott;Werris Creek;	AMG	56	272400	6526400	AFT,	Open Camp Site	Hammond,H (01-MAY-64)	
		Status Valid							
		Primary Contact							
29-2-0005	Narrawolga;	AMG	56	274800	6523300	GDG	Axe Grinding Groove		
		Status Valid							
		Primary Contact							
29-2-0083	WC-OS-1;The Gap, Werris Creek;	AMG	56	271630	6528500	AFT,	Open Camp Site	Kelton,J (12-AUG-97)	
		Status Valid							
		Primary Contact							

Number of Sites :3

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Appendix II

Site Types

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Site types associated with Indigenous activities and culture

The definitions that follow are for terms used in this report, and do not necessarily apply to their use in different contexts.

Art sites are defined as places where any medium has been applied to a rock surface either as symbols, characters, drawings, paintings, or any other rendition, recognisable as not being a natural discolouration or feature. They also include markings to a rock surface, either by engraving, abrading, or pecking, and which cannot be identified as being a natural feature.

Bora rings are circles of 2-30 metres diameter of compressed earth (from repeated treading or dancing), or stone arrangements, at which men performed initiation ceremonies, and are the most frequently recorded ceremonial sites. Sometimes they occur as two rings joined by a central track in a barbel configuration. They usually occur on level or low-lying country, which is usually the first topographical unit to be cultivated, or utilised for highways and roads, but they may also occur as circular stone arrangements on elevated rock platforms and hilltops. If they are or were present then they are usually either already known and have been recorded, or they have long since been destroyed.

Carved trees are readily recognised by even the untrained observer. The carving is incised either into the outer bark, or more commonly, into the living wood after removal of a section of the bark. The designs frequently consist of 'diamond cross-cuts', but may also consist of stylised animal motifs. Previously unrecorded carved trees are still discovered in relatively remote or inaccessible areas. Carved trees frequently occur near burial sites and/or Bora rings, but in some regions they may have been tribal boundary markers.

Fish traps may occur either in rivers or on seashores. They are recognisable as unnaturally formed stone arrangements that were constructed to trap fish (or eels or turtles) carried into the enclosure in deep water, and which are left stranded within the enclosure as the water level drops. The fish were then caught by nets, hand, or by spear.

Grinding grooves are usually observed on the surfaces of large sedimentary boulders or exposed shelves and outcrops of sedimentary rock along creek banks and beds, or near water. They have been produced by Aborigines using the rock surface to shape and sharpen the edges of stone to produce ground-edged axes, or to sharpen wooden spears (the latter tend to be narrow and deep). Water was used to lubricate the surface of the rock. The grooves frequently occur as linear abraded depressions in the rock, and may each be between 10 and 50 centimetres long, up to 15 centimetres wide, and 2 to 5 centimetres deep. Some sedimentary rock surfaces may exhibit shallow ground depressions of roughly round or elliptical shape, and these are more likely to be associated with seed grinding, root crushing, or other food preparation.

Middens may be identified variously as beach, lagoon, lacustrine, or estuarine, and are most likely to be observed at or above the water line where erosion, topsoil removal, or mining has exposed the shell. The size of the midden can vary enormously, with the smallest comprising a 'one off', "dinner-time camp" (Meehan. 1982), with as few as two or three shells, or a shallow lens of only a few centimetres. The largest middens may extend for many kilometres and may comprise of a number of lenses and layers of shell and ash up to several metres deep. These large middens may be evidence of continuous exploitation of the resource over many thousands of years. Middens of fresh water mussel shell may be found in eroding creek banks or in eroding terraces, particularly near both existing and defunct water holes.

Isolated shell or fragments may occur on any surface and in any situation. A single shell may have been discarded by a bird, but the presence of use-wear would indicate Aboriginal use of the shell as a tool, which was discarded after use. Such occurrence is likely to be where there is no immediate source of stone material suitable for tool manufacture.

Natural Mythological sites are places of significance to Aborigines, either because they are described in mythological stories or songlines, or because they were used in religious ceremonies. They may occur anywhere and while some are more predictable than others – as for example, permanent water holes, waterfalls, rock promontories, etc., others may have no particularly remarkable features. Seldom is there any recognisable artefactual evidence or anything to distinguish it from similar features in the vicinity. These sites must of necessity be identified by Aboriginal people with an association with the place.

Open sites, campsites, knapping floors, scatters, and isolated artefacts, are most likely to occur on eroded and exposed creek banks, particularly where slope wash or stock trails has removed the humic layer, or on eroded ridges and spurs, particularly near the junctions in watercourses.
Open sites are most likely to be present in greatest numbers near a source of either raw stone material, or potential food resources, or in a natural corridor between two differentially preferred environmental zones, or at the contact between two environmental zones containing different resources.
Artefacts in open scatters are likely to be manufactured from the dominant raw material available; i.e. Greywacke on greywacke-sourced soils, quartz on granite-sourced soils, silcrete and chert on relict sedimentary soils.
Artefact assemblages in open scatters are likely to consist predominantly of discard material, i.e., cores, flakes, flaked pieces, and debitage.
Artefacts exhibiting retouch scars and backing are most likely to occur in sites where secondary activity took place peripheral to the central camp site, although this is a generality and can only be observed where there is sufficient surface visibility to identify peripheral sites. Fragments of flakes with retouch or backing may occur on knapping floors indicating breakage occurring during manufacture, or maintenance areas in which damaged tools have been replaced and discarded.

Isolated artefacts are likely to be most frequently observed where the groundcover obscures all but the larger artefacts, such as cores, and large flakes, or where there is little contrast between the texture of artefactual material and the surface upon which it lies. Artefacts of materials contrasting with the matrix may be visible regardless of size; eg. quartz artefacts may be far more visible than much larger basalt artefacts against a background of dark humic terrace soils.

PADs or Potential Archaeological Deposits are deposits, usually in shelters (but they may also be identified where there are intact deposits in open areas), which although not containing any visible archaeological material, are considered likely to contain archaeological material below the surface. These 'sites' are not recorded as sites on the Aboriginal Site Register, but are identified as places that require subsurface testing to establish whether a site exists or not.

Rock shelters with art or occupation deposits, are most likely to occur where the character of the parent rock is sufficiently massive or consolidated for it to retain a structure that weathers differentially to form shelters and overhangs.

Scarred trees are perhaps the most difficult site type to determine as having been caused by deliberate removal of the bark by humans and not as a consequence of natural events; such as abrasion from falling trees or branches, natural branch attrition, fire damage, or contact from vehicles or stock. They may occur in places wherever there are tree species that produce bark suitable for tool and implement manufacture. While some scars are clearly the consequence of deliberate bark removal by Aborigines (either evidenced by stone axe marks, or identified by Knowledge Holders), some scars were made by settlers, and stockmen, and surveyors who frequently blazed trails and property boundaries by scarring the trees, and by timber men who removed a strip of bark to test the suitability of a tree for logging.

Other site types such as hearths, burials, etc., are less easily predicted, although burials are frequently associated with carved trees, and Bora rings, and hearths with campsites, shelters, and shell middens.