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Gunlake Quarries
Gunlake Quarry Project

ENVIRONMENTAL ASSESSMENT

VOLUME III

Part 6
Australian Archaeological Survey Consultants Pty Ltd
Preliminary Archaeological Assessment. Proposed Gunlake Quarry Marulan NSW.

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Proposed Hard Rock Quarry Marulan NSW

Preliminary Archaeological Assessment

a report to Gunlake Quarries

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EXECUTIVE SUMMARY

Australian Archaeological Survey Consultants were contracted by Gunlake Quarries, a division of Rollers Australia Pty Ltd to undertake a cultural heritage assessment of the lands proposed for the development of a hard rock quarry at Marulan, NSW.

The study area, located approximately 8km northwest of Marulan, is accessed by Brayton Road. The study area consists of the area of impact associated with the proposed quarry site and the proposed future haul road. The proposed Project Site is 230ha in total. The Gunlake Quarry internal haul road is approximately 2km in length and 9m in width, traversing from the proposed quarry site northeast to Brayton Road. The haul road will then traverse southeast along Brayton Road (Brayton Road not part of current study) roughly some 4km. The proposed future haul route (which is included in this study then traverses east from Brayton Road some 3km to the Hume Highway.

A review was made of the NSW DEC AHIMS database, the Goulburn Mulwaree Shire Council LEP, the NSW State Heritage Register and the Australian Heritage Database to determine if any previously identified Indigenous and non-Indigenous sites were located within, or in close proximity to the study area. While no Indigenous sites have been registered within the survey area, several sites have been identified within the region. These sites are discussed in this report.

The Goulburn Mulwaree Shire Council LEP and State Heritage Register identify two (2) non-Indigenous heritage items within proximity to the survey area, the Marulan Station and Yard Group and Old Marulan Town. None of the above non-Indigenous heritage items are within the bounds of the study area, nor will the items be impacted on by the proposed developments.

The fieldwork component of the cultural heritage assessment for the project was completed by Dave Johnston (AASC Archaeologist), Peter Falk (representing Gavin Andrews of the D'harawal Knowledge Holders) and Justine Boney (Pejar Local Aboriginal Land Council Representative). The survey was carried out on the 6th and 13th June 2007.

Field investigations were also carried out to identify non-Indigenous sites within the study area and to assess the impact the proposed development may have on previously recorded non-Indigenous heritage items. The assessment by Robert Paton and Charmain O'Halloran (AASC Archaeologists) was completed on the 11th October 2007.

The survey was completed in the areas of impact associated with the proposed quarry site and the intended haul road within the proposed mine site boundaries as well as the proposed future haul road (which will traverse east of Brayton Road, south of the quarry site and joining the Hume Highway). These areas included the proposed quarry (1250m x 500m), the processing and stockpile area (270m x 100m), the overburden emplacement (300m x 450m), the quarry site haul road (2000m x 9m) and the proposed haul route/road which incorporates the existing Red Hill Road connecting to the Hume Highway (4000m x 9m). The survey team walked transects in a general north to south direction within the Gunlake quarry site, spaced 5m apart, therefore equalling a width of 15m.

During the course of the field survey five (5) Indigenous archaeological sites were identified. The sites consisted of one (1) isolated find and four (4) small artefact scatters containing less than 10 artefacts. The details of the sites are provided in *Appendix 1* of the following report.

RECOMMENDATIONS

Based on the above findings and in accordance with the legal requirements of the NSW DEC, a series of specific management recommendations have been established for the sites identified within the study area. The recommendations are aimed at minimising the impact of proposed developments on any potential cultural resources present within the surveyed area.

Heritage management options and recommendations provided in this report are made on the following bases:

- Consultation with representatives of the Pejar Local Aboriginal Land Council and Peter Falk, representative for Gavin Andrews of the D'harawal Knowledge Holders;
- The legal and procedural requirements of NSW DEC;
- The results of the investigation as documented in this report; and
- Background research into the extant archaeological and historic record for the study area and its surrounding regions.

The recommendations are:

1) Salvage and relocation of all sites (GL1 –5) should be completed prior to the commencement of works. The salvage should be completed in accordance with the NPW Act 1974 (NSW). A Section 90 Application (Consent, Consent with salvage) should be submitted to the NSW DEC. The salvage program should be completed on receipt of the Section 90 permit, by a qualified Archaeologist and with representatives of the relevant Indigenous organisations.

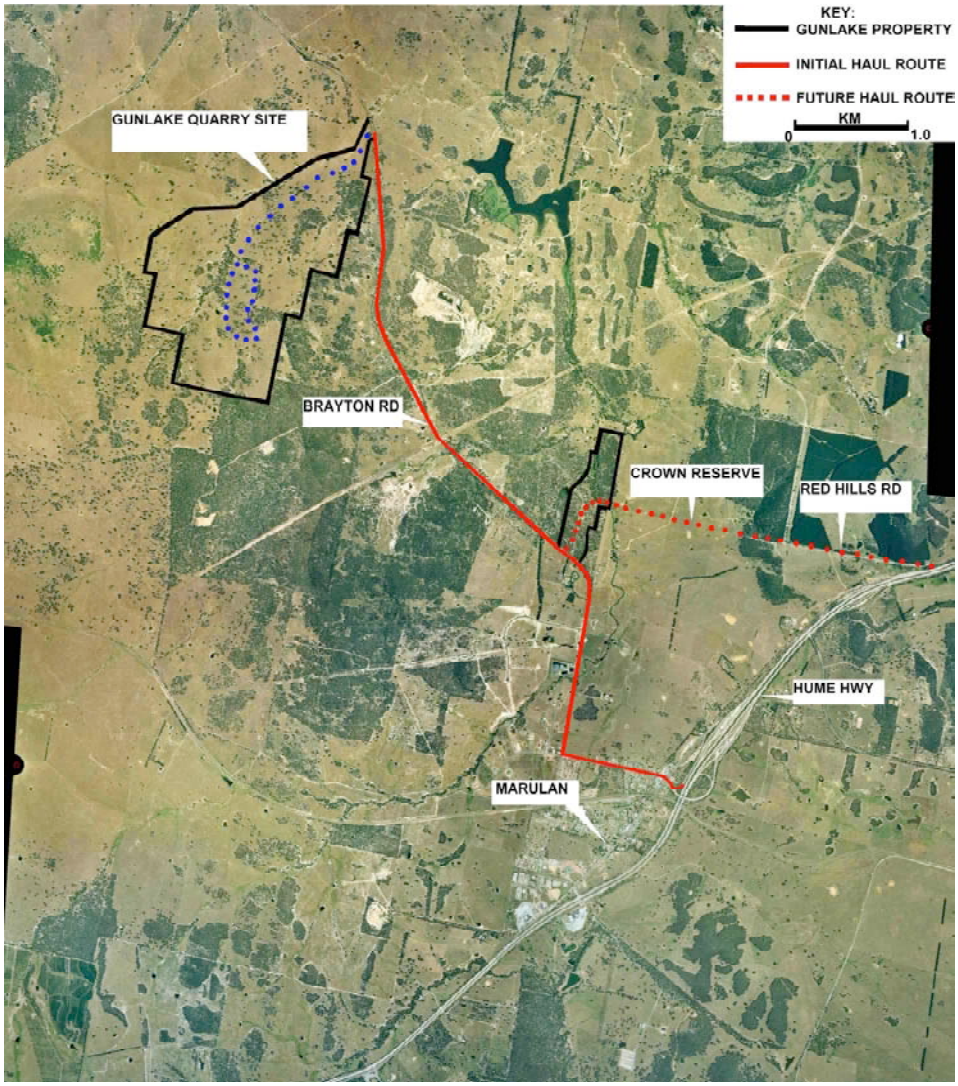
2) Copies of the archaeological report should be supplied to:
   - NSW DEC;
   - Pejar Local Aboriginal Land Council;
   - Peter Falk (representative for Gavin Andrews of the D'harawal Knowledge Holders);
   - Yass Shire Council.

CONTENTS

1.0 PROJECT DETAILS

1.1 PROJECT OVERVIEW

Australian Archaeological Survey Consultants were contracted by Gunlake Quarries, a division of Rollers Australia Pty Ltd to undertake a cultural heritage assessment of the lands proposed for the development of a hard rock quarry at Marulan, NSW (see *Map 1 – Site Locality*).



Map 1 – Site Locality

The study area, located approximately 8km northwest of Marulan, is accessed by Brayton Road. The study area consists of the area of impact associated with the proposed quarry site and the proposed future haul road. The proposed Project Site is 230ha in total. The Gunlake Quarry internal haul road is approximately 2km in length and 9m in width, traversing from the proposed quarry site northeast to Brayton Road. The haul road will then traverse southeast along Brayton Road (Brayton Road not part of current study) roughly some 4km. The proposed future haul route (which is included in this study then traverses east from Brayton Road some 3km to the Hume Highway. *Map 1* provides details of the proposed quarry site and associated infrastructure.

1.2 PROJECT AIMS

The principal aims of this project are as follows:

- Review the available archaeological information for the study region;
- Carry out a field survey assessment within the bounds of the proposed site area;
- Record and plot the location of all Indigenous and non-Indigenous cultural heritage sites within the study area;
- Identify areas of potential archaeological sensitivity within the study area;
- Gauge the potential for sub-surface archaeological materials to be present in the study area;
- Assess the significance of all Indigenous and non-Indigenous cultural heritage sites or objects identified within the study area; and
- Develop a set of management procedures for all heritage sites and areas of potential archaeological sensitivity identified within the study area.

1.3 PROJECT METHODOLOGY

In order to fulfil the outlined project aims, a three stage methodological approach has been adopted for this study.

Stage 1 (The Background Research)

Stage 1 entailed the background component of the project, wherein the following tasks were undertaken:

- In accordance with the Department of Environment and Conservation (NSW) *Interim Community Consultation Requirements for Applicants* (2004) requests for registration of interest was sought through public notification via an advertisement in the local print media. A record of responses to this notification is included in the Consultation section of this report.

- Written notification was provided to:
  - Local Aboriginal Land Council(s);
  - Registrar of Aboriginal Owners;
  - Native Title Services;
  - Local council(s);
  - Department of Environment and Conservation.

- A review was made of the NSW DEC AHIMS database, the Goulburn Mulwaree Shire Council LEP, the NSW State Heritage Register and the Australian Heritage Database to determine if any previously identified Indigenous and non-Indigenous sites were located within, or in close proximity to the study area. While no Indigenous sites have been registered within the survey area, several sites have been identified within the region. These sites are discussed in this report.

- The Goulburn Mulwaree Shire Council LEP and State Heritage Register identify two (2) non-Indigenous heritage items within proximity to the survey area, the Marulan Station and Yard Group and Old Marulan Town. The Marulan Station and Yard Group, also registered on the State Agency Heritage Register, under s170 of the NSW Heritage Act, consists of the station building, signal box, platform faces, overbridge road and weighbridge. The item 'Old Marulan Town', identified and registered as an item of State Heritage significance and protected under a Permanent Conservation Order consists of 106 properties. The item is described as including the Hume Highway (formerly the Great South Road), Bungonia Street and Barber Street and a number of other identifiable streets, all of which provide evidence of the original town plan.

- The Australian Heritage Database also identifies two (2) historic heritage sites, listed on the Register of the National Estate. These include the Old Marulan Catholic Cemetery and the Old Marulan Anglican Church Cemetery.

- None of the above non-Indigenous heritage items are within the bounds of the study area, nor will the items be impacted on by the proposed developments.

- The following background information was collated:
  - 1:25 000 maps of the study area;
  - Ethnohistoric and Anthropological literature for the region;
  - Archaeological reports for the study area and surrounding region;
  - Environmental reports;
  - References to the land use history of the study area.

Stage 2 (Field Work)

Stage 2 of the project entailed the implementation of a field survey program to locate and record cultural heritage sites and areas of potential archaeological sensitivity within the study area. The fieldwork component of the cultural heritage assessment for the project was completed by Dave Johnston (Archaeologist), Peter Falk (representing Gavin Andrews of the D'harawal Knowledge Holders) and Justine Boney (Pejar Local Aboriginal Land Council Representative). The survey was carried out on the 6th and 13th June 2007. Field investigations were also carried out to identify non-Indigenous sites within the study area and to assess the impact the proposed development may have on previously recorded non-Indigenous heritage items. The assessment by Robert Paton and Charmain O'Halloran (AASC Archaeologists) was completed on the 11th October 2007.

The survey was completed in the areas of impact associated with the proposed quarry site and the intended haul road within the proposed mine site boundaries as well as the proposed future haul road (which will traverse east of Brayton Road, south of the quarry site and joining the Hume Highway). These areas included the proposed quarry (1250m x 500m), the processing and stockpile area (270m x 100m), the overburden emplacement (300m x 450m), the quarry site haul road (2000m x 9m) and the proposed haul route/road which incorporates the existing Red Hill Road connecting to the Hume Highway (4000m x 9m). The survey team walked transects in a general north to south direction within the Gunlake quarry site, spaced 5m apart, therefore equalling a width of 15m.

For this investigation when a site was located the following variables were to be recorded:

Site type: The type of site identified eg. Aboriginal surface artefact scatter. In this survey, sites were classified under the following categories:

- isolated find (a single artefact);
- open artefact scatter (2 or more artefacts, each of which is situated within 50m of another);

Location: Description of how to get to the site, including the best route either by foot or vehicle.

Grid reference: The location of sites were plotted on a 1:25 0 000 scale map. The grid references were identified using Global Positioning System (GPS) units. GPS references were recorded at roughly the centre of each site.

Environmental setting: This describes the sites' environmental context including geomorphology, geology, vegetation and local hydrology.

Aspect: Direction and degree of the ground slope at the site. Aspect is thought to be a prime determinant of site location.

Site contents: This is a description of the artefacts and/or any other archaeological features that constitute a site. At sites consisting of stone artefact scatters, descriptions involve recording measurements of particular variables on the artefacts, including: raw material, artefact type, presence of retouch or use wear, and any general comments considered relevant. Of course, these variables are only very general in nature, and for this reason any sites considered to have greater research potential are indicated and the potential avenue of research is discussed. The density and extent of an artefact scatter site would determine if only a sample of the artefacts was to be recorded.

Site size: Refers to the dimensions over which artefacts or features are visible. When recording artefact scatters it is often difficult to establish the parameters of a site, due mainly to poor surface visibility. In these instances, site boundaries are defined as the limit of artefact distribution visible on the surface. Using this method, the observed site may be considered to constitute a representative sample of the total site. However, it must be acknowledged that intra-site spatial variations in artefact distribution may bias results to an unknown degree.

Site condition: Describes the condition of the site in terms of factors which may have disturbed it (such as road works, fluvial erosion etc.) or which have the potential to disturb.

Site Significance: An assessment of the archaeological importance of the site. The basis of assigning a sites' significance is discussed below in more detail.

Management considerations: This details the potential threat to the site specifically in terms of future potential developments. In addition, specific ameliorative measures are recommended if warranted.

Photographs were to be taken of any sites located during the survey, as a supplement to the written record.

Conditions of Surface Visibility

Clearly conditions of ground surface visibility will affect how many sites are found. Visibility may also skew the results of a survey. If, for example, conditions of ground surface visibility vary dramatically between environmental zones, this in turn will be reflected in the numbers of sites reported for each zone. Zones with the best visibility may be reported as having the most sites (because they are visible on the ground), while another zone with less visibility, but perhaps more sites, will be reported as having very little occupation. It is important therefore to consider the nature of ground surface visibility as part of any archaeological investigation.

Throughout the majority of the study area, surface visibility generally averaged between 5-10%, with the main impediment to visibility being vegetation cover. There were a number of formed vehicle and walking tracks throughout the study area which provided transects of improved visibility (60-90%).

Coverage Analysis

Witter (Witter and Hughes 1983) discusses the concept of *actual* area surveyed for any study, given that conditions of ground surface visibility and sedimentation etc. will vary from area to area. This is a useful measurement to allow cultural resource managers to assess surveys from adjacent areas and it also allows some meaningful calculation of the actual sample size surveyed.

Witter has calculated actual areas surveyed via the formula: (D1) x (s) x (v) x (b) = (D2) where:

D1 = area in metres square surveyed. In this case a total of 20 transects were walked through the impact areas described above. Each transect being 15m in width. The total survey area was composed of:

- proposed quarry (1250m x 15m x 12 transects = 225000 square metres);
- processing and stockpile area (270m x 15m x 3 transects = 12150 square metres);
- overburden emplacement (450m x 15m x 5 transects = 33750 square metres);
- quarry site haul road (2000m x 9m x 1 = 18000 square metres);
- proposed haul route/road (4000m x 9m x 1 transect = 36000 square metres).

This means that the area surveyed was 324 900 square metres.

s = index of sedimentation
0.1 = aggrading surface
0.5 = stable or uncertain
1.0 = degrading surface **(applies in this case)**

v = index of visibility
0.1 = negligible visibility
0.2 = 10% visibility
0.5 = 20% visibility **(applies in this case)**
1.0 = 30% and greater visibility

b = background effects (i.e. the presence of natural quartz)
0.1 = massive amounts of natural quartz
0.5 = small amounts of natural quartz
0.9 = minimal amount of natural quartz **(applies generally in this case)**
1.0 = no natural quartz

D2 = distance in square metres of effective coverage.

Applying the formula the following calculations results:
324 900 x 1.0 x 0.9 x 0.5 = square metres. If we consider that the total area of the study constitutes about 146 205 square metres the actual effective coverage is approximately 45% of the area.

Stage 3 (Analysis)
Stage three of the project involved the analysis of the data obtained from the field survey. In the analysis specific attention was paid to:

- the analysis of micro-land systems in the study area that are likely to contain sites;
- the relationship between site types, site densities and environmental factors;
- an assessment of the results, which takes into account variability in such factors as surface visibility, survey intensity and surveying approaches.

2.0 INDIGENOUS CONSULTATION

Bowdler (1983:26) recognises two kinds of sites that are significant to Aboriginal people. The first relates to pre-contact times, the second to the period since colonisation. Some of these sites may be recognisable due to landscape modification or material remains whereas others may consist of a noticeable but natural physical feature. Bowdler (1983:30) stresses that:

> '..identification of sacred sites and sites of significance to Aboriginal people is of necessity a matter for Aboriginal people. No-one else can decide either the fact of significance or the degree of that significance to an Aboriginal community, except members of that community.'

It is for this reason that members of the Aboriginal community are consulted during heritage studies such as this.

The NSW DEC also have a policy that Local Aboriginal Land Councils and Native Title Claimants should be consulted and actively involved in the Cultural Heritage Assessment process.

In accordance with the Department of Environment and Conservation (NSW) *Interim Community Consultation Requirements for Applicants* (2004) requests for registration of interest were sought through public notification via an advertisement in the local print media. A record of responses to this notification is included in the Consultation section of this report.

Respondents to the notification included:

- Pejar Local Aboriginal Land Council
- Peter Falk (representative for Gavin Andrews of the D'harawal Knowledge Holders)

Respondents provided either written or verbal registration of interest. All respondents were contacted by phone to confirm their registration of interest and provided with the proposed methodology for the preliminary phase of field investigations.

The respondents provided verbal agreement to the proposed field methodology during telephone communications with Charmain O'Halloran (AASC Archaeologist).

Written notification was provided to:

- Local Aboriginal Land Council(s);
- Registrar of Aboriginal Owners;
- Native Title Services;
- Local council(s);
- Department of Environment and Conservation (DEC).

Both respondents were invited and participated in the fieldwork and compilation of the recommendations, detailed below in Section 10.

3.0 LEGISLATIVE REQUIREMENTS

3.1 STATE LEGISLATION

The protection of indigenous cultural heritage in New South Wales is principally governed by the *National Parks and Wildlife Act 1974* ("the NPW Act"), which is administered by the DEC (NPWS). When seeking approval for development, certain conditions will usually be imposed - one of which is that an assessment be made of any potential impact on sites or places of indigenous cultural heritage.

Normally Section 86 of the NPW Act requires that any disturbance of the land (to collect indigenous artefactual material) or collection of that material can only be undertaken under a permit issued by the DEC (NPWS). However, in 2005 the NSW Parliament passed amendments to the *Environmental Planning and Assessment Act 1979* ("the EP&A Act"). The EP&A Act is designed to facilitate major and critical infrastructure developments.

Approval has been given for the Act to apply to the current Project. Under Part 3A of this Act, separate approvals or permits are not required from DEC, although they may be consulted to ensure best practices are being undertaken.

Regardless of Part 3A, any person (whether they have a 'legal interest' in the area or not) can bring proceedings against a person damaging or destroying indigenous cultural heritage in the Land and Environment Court (NSW) to prevent or remedy that damage or destruction (s.176). In addition to individual penalties of up to $11 000, an order can also be made that compensation is to be paid for the damage or destruction of the Aboriginal Object or area.

If the Director-General of the DEC (NPWS) believes that an action will or could have a significant effect on the 'environment of native plants' (which is also an indigenous issue) he / she can issue a Stop Work Order for 40 days, without any prior notice needed to be given (ss.91AA-EE). That Order can be extended for an additional 40 day period as the Director-General sees fit. If the action that has been stopped is not able to be modified sufficiently to protect the environment in question, the Director-General must recommend an Interim Protection Order be made (s.91EE) that will last for up to 2 years (s.91D). The Director-General can also direct that an Interim Protection Order be put in place if, in his opinion, an area of cultural significance is at risk of damage (s.91A).

Each person has a duty to report the discovery of an Aboriginal Object to the DEC (NPWS) within a reasonable period of time unless they have reason to believe that the DEC (NPWS) is already aware of its existence (s.91).

3.2 COMMONWEALTH LEGISLATION

As well as State Legislation, there are also several pieces of Federal Legislation that provide protection for, or are relevant to, Indigenous cultural heritage. These pieces of Legislation include:

- *Native Title Act 1993*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Environment Protection and Biodiversity Conservation Act (EPBC) 1999*

Native Title Act 1993

This Act provides national recognition that Indigenous people had a system of law and land ownership prior to the arrival of Europeans. This Act has ramifications for land tenure and consultation under other Acts.

Aboriginal and Torres Strait Islander Heritage Protection Act 1987

The Act was passed to provide protection for Aboriginal heritage in circumstances where it could be demonstrated that such protection was not available at a State or Territory level. In certain instances, the Act overrides relevant State and Territory provisions.

The major stated purpose of the Act is to preserve and protect areas and objects of significance to Aborigines and Islanders, from injury and desecration. The Act enables immediate and direct action for protection of threatened areas and objects by a declaration from the Commonwealth minister or authorised officers. The Act must be invoked by, or on behalf of, an Aboriginal or Torres Strait Islander or organisation.

Environment Protection and Biodiversity Conservation Act (EPBC) 1999

The Environment Protection and Biodiversity Conservation Act 1999 (Comm.) *has recently been amended, through the* Environment and Heritage Legislation Amendment Act (No1) 2003 *to provide protection for cultural heritage sites, in addition to the existing aim of protecting environmental areas and sites of national significance.*

The 2003 amendments to the *Environment Protection and Biodiversity Conservation Act 1999* have resulted in the inclusion of indigenous and non-Indigenous heritage sites and areas. These heritage items are defined as:

> *'indigenous heritage value of a place means a heritage value of the place that is of significance to indigenous persons in accordance with their practices, observances, customs, traditions, beliefs or history;*

Items identified under this legislation are given the same penalty as actions taken against environmentally sensitive sites. Specific to cultural heritage sites are Sections 324A-324ZB.

In addition to the above amendments to the *Environment Protection and Biodiversity Conservation Act 1999* to include provisions for the protection and conservation of heritage, the *Environment and Heritage Legislation Amendment Act (No1) 2003* (Comm.) also enables the identification and subsequent listing of items for the Commonwealth and National Heritage Lists. The Act establishes the National Heritage List that enables listing of sites nationally and internationally that are significant and governed by Australia.

The *Australian Heritage Council Act 2003* defines the heritage advisory boards and relevant lists, with the Act's Consequential and Transitional Provisions repealing the *Australian Heritage Commission Act 1975*. The Australian Heritage Council Act, like the Australian Heritage Commission Act, does not provide legislative protection regarding the conservation of heritage items in Australia, but has compiled a list of items recognised as possessing heritage significance to the Australian community. The *Register of the National Estate*, managed by the Australian Heritage Council, applies no legal constraints on heritage items included on this list.

4.0 ENVIRONMENTAL SETTING

Numerous investigations within Eastern Australia have revealed that the nature and distribution of archaeological sites across the landscape are strongly influenced by environmental factors. The bedrock geology of a region, it's landforms, soils, vegetation, and climate, all combine to influence the distribution and availability of resources considered to be of importance to prehistoric Aboriginal groups (these being, plant and animal foods, water, raw materials for tool making, ochre and suitable campsites). Such factors will also affect the ease with which people could travel across the landscape. It stands to reason then, that in order to properly understand, or indeed predict patterns of Aboriginal activity within a region, one must first be familiar with the environmental setting of the study region.

4.1 TOPOGRAPHIC SETTING

The quarry site is situated within gently undulating grounds. The elevation ranging from 620-690m AHD. A creek, Chapman's Creek, is located on the northeast boundary of the quarry site.

4.2 GEOLOGIC HISTORY

Three main geological zones have been identified within or surrounding the quarry site. Lockyersleigh Adamellite composes the majority of the quarry site; a band of Bungonia Limestone has been identified to the north of the site, of the east side of Chapman's Creek;

Bindook Porphyr, contained in a large section to the east and south of the site and Hume Highway (Australian Geoscience 2007). The ademellite, classified as rock consisting equal parts orthoclase and plagioclase, is a form of granite, a common compositional element of aggregate (Mayer 1976: 48). The Bungonia Limestone, containing limestone, shale, and ferruginous sandstone and Bindook Porphyry, consisting quartz, feldspur, porphyry, dacide, felstik and tuff (Australian Geoscience 2007) may also be utilised in aggregate composition.

4.3 HYDROLOGY

The study area lies within the upper catchment of Chapman's Creek. Chapman's Creek flows east to join Joarimin Creek, approximately 1km downstream of the site. The Wollondilly River, in which Joarimin Creek flows, is located approximately 4km north of the site. Ephemeral drainage lines associated with Chapman's Creek are present within the study area.

4.4 VEGETATION

Vegetation within the survey area is dominated by cleared grassland and remnant woodland mainly located within proximity to creek lines or on hilltops. Minimal native vegetation remains within the study area, a subsequent result of land clearing for agricultural purposes.

5.0 ETHNOHISTORIC ACCOUNTS OF THE REGION

Ethnohistory entails the use of historical literature as a source for constructing ethnographic analogies and models in the study of the prehistory and contact history of indigenous peoples (McBryde 1979). Although ethnohistoric accounts have been recognised as a valuable source for providing insights into the lifeways of prehistoric people, their application can be problematical. These problems relate primarily to the nature of the sources, their accuracy and / or validity.

Flood (1980) identifies three types of ethnohistoric observations:

- the first hand, eyewitness observations made at the time of first contact with Europeans,
- first hand observations made at a later stage when Aboriginal society had become 'Europeanised', and,
- second-hand or generalised accounts of Aboriginal life.

Of these sources of information, the most valuable and reliable for the reconstruction of precontact Aboriginal life are the first-hand observations made at the time of first contact with Europeans. These include the accounts by explorers, surveyors and pioneer settlers. This does not necessarily mean that other forms of observations should be disregarded. However, caution must be exercised in their application.

From such sources of information, insights may be gained into aspects of Aboriginal life such as demography, material culture, language, social and political relationships, subsistence regimes, and ideological beliefs. Some of these will be discussed below.

According to the best sources, the people living in the Study Area came from the language or 'tribal' group of people known as the Wiradjuri (Tindale 1974). Subsequent research (Jackson-Nakano 2001; 2002) has shown Tindale's tribal delineations to be more flexible than is implied by a strict 'boundary', and that this Study Area was inhabited by distinct cultural groups loosely affiliated as "Wiradjuri".

Paton (1990) gives a summary of many of the known primary and relevant secondary sources for the region around the Study Area. These sources have been supplemented by more recent studies (ie Jackson-Nakano 2001; 2002) in the discussion below.

The major water sources such as the large rivers (ie the Shoalhaven) and lakes, such as Lake George and Lake Bathurst, appeared to have been the focus of occupation by the local Wiradjuri groups. Early records from around 1810-30 seem to support the view that these water sources were a rich foci for occupation. Typically, as with many such landscapes in Australia, these were also the prime focus for European occupation when they entered an area. A similar story can be told for most of the large river systems: the thin, rich but fragile ecosystem was able to support a large and healthy Aboriginal population. Unfortunately however such ectotones tend to be marginal only a few hundred metres away from the river corridors, thus making them less than ideal when two cultures clash. Certainly, the clash of cultures occurred abruptly and with dire consequences in this region.

Historical accounts do not give a good indication of group sizes in this area apart from references such as a third hand account by Etheridge (1893:50) which refers to stories of a "gathering ground" along the Wollindilly River. By the time any sound observations were made, small pox, influenza and the affects of European settlement had decimated the local Aboriginal populations. (Mackaness 1941: 343; Goulburn Evening Post October 3, 1979; Butlin 1981: 24).

In 1836 the government surveyor Govett commented:

> *The kangaroos have either been killed, or have fled in search of more retired forests. Sheep and cattle have taken their place, the emu and turkey are seldom seen, the millions of parrots have even become scarce, and the few harmless blacks remaining, having lost their native energy, now even here court the white man for rum, his tobacco, and his bread!* (1836, July : 20).

It is estimated that by 1848 the local Aboriginal population was only 25 individuals. This is a small number considering that in 1839 Aborigines outnumbered Europeans by 10 to 1 at the Goulburn races. (Unfortunately we do not know the number of Europeans at the 1839 races, and so we cannot calculate the number of Aborigines).

The evidence for occupation away from the major rivers is sparse and tend to come mostly from wide ranging archaeological surveys (Flood 1980) and models of environmental determinism (Packard 1986). The supposed pattern based on these sources is occupation of the major water sources during the hotter drier months and a fanning out of people when rains filled smaller creeks and soaks. There is nothing to suggest this model has any major flaws, other than it requires more research to test its viability.

We can get an insight into what a typical Aboriginal campsite might have looked like through the eyes of Surveyor Govett who visited a settlement in the district in the early 1830's. He says

> *After dark, the blacks seldom leave their own gunyas [huts], so that we went from one fire to another in order to observe the particular actions and employments of the several groups or families. The chief was sitting cross - legged between his two wives, and smoking a short black pipe. He was naked with the exception of the belt around his waist; upon his neck he wore a chain, to which was attached a brass plate in the shape of a half moon, on which was inscribed his name, etc, and he appeared as the light of the fire was reflected on him, a strong and muscular man. He had just finished his meal, and his two gins (or wives) were busily engaged in eating the fragments of opossums and kangaroo rats etc, every now and then poking out from the*

> *ashes small ground-nuts or yams. They occasionally gave a dog a slap with a stick...*
>
> *The next gunya contained two young men, and one of these seemed to be employed with two double sets of strings, which by twisting and changing in a very intricate manner, he constantly drew out the back parts of his hands into a variety of forms and shapes . . . In other gunyas might be seen men and women of different ages, who were either smoking and chatting, or had fallen asleep; but wherever there were boys, infants, or adults, something appeared to be doing for the sake of amusement . . . Other children, were amused in various ways; some with little tomahawks were pretending to be cutting and hacking, while others were digging the earth with sticks, in imitation of their mothers, in search of food* (Govett 1836: 256 (no. 264)).

This period of occupation by Aboriginal people has left a legacy of archaeological sites in the region including open campsites with stone tools, rock shelters, caves with living floors, axe grinding grooves, art sites, burial grounds and scarred trees. These are discussed further below. In addition to these archaeological sites, there are a number of other types of Aboriginal sites recorded by early European observers which reflect the more spiritual aspects of Aboriginal life. No physical evidence of these sites has been either remains or has yet been recorded.

An interesting example is tree carved tree sites noted by early explorers: two to the south-east of Goulburn and another on Mt Wayo 16 kilometres north of the city. These sites consisted of between 1 and 5 trees (Etheridge 1918: 53, Govett 1836). In each case a burial was associated with the trees. Govett gives an interesting account of the Mt Wayo site:

> *I had left my camp one morning to reconnoitre some ground near Mount Wayo, in Argyle, and after travelling for an hour, I crossed a rather steep grassy ridge, and descended into a rich forest-flat between the hills . . . my attention was attracted by sounds of human voices, wailing in wild and melancholy strains. I listened attentively, and the more I was struck with the peculiarity of the noise. Having made for the direction from which the sounds proceeded, I soon perceived before me three native black women, and rode up to them. They were sitting round a mound of earth, with their heads depressed and nearly touching one another, nor did my presence at all disturb them, or rouse their attention, but they remained in the same postures, and did not even look up.*
>
> *I waited some time in astonishment observing their actions, and listening to their horrid lamentable yells. They were each of them striking their heads with a tomahawk, holding that instrument in their right hand, and wounding particularly the upper part of the back of the head. Their hair was besmeared with blood, which I could perceive trickling down behind their neck and ears. I called to them loudly but in vain. Determined, if possible, to find out the cause of the extraordinary scene before me, I dismounted, and tethered my horse at a little distance, and allowed them to remain undisturbed, while I took notice of the tomb and place around. The mound of earth might have been about three feet high; it was shaped as a dome, and built of a reddish clay: it was surrounded by a kind of flat gutter or channel, outside of which was a margin, both formed of the same material. The staves of the women were leaning upon it, and their nets, with their contents, thrown aside.*

> *The appearance of the place was agreeable, though lonely and sequestered, and trees of various descriptions ornamented the rich pasture on the ground. The trees all round the tomb were marked in various peculiar ways, some with zigzags and stripes, and pieces of bark otherwise cut.* (Govett 1836: November: 182-183).

In addition to those burials associated with scarred trees, several others were noted in the early literature, though details about their locations are imprecise (Hardy n.d.; Goulburn Evening Post, October 3, 1979; MacAlister 1907:85; Wyatt 1941:110). The most precisely provenanced of these burials, recorded on a hill above the Landsdowne property (Wyatt 1941) was investigated by Hughes (1984) who said all traces of the site had disappeared.

The type of burial in this region is described in detail by Govett:

> *The method of their disposing of their dead is generally as follows, (and although few have ever witnessed the burial of a native, still the spot having been known, the corpse has been seen in the grave after burial): The body is removed to the place appropriated for its burial; the head is then bound down by strings of bark, close and nearly between the knees; the two hands are fastened behind each angle, so that the body is forced into a crouching form, and takes up as little space as possible. The grave, or hole, is made just large enough to admit the body, and deep enough to allow rather more than a foot of earth above it when interred. The body is buried naked, with the exception of the bandages of bark with which it is confined, and the cloak, spears, and other weapons of the deceased are claimed, and become the property, I believe, of the chief* (Govett 1836: October 184).

A number of bora, or initiation grounds, were also noted in the region. They are located at Eastgrove and on the site of the Goulburn Railway Station (Lance and Koettig 1986 from Wyatt 1941:112) and near the site of the present Kenmore Hospital (MacAlister 1907:85). MacAlister says:

> *Near the Kenmore Hospital there is a little red hill, where the oft described man-making ceremony (or 'bora') was performed. The prospective adults had to undergo a very severe ordeal before being admitted, by native law, to man's estate. Like the hermits of old, they observed a long period of solitude, during which their food was very coarse and scanty; they had, particularly to avoid the sight or company of females, and had to submit with stoic fortitude to a very severe 'birching' by several elders of the tribe. But their chief torture was the knocking out of one of their front teeth, in the case of each individual. To effect this, a sharpened kangaroo bone was held firmly against the 'doomed' tooth, and a strong Marra (black would punch the molar out by repeated blows on the kangaroo bone, with a stone hatchet. Within a few days of this event, the young hermits were brought into the camp, and a big 'baptismal' fire was lighted. The young men just 'created' were allotted places one side of this fire, and the other side was sacred to the gins.*

With the arrival of European people into the region came dramatic disruption to the social and political structure of the Wiradjuri and the Onerwal. Eventually, the Aboriginal people were moved by the government from their traditional lands elsewhere. This culminated in the 1880's with the formation of the Aborigines Protection Board (Read 1988). With the development of government strategies for "management of the Aboriginal problem" came the

development of managed mission stations and unmanaged stations or reserves, as well as a string of unmanaged Aboriginal fringe camps which arose near European towns and settlements.

6.0 ARCHAEOLOGICAL BACKGROUND

6.1 PREVIOUSLY IDENTIFIED SITES WITHIN CLOSE PROXIMITY TO THE SURVEY AREA

A search of the NSW DEC Aboriginal Heritage Information Management System (AHIMS) was completed to determine the extent of previously recorded sites within and surrounding the survey area. The search was undertaken on the 8th January 2007 and included an area of 13 square kilometres surrounding the survey area. The database search showed that no identified sites had been registered within the survey area. However, several registered sites are noted within close proximity to the study area.

Table 1 – Registered Sites Within Close Proximity to the Survey Area

Site ID	Study	Site Type
51-6-0074	Johnston	Open Camp Site
51-6-0075	Johnston	Isolated Find
51-6-0076	Johnston	Open Camp Site
51-6-0077	Johnston	Open Camp Site
51-6-0079	Johnston	Open Camp Site
51-6-0080	Johnston	Open Camp Site

6.2 ARCHAEOLOGICAL INVESTIGATIONS WITHIN PROXIMITY TO THE SURVEY AREA

6.2.1 LOCAL AREA

'Ardmore Park' located approximately 50km southwest of the study area was surveyed in August 2003 for the construction of a proposed poultry farm (Kuskie and Webster 2003). Their investigation was of several parts of the property, measuring about 45 hectares, where large poultry sheds were to be constructed. This survey resulted in the discovery of one Aboriginal archaeological site. The site consisted of a single stone artefact. Kuskie and Webster noted however, that due to poor conditions of ground surface visibility "there remains a moderate to high potential for further heritage evidence to occur in the form of stone artefacts, albeit largely as a low density background scatter reflecting low-intensity Aboriginal occupation."

The AHIMS register shows that no other archaeological surveys or sites have been undertaken of the Study Area.

6.2.2 THE SURROUNDING REGION

A large number of archaeological surveys and studies have been carried out in the wider region surrounding this Study Area, and some of these can provide useful information regarding site patterning in the landscape and the chronology of human occupation. By and large most of these surveys have been small-scale projects undertaken for environmental impact assessments. Perhaps the most fruitful information regarding site patterning can be found in the following studies which have discussed broad issues relating to either site distribution or chronology: Barber 1994; Hughes and Koettig 1983 (Dalton); Baker, Feary and Hughes 1984 (Lake Bathurst); Hughes, Barz and Hiscock 1984 (Lake George); Baker and Feary 1984 (Lake George); Lance 1985 (Bungendore); Attenbrow 1984 (Braidwood); Packard and Hughes 1983 (Yass River); Packard 1986; Ferguson 1988 (Braidwood); Paton 1990 (Goulburn); Shawcross 1998 (Boro); Keottig 1983 (Goulburn); Paton 2001 (Elmslea);

Reeve and Thomson 2004 (Woodlawn); Navin and Officer 1998 (Woodlawn); Boot 2002; 1996a; 1996b; Navin Officer 2003.

Even though the range of environmental zones sampled by the majority of these surveys has been limited, the results when assessed at a general level show a distinct patterning in site location, with most sites being recorded on creek banks or high ground adjacent to permanent or semi-permanent water sources. In Koettig's (1983) survey of the Goulburn area, for example, 50% of the sites occurred on slopes near water. Similarly, in Attenbrow's (1984) wide ranging survey of the Welcome Reef Dam, 88% of sites were located on slopes adjacent to permanent or semi-permanent water. Lance (1985) detected the same pattern around Goulburn where most sites recorded were along water courses. There is no indication in any reports for the region that sites, other than the occasional small artefact scatter or isolated find, occur in waterless hilly terrain such as that found in the Study Area for this investigation (see for example the Woodlawn Study (Reeve and Thomson 2004) where isloated artefacts are found on locally flat, raised, waterless terrain).

Where surface surveys have been augmented by excavations it was found that surface results were not particularly reliable as indicators of sub-surface sites. Along the Wodonga – Wagga Wagga gas pipeline, for example, a surface survey was followed up by a test pitting programme which showed that sites tended to cluster along creeklines, even though surface indications did not clearly demonstrate this pattern in the detail that the excavations revealed (Navin and Officer 1996; Navin, Officer and Kamminga 1998a). In a more recent experimental analysis, a surface survey was compared to a sub-surface inspection in the southern ACT. This was undertaken along a recently graded fire trail beside a creek. The survey compared the results of a 1 kilometre high visibility trail with a parallel transect 3 metres away. Six sites (all artefact scatters) were located along the trail, whereas only one was found on the parallel transect (Paton 2004). This again demonstrates the disparity between surface versus sub-surface results, especially in terms of the most common site type.

Other sites recorded for the much wider area include scarred and carved trees, bora rings and ceremonial grounds, stone arrangements, and burials. Such sites tend to be comparatively rare and are often well known, and are generally unlikely to be detected via test excavations or in small surface surveys. Here other methods of investigation can be useful. Two detailed historic/surface archaeological studies of the area around Goulburn (Lance and Koettig 1986; Fuller 1989) show that such sites, while not common, certainly existed as part of the former range of places which were part of Aboriginal life. Unfortunately, as development of land occurred many of these sites were destroyed. In some instances, as is the case for the bora ground at Kenmore Hospital Goulburn, only historic accounts of these rarer sites remain.

By far the most frequently occurring site type in the region surrounding the Study Area is the open artefact scatter. Most of these are small sites containing less than 50 artefacts (often less than 10), with medium sized sites of up to 300 artefacts occurring intermittently. Very occasionally large sites with several hundred artefacts occur. The artefacts at these sites are usually manufactured from quartz, silcrete and fine-grained siliceous and volcanic rock. The artefacts types located during these surveys included flakes, flaked pieces, amorphous flakes, backed blades and hammer-stones, hatchet heads, and ground pieces of sandstone. Several sites had bipolar artefacts. Bipolar technology is thought to have been employed more extensively in the past 1500 years, and the presence of these 'types' may be useful for dating sites (see below).

The majority of these sites have been open campsites, surface scatters of artefacts with little or no sub-surface material and stratigraphy. The largest sites with stratigraphy have been found associated with sandy deposits along larger water courses or on the shores of Lakes (Baker, Feary and Hughes 1984 (Lake Bathurst); Hughes, Barz and Hiscock 1984 (Lake

George); Baker and Feary 1984 (Lake George); Ferguson 1988 (Braidwood); Paton 1990 (Goulburn); Keottig 1983 (Goulburn)). Apart from rockshelters, such sites which contain relatively undisturbed stratified deposits are generally the most suitable for dating, not that this precludes open artefact scatters as sources of dateable materials (Boot 2002).

The relative position of artefact types within the sediments of these stratified sites is thought to be important for documenting cultural change over time. Bipolar and microlith manufacture employ different technologies, which until recently were thought to be temporally separated. It was thought that in a typical 'south east Australian cultural sequence' microliths would be apparent from about 5000 years ago, but would eventually be replaced (or dominated) about 1500 years ago by a quartz industry based on a particular type of artefact manufacture, the bipolar technique. This technique involves removing flakes from very small cores by resting them on a rock and hitting them with a hard hammerstone. The core is often rotated to find good platforms from which other flakes can be struck. This results in the core having a distinctive pattern of flake removal, as well as crushing on two opposing edges (hence the name bipolar). The supposed replacement of microlith technology by bipolar at around 1500 years is now being questioned after the discovery of recent microlith horizons in several sites including Bulee Brook 2 with backed blades at 1480 $\pm$ 70 (ANU-9374) and Kangaroo Hill 2 with backed blades at 420 $\pm$ 60 (ANU-8436) (Boot 2002).

Hughes and Lampert (1977) in fact pointed out much earlier that the division of late holocene assemblages (i.e. 5000 years old) into two phases may be inappropriate for the southern tablelands mainly on the basis that many of the sites may have been disturbed. They say that many southern tablelands sites are likely to have suffered post-depositional disturbance (trampling and treadage) as they lack resilient layers (i.e. shell) which serve to protect other deposits. Flood (1980) also noted that it was difficult to divide the southern tablelands sequence into two industries. She says microliths and bipolar pieces co-exist, and interprets this as cultural conservation (i.e where people do not give up microlithic production in favour of the new bipolar technology). Packard (1986:10-11) also noted problems with defining two stages of technology. He says

> *it can be misleading to discuss 'Bondian versus post-Bondian' assemblages in a Southern Tablelands context, rather it would be better to discuss assemblages in terms of their significant features, i.e. backed blade dominated or bipolar dominated assemblages.*

Tantalising historical evidence also hints that the two industry division may be inappropriate for the southern tableland sites. Surveyor Govett (circa 1830) in a series of articles in *The Saturday Magazine* describing his travels in the Goulburn district. In two articles he illustrates spears belonging to a "native of Mulwaree Plains in country Argyle". Both of these spears have a series of small barbs embedded near the tip. He says:

> *Their spears are generally from ten to twelve feet in length, frequently longer; some consist of one, others of two, and the longest of three distinct pieces, which are chiefly made of the iron bark wood . . . Some spears are hooked and jagged, and since the natives have become acquainted with glass, they have taken advantage of that material, by cementing the broken sharp splints of it, which are made to jut out of the top of the spear like the points of lancets, as a substitute for their common way of jagging.* (Govett 1836:252 (No. 252).

Govett's observations, while certainly not conclusive, at least hints that the microlithic technological method may have been used until historic times, lending further support to the

suggestion that there is no real division between an early microlith industry and a later bipolar technology.

The only sites where the division between the two technologies is in any way apparently clear are Butmaroo and Site G17 at Goulburn. Butmaroo is apparently a well dated site (6000 BP - 500BP), although the dates are not at the moment publicly available. What we know comes primarily from Packard (1986: 19-20). Based on personal communication with the excavator Rhys Jones, he says:

> *The upper portion of the deposit (light grey sand) contained a quartz-dominant assemblage with few bipolar artefacts and no backed blades. Radiocarbon dates for this layer were in the range of 500-1,000Y BP. The deposit under this layer (pink-yellow sands) displayed a poorly developed soil horizon which contained an assemblage of silcrete and quartz artefacts with backed blades made on both raw materials. Radiocarbon dates for this part of the deposit were in the range of 3,000 – 4,000Y BP. Below this layer a few quartz artefacts were found; a single quartz artefacts was found in a buried lag of weathered pebbles and cobbles. A radiocarbon date on charcoal from the sands above the lag (70cm below the surface) gave a date of approximately 6,000Y BP.*

Similar dates are not available for Site G17 as no suitable carbon was located in the deposits. Nevertheless the same approximate pattern of artefacts was found in the deposits, as at Butmaroo. Yet at other southern tableland excavations, and at more recent sites described above (Bulee Brook 2 and Kangaroo Hill 2 – Boot 2002) this pattern is not clearly evident. These sites usually contain microliths or bipolar pieces, or neither (see for example Hughes and Koettig 1983 (Dalton); Baker, Feary and Hughes 1984 (Lake Bathurst); Hughes, Barz and Hiscock 1984 (Lake George); Baker and Feary 1984 (Lake George); Lance 1985 (Bungendore); Attenbrow 1984 (Braidwood); Packard and Hughes 1983 (Yass River); Ferguson 1988 (Braidwood)). As discussed previously, it may be the case that at Butmaroo and G17 the sequence may be a product of various pedogenic processes rather than cultural factors, given that the relatively young artefacts appear to be contained in very old sediments.

The weight of evidence must bring into question the appropriateness of maintaining a clear-cut distinction between microlith and bipolar industries. Butmaroo, G17 and sites like them may be the exception rather than the rule. Particularly since at both sites it is easy to demonstrate that the cultural material has worked its way into the sediments, rather than having been laid down as part of the stratigraphic processes.

The exact age of the beginnings of occupation in this area is far from resolved. Excavations have clearly demonstrated Aboriginal occupation in the southern highlands during the Holocene. Given the marginal environment, this had important implications for debates in the 1970's and 1980's about Pleistocene colonisation patterns and Holocene intensification. Detailed archaeological research on this question commenced in 1970, with Flood's study. Her thesis, published in 1973, led her to conclude that his region was unoccupied prior to the introduction of the Small Tool Tradition, approximately 5000 years BP. In the following ten years, eleven rock shelters and one open camp site were excavated in the region. None of these sites were found to be older than 4000 years. The oldest sites in the region being Sassafras 1 (located at the top of the coastal Budawang range), with a basal date of 3770 $\pm$ 150 BP (Flood 1980) and Nursery Swamp 2 in the ACT, dated to 3700 $\pm$ 110 BP. More recently these dates have been significantly expanded by Boot (2002; 1996a; 1996b) who excavated sites within 5 km of Sassafras to 10,850 $\pm$ 300 BP (ANU-8313) at Bob's Cave and 18,810 $\pm$ 160 BP (ANU 9375) at Brulee Brook 2. Another site, an open site, in the southern

Highlands at Wombeyan Caves (Navin Officer 2003) has also been dated to the Pleistocene: 9,998 ± 75 BP (Wk 11562) and 12,178 ± 66 BP (Wk 11562).

Flood's excavation of the Birrigai rock shelter, situated in the northern fringes of the Southern Highlands, provided the first substantive evidence for Pleistocene occupation of the region, and remains the oldest known site. Three relatively distinct phases of occupation of the shelter were noted:

1. Occupation commences at around 21000 BP with a low intensity of occupation continuing through to 3000 BP;
2. At around 3000 BP occupation intensity increases dramatically, and continues to increase through till approximately 100 BP
3. In the period from 100 BP through to present, there is evidence of a continuation in the Aboriginal occupation of the rock shelter, coinciding with the onset of non-Indigenous activity in the area (Flood *et al* 1987)

Recent technological advances, in the form of high-precision calibration, has resulted in the refinement of these mid to late Holocene radiocarbon dates. Bullbeck and Boot (1991), provide a list of calibrated dates for sites in the region, which includes the more recent findings of Packard and other workers. A brief review of this list reveals a particularly striking feature. This being the very long interval between the date of earliest occupation of the Birrigai site and the earliest dates of occupation for other sites in the region, which appear to cluster between the third and the fifth millennium, this period coinciding with the onset of intensified occupation noted for the Birrigai site (Flood *et al* 1987). This phenomena has been interpreted as representing the onset of permanent, intense occupation in the Southern Uplands at no earlier than 3000 BP (Flood *et al* 1987). But, as Bullbeck and Boot (1991) point out, this interpretation is based on uncalibrated dates, and does not include the recent findings of other workers in the region. Taking these factors into account, the onset of intensive occupation in the region may have occurred somewhat earlier (ie around 4000-5000 BP).

7.0 PREDICTIVE MODELLING

7.1 SITE TYPES AND THEIR LOCATIONS

The ethno-historic records and the archaeological studies for the region provide a fairly clear indication that sites are predominantly located on certain landscapes: typically the most common site type (artefact scatters) are found near creeks, on locally raised, flat terrain. The terrain of the Study Area is mildly undulating and contains several ephemeral water sources. It is likely based on known site patterning, that small artefact scatters will be found in such areas. There are areas of Eucalypt regrowth across the terrain, although none of these trees appear old enough to have scars of Aboriginal origin. Although it is possible that other types of sites (mentioned above) may be located during the survey, the probability of this being is low because very few of these site types have been recorded in the region.

Artefacts may also be found within the sandy deposits even though it is likely that these sediments are much older than human occupation. As discussed previously, if this is the case these artefacts would have worked their way into the deposits via natural pedogenic processes. Whether or not sub-surface archaeological remains exist within the remainder of the Study Area need not be related to the visibility of artefacts on the surface. Often the only way of gauging if sub-surface material is present is to test pit in areas that are deemed to be 'archaeologically sensitive" based on what we already know about a locality. In other instances, disturbance of sediments, or conditions of ground surface visibility, allow us to make a reasonable estimation of what lies beneath the surface. In the case of the Study Area reviewed for this project, it has had some disturbance of the skeletal sediments by vehicles

and farming activities, which have exposed the underlying geomorphology, thus allowing a visual inspection without test pitting.

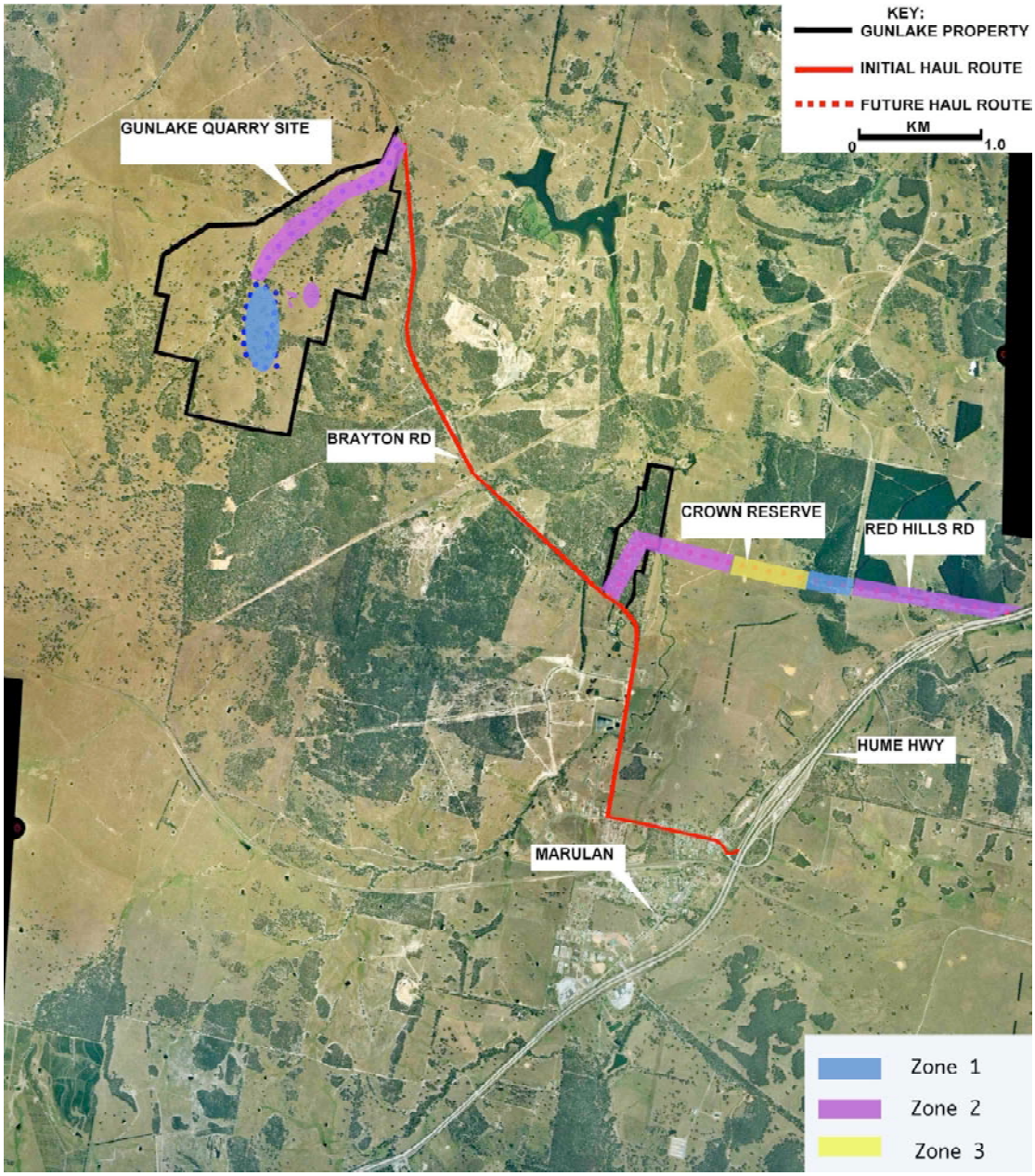
7.2 PREDICTIONS FOR SITE TYPE AND LOCATION

Based on the above analysis, the archaeological sensitivity of the study area has been mapped on *Map 3*. In summary the landscape has been divided into three zones as follows:

Zone 1 Gently undulating slopes near semi permanent / permanent water sources: Archaeological Potential – Medium to High.
This zone may contain larger artefact scatters than Zone 2, although they are still likely to be small on a regional scale. Sites are likely to be found close to the water courses on elevated flat terrain – such sites are the most typical for the region. There is a moderate potential for sub-surface archaeological deposits to be found in such areas. Approximately 75% of the study area was within this terrain unit.

Zone 2 Hill Crest above semi permanent/permanent water sources: Archaeological Potential – Low to Medium
This zone may contain sub-surface deposits similar to those at Butmaroo and Site G17 at Goulburn. The deposits are likely to be highly disturbed and laid down within the sediments naturally, rather than culturally. Approximately 15% of the study area was within this terrain unit.

Zone 3 Hilly Terrain: Archaeological Potential – Low to Medium.
This zone may contain small artefact scatters in localised areas and a thin veneer of isolated artefacts. It is unlikely that large sites will be evident or that any sub-surface deposits will be encountered in the thin soils. Approximately 10% of the study area was within this terrain unit.



Map 2 – Terrain Units

8.0 RESULTS AND DISCUSSIONS

8.1 INDIGENOUS ARCHAEOLOGICAL SITES IDENTIFIED DURING THE FIELD SURVEY

During the course of the field survey five (5) Indigenous archaeological sites were identified. The sites consisted of one (1) isolated find and four (4) small artefact scatters containing less than 10 artefacts. The details of the sites are provided in *Appendix 1*. The locations of the sites are provided in *Maps 3 & 4*.

Table 2 – Survey Results

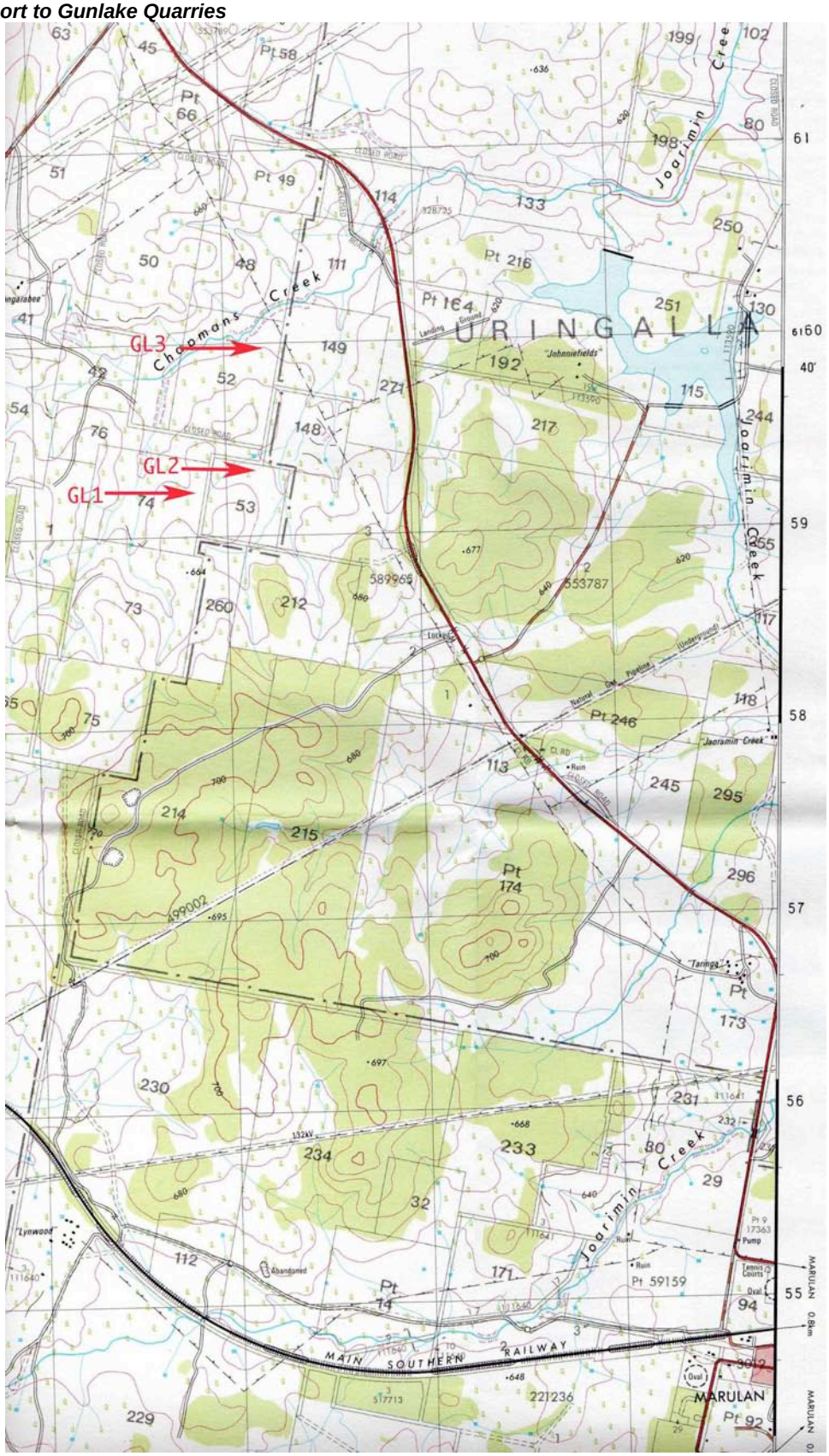
Site Name	Site Type	Grid Reference (WGS84)	Site Details
GL1	Artefact Scatter	E771978 N6159494	6 artefacts on erosion scald on saddle
GL2	Artefact Scatter	E772251 N6159535	6 artefacts on gently sloping dirt track
GL3	Artefact Scatter	E772393 N6160148	4 artefacts on erosion scald on gently sloping flat
GL4	Isolated Find	E225442 N6157488	1 artefact on west bank of creek
GL5	Artefact Scatter	E226975 N6157325	2 artefacts on moderate hill slope

As outlined above, previous investigations within proximity to the study area have been completed over several years. To summarise the results of these studies, the most common site types identified were artefact scatters, small to moderate in size. The results of the preliminary survey were consistent with these previous studies. All artefact scatters recorded during the present survey were identified as small, artefact quantities ranging from 2-6 in each site. One isolated find was also recorded.

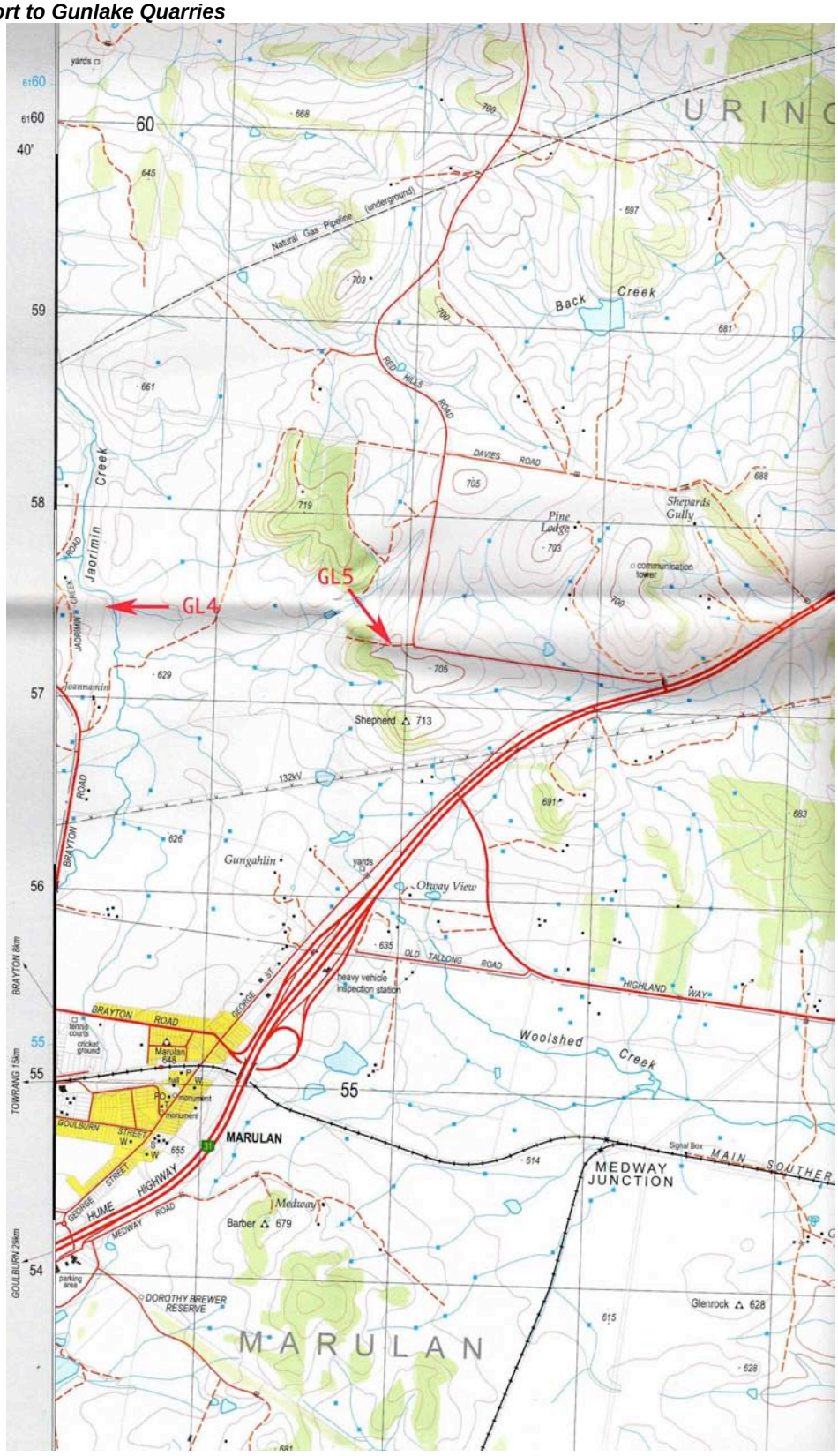
The material composition of artefacts within the identified sites, were generally consistent with previously recorded artefacts in the area. The most frequently identified material of this survey being silcrete (53.3%), the second most common being quartzite (26.7%). Equal quantities of chert (6.7%), metamorphic (6.7%) and quartz (6.7%) artefacts were recorded. Artefact types recorded during the survey included flakes and a flaked piece, the most common of artefact types recorded in previous studies. *Table 3* provides the details of artefact and material types.

Table 3 – Artefact and Material Composition

	Silcrete	Chert	Quartzite	Metamorphic	Quartz	Total
Flake	6 (75%)	0 (0%)	2 (50%)	1 (100%)	1 (100%)	**10 (66.7%)**
Flaked Piece	1 (12.5%)	1 (100%)	2 (50%)	0 (0%)	0 (0%)	**4 (26.7%)**
Core	1 (12.5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**1 (6.7%)**
Total	**8 (53.3%)**	**1 (6.7%)**	**4 (26.7%)**	**1 (6.7%)**	**1 (6.7%)**	**15**



Map 3 –Site Locations (a)



Map 4 – Site Locations (b)

The location of sites within the study area was also in keeping with the predictive model, outlined above. Terrain units with medium to high archaeological sensitivity included gently undulating slopes near semi permanent/permanent water sources (Zone 1). Three (3) sites (GL2, GL3, GL4) were identified within this terrain unit. It is hypothesised that the density of archaeological sites in the areas directly adjacent to creek lines would have been greater prior to the non-Indigenous occupation and associated environmental alteration.

The remaining sites (GL1, GL5) were recorded with Zone 2 – Hill Crest above semi-permanent/permanent water sources and Zone 3 – Hilly Terrain, respectively. Both these terrain units were awarded a level of low to medium archaeological sensitivity.

As discussed in the coverage analysis of the study area, the actual survey coverage equalled to approximately 45% of the studied survey area. In addition to vegetation coverage impeding the visibility of potential surface artefact scatters, stock grazing and clearing of lands within the study area has potentially resulted in the exposure and redepositing of artefacts. Subsequently, artefacts once located on the soils' surface may now be contained within the subsurface of the study area, or have been redeposited to other surface locations.

9.0 SIGNIFICANCE ASSESSMENT

The following provides an outline of the processes used to assess the significance of any cultural heritage sites that were identified during the course of the assessment.

9.1 ASSESSMENT GUIDELINES

There are several different ways of defining types of significance, and many practitioners have developed their own system of significance assessment. However, as Sullivan and Pearson (1995) point out, there seems to be a general advantage in using a set of criteria which is already widely accepted. In Australia cultural significance is usually assessed against the Burra Charter guidelines and the Australian Heritage Commission guidelines (ICOMOS 1988, 1999).

9.1.1 THE BURRA CHARTER

Under the guidelines of the Burra Charter 'cultural significance' refers to the 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations' of a 'place' (ICOMOS 1999:2). The guidelines to the Burra Charter comment:

> *"Although there are a variety of adjectives used in definitions of cultural significance in Australia, the adjectives 'aesthetic', 'historic', 'scientific' and 'social' ... can encompass all other values".*

The following provides the descriptions given for each of these terms.

Aesthetic Value
Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and materials of the fabric; the smells and sounds associated with the place and its use (Marquis-Kyle & Walker 1992).

Historic Value
A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may

be so important that the place retains significance regardless of subsequent treatment (Marquis-Kyle & Walker 1992).

Scientific Value
The scientific or research value of a place will depend upon the importance of the data involved or its rarity, quality or representativeness and on the degree to which the place may contribute further substantial information.

A site or a resource is said to be scientifically significant when its further study may be expected to help current research questions. That is, scientific significance is defined as research potential (Marquis-Kyle & Walker 1992).

Social Value
The social value of a place is perhaps the most difficult value for heritage professionals to substantiate (Johnston 1994). However, social value is broadly defined as 'the qualities for which a place has become a focus of spiritual, political, natural or other cultural sentimental to a majority or minority group' (ICOMOS 1988:30). In *What is Social Value*, Johnston (1994) has provided a clear definition of social value:

> *'Social value is about collective attachment to places that embody meaning important to a community, these places are usually community owned or publicly accessible or in some other way 'appropriated' into people's daily lives. Such meanings are in addition to other values, such as the evidence of valued aspects of history or beauty, and these meanings may not be apparent in the fabric of the place, and may not be apparent to the disinterested observer.' (Johnston 1994:10)*

Although encompassed within the criterion of social value, the spiritual value of a place is a new addition to the Burra Charter (ICOMOS 1999:1). Spiritual value is predominantly used to assess places of cultural significance to Indigenous Australians.

The degree to which a place is significant can vary. As Johnston (1994:3) has stated when trying to understand significance a 'variety of concepts [are] used from a geographical comparison ('national', 'state', 'local') to terms such as 'early', 'rare', or 'seminal''. Indeed the Burra Charter clearly states that when assessing historic significance, one should note that for:

> *'any given place the significance will be greater where evidence of the association or event survives in situ, or where the setting are substantially intact, than where it has been changed or evidence does not survive'. (ICOMOS 1988:29)*

9.1.2 SIGNIFICANCE CRITERIA RELEVANT TO INDIGENOUS SITES

Indigenous heritage sites and places may have educational, tourism and other values to groups in society. However, their two principal values are likely to be in terms of their cultural / social significance to Aboriginal people and their scientific / archaeological significance. These are the two criteria that are commonly used in establishing the significance of Aboriginal sites. The following provides an explanation of these criteria.

Aboriginal Cultural / Social Significance
This relates to the value placed upon a site or suite of sites by the local or regional Aboriginal community. The identification and assessment of those sites that are significant to Aboriginal

people is a matter for Aboriginal people. This assessment can only be made by the appropriate Aboriginal representatives of the relevant communities.

Scientific (Archaeological) Significance
Archaeological significance values (or scientific values) generally are assessed on the potential of a site or place to generate knowledge through archaeological research or knowledge. Bowdler (1984) states that the scientific significance should be assessed according to timely and specific research questions (research potential) and site representativeness.

Research potential entails the potential of a site or suite of sites for scientific research and excavation. This is measured in terms of a site's ability to provide information on aspects of Aboriginal culture. In this respect, the contents of a site and their state of preservation are important considerations.

Representativeness takes account of how common a site type is (Bowdler 1984). That is, it allows sites to be evaluated with reference to the known archaeological record within the given region. The primary goal of cultural resource management is to afford the greatest protection to a representative sample of sites throughout a region. The corollary of a representative site is the notion of a rare or unique site. These sites may help to understand the patterning of more common sites in the surrounding area, and are therefore often considered of archaeological significance. The concept of a rarity cannot be easily separated from that of representativeness. If a site is determined to be rare, then it will by definition be included as part of the representative sample of that site type.

The concepts of both research potential and representativeness are ever changing variables. As research interests shift and archaeological methods and techniques change, then the criteria for assessing site significance are also re-evaluated. As a consequence, the sample of site types which are used to assess site significance must be large enough to account for the change in these variables.

9.2 SIGNIFICANCE ASSESSMENTS FOR SITES IDENTIFIED IN THE STUDY AREA

All of the Aboriginal sites identified during the course of the field study have been accorded a scientific significance rating. For the purposes of this assessment, eight distinctive levels of significance have been established. These are as follows:

Very low	Moderate-High
Low	High
Low-Moderate	High-Very High
Moderate	Very High

Sites GL1, GL2, GL3, GL4 and GL5
These small artefact scatters and isolated find (GL4) are assessed as possessing very low significance. The artefact types identified at these locations are well represented within the archaeological record of the region and therefore it is unlikely that additional information can be derived from the sites in accordance with the existing cultural evidence.

10.0 RECOMMENDATIONS

Based on the above findings and in accordance with the legal requirements of the NSW DEC, a series of specific management recommendations have been established for the sites identified within the study area. The recommendations are aimed at minimising the impact of proposed developments on any potential cultural resources present within the surveyed area.

Heritage management options and recommendations provided in this report are made on the following bases:

- Consultation with representatives of the Pejar Local Aboriginal Land Council and Peter Falk, representative for Gavin Andrews of the D'harawal Knowledge Holders;
- The legal and procedural requirements of NSW DEC;
- The results of the investigation as documented in this report; and
- Background research into the extant archaeological and historic record for the study area and its surrounding regions.

The recommendations are:

1) Salvage and relocation of all sites (GL1–5) should be completed prior to the commencement of works. The salvage should be completed in accordance with the NPW Act 1974 (NSW). A Section 90 Application (Consent, Consent with salvage) should be submitted to the NSW DEC. The salvage program should be completed on receipt of the Section 90 permit, by a qualified Archaeologist and with representatives of the relevant Indigenous organisations.

2) Copies of the archaeological report should be supplied to:
   - NSW DEC;
   - Pejar Local Aboriginal Land Council;
   - Peter Falk (representative for Gavin Andrews of the D'harawal Knowledge Holders);
   - Yass Shire Council.

GENERAL MANAGEMENT RECOMMENDATIONS

A cultural heritage assessment should be completed for additional infrastructure, access routes or alterations to the proposed development. This should be undertaken by a qualified Archaeologist and representatives of the relevant Indigenous groups. A cultural heritage management plan should be developed and applied to these additional areas.

The following mitigation measures should be implemented in the event that sites or artefacts are identified during the course of monitoring and construction activities.

Discovery of Cultural Heritage Items

Step 1
Any person discovering suspected cultural heritage sites or items should notify machinery operators that are working in the general vicinity of the area that earth disturbance works should stop immediately. Remember health and safety requirements when approaching machinery operators.

Step 2
A buffer protection zone of 20m x 20m should be established around the suspected cultural heritage site or items. No unauthorised entry or earth disturbance will be allowed within this 'archaeological zone' until such time as the suspected cultural heritage items have been assessed, and appropriate mitigation measures have been carried out.

Step 3
If required, an archaeologist should be contracted and requested to assist the Indigenous stakeholders in carrying out an assessment of the cultural heritage find.

Step 4

Based on the findings of the assessment, appropriate management recommendations should be developed for the cultural heritage find. These recommendations should be submitted to the Parties for endorsement.

Step 5
Once endorsement has been obtained, the prescribed management recommendations should be carried out by the appropriate personnel.

Step 6
On the completion of the prescribed works, the Parties should advise the Site Supervisor (or other Project Personnel) that construction works may recommence in the 'archaeological zone'. If there are further constraints to construction works in the 'archaeological zone', then the Site Supervisor should be informed of these. It is the responsibility of the Site Supervisor to inform construction crews of these constraints.

Discovery of Skeletal Material

Step 1
Under no circumstances should the suspected skeletal remains be touched or disturbed. If these are human remains, then this area potentially is a crime scene. Tampering with a crime scene is a criminal offence.

Step 2
Any person discovering suspected skeletal remains should notify machinery operators that are working in the general vicinity of the area that earth disturbing works should stop immediately. Remember health and safety requirements when approaching machinery operators.

Step 3
A buffer protection zone of 100m x 100m should be established around the suspected skeletal remains. No unauthorised entry or earth disturbance will be allowed with this buffer zone until such time as the suspected skeletal remains have been assessed.

Step 4
The police, DEC and a qualified archaeologist will be contacted and informed of the discovery. A time will be arranged for these parties to meet on site to carry out an assessment of the suspected skeletal remains.

Step 5
Should the skeletal remains be declared an Indigenous burial site, the following procedures will be implemented.

- A meeting shall be convened between the Parties to review the circumstances of the find.
- The Indigenous representatives in consultation with Gunlake Quarries shall request that identified Aboriginal representatives, a qualified archaeologist and the relevant DEC officer shall undertake a site inspection. The purpose of this inspection will be to develop recommendations for further actions required to be undertaken at this site.
- These recommendations shall be submitted to the Parties for review and endorsement.
- Once endorsed, these recommendations shall be carried out by the specified personnel.

11.0 REFERENCES CITED

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APPENDIX 1 – Site Details

Site Name	GL1
Grid Reference	E771978 N6159494 (WGS 84)
	E771863 N6159308 (Aus 84)
Site Type	Artefact Scatter

An artefact scatter consisting six (6) artefacts, was located on an erosion scald on the flat of a hill saddle. The site was contained within a 45m x 15m area. The area, previously cleared for stock grazing and other agricultural practices, was vegetated with immature Eucalyptus species and introduced and native grass species. Surface visibility at the time of the survey was 80% on the scald reducing to 10% in other areas. The site aspect was open.

Artefact Details

1. quartzite flaked piece (red) – possible reduction piece
   47mm x 30mm x 20.5mm
2. quartzite flaked piece (red / white)
   43mm x 17mm x 14mm
3. banded chert flake (red / white)
   11mm x 16mm x 4mm
4. quartzite flake (pink) – retouch along one margin (39mm)
   39mm x 37.5mm x 11.5mm
5. silcrete flake (red / white)
   14.5 x 21.5mm x 7.5mm
6. quartzite flake (yellow/brown) – course grained
   19.5mm x 15mm x 5.5mm

GL1 – Artefacts

GL1 – Site View

Site Name GL2
Grid Reference E772251 N6159535 (WGS 84)
E772139 N6159349 (Aus 84)
Site Type Artefact Scatter

Six (6) artefacts located on a dirt track within close proximity to a gate entrance approximately 40m above a constructed dam. The area sloped gently (5 degrees) west. The area, previously cleared, contained introduced grass species. Surface visibility at the time of the survey was 90% on the track, reducing to less than 10% elsewhere. Artefacts identified in addition to the below sample included four (4) silcrete flakes and one (1) chert core.

Artefact Details (sample)

1. silcrete flaked piece (light grey)
   27mm x 20mm x 7mm
2. silcrete core (light grey) – 2 platforms a) 3 negative scars b) 1 negative scar (step fracture)
   25mm x 15mm x 9mm

GL2 - Artefacts

GL2 – Site View

Site Name GL3

Grid Reference E772393 N6160148 (WGS 84)
E772280 N6159961 (Aus 84)
Site Type Artefact Scatter

A small artefact scatter located on an erosion scald / ant nest on open, gently sloping ground (approximately 3degrees) with a north facing aspect. Artefacts were contained within an area approximately 5m x 5m within the access road easement. The area, previously cleared, was vegetated with immature Eucalypt species and grasses. Soils in the area consisted of sand with some small gravels. Surface visibility at the time of the survey was 90% on the erosion scald reducing to less than 10% elsewhere.

Artefact Details

1. silcrete flake (grey) – 5% cortex
   39mm x 67mm x 13mm
2. metamorphic flake (light cream/grey)
   31mm x 46.5mm x 14.5mm
3. silcrete flake (grey, fine)
   29mm x 23mm x 8mm
4. silcrete flake (grey/red) distal absent
   14mm x 15.5mm x 6mm

GL3 - Artefacts

GL3 – Site View
(Ed O'Neil & Peter Falk)

Site Name GL4
Grid Reference E225442 N6157488 (WGS 84)

E225336 N6157312 (Aus 84)

Site Type Isolated Find

An isolated find was identified on the west bank of Chapman's Creek. The artefact was recorded on a flat to gently sloping area (less than 5 degree), with an open aspect, approximately 18m from the creek bank. Surface visibility at the time of the survey was 10% with soils consisting brown loam with volcanic gravels. Vegetation in the area consisted some remnant Eucalypt and grasses.

Artefact Details

1. quartz flake (milky/crystalline) – 30% cortex
   34mm x 29mm x 10mm

GL4 – Artefact

GL4 – Site View

Site Name GL5
Grid Reference E226975 N6157325 (WGS 84)

E226870 N6157134 (Aus 84)

Site Type Artefact Scatter

A small artefact scatter containing two (2) artefacts was located on a dirt track on a moderate east sloping hillside (5-10 degrees), approximately 40m from the hill crest. Vegetation in the area, previously cleared, consisted of a pine stand and grasses. The stand of pine trees was located in the immediate vicinity. Soils in the area included brown loam with some river gravels. Surface visibility at the time of the survey was 60% on the track reducing to less than 10% elsewhere. Artefacts were contained within a 1m x 1m area.

Artefact Details

1. silcrete flake, distal (light grey) – retouch along 1 margin (25mm)
   29.5m x 17.5mm x 6mm
2. silcrete flake, distal (light grey) –retouched along 1 margin
   23mm x 10mm x 9mm

GL5 – Artefacts

GL5 – Site View