BIOSIS
RESEARCH

Archaeological and Cultural Heritage Impact Assessment of Proposed Longwalls 705 – 710, West Appin, NSW

Report for BHP Billiton Illawarra Coal

June 2008

Natural & Cultural Heritage Consultants 8 Tate Street Wollongong NSW 2500

Ballarat:
449 Doveton Street North Ballarat3350
Ph: (03) 5331 7000 Fax: (03) 5331 7033
email: ballarat@biosisresearch.com.au

Melbourne:
38 Bertie Street Port Melbourne 3207
Ph: (03) 9646 9499 Fax: (03) 9646 9242
email: melbourne@biosisresearch.com.au

Queanbeyan:
55 Lorn Road Queanbeyan 2620
Ph: (02) 6284 4633 Fax: (02) 6284 4699
email: queanbeyan@biosisresearch.com.au

Sydney:
15 – 17 Henrietta Street Chippendale 2008
Ph: (02) 9690 2777 Fax: (02) 9690 2577
email: sydney@biosisresearch.com.au

Wollongong:
8 Tate St Wollongong 2500
Ph: (02) 4229 5222 Fax: (02) 4229 5500
email: wollongong@biosisresearch.com.au

Project no: s4970

Author:

Melanie Thomson and Chris Lewczak

Reviewer:

Jamie Reeves

Mapping:

Peter Crow and Rob Suansri

ACKNOWLEDGMENTS

Biosis Research acknowledges the contribution of the following people and organisations in preparing this report:

- Bruce Blunden and Gary Brassington (BHP Billiton Illawarra Coal)
- Ron Moon and Zina Ainsworth (BHP Billiton Illawarra Coal)
- Peter Chudleigh and Toni Stevens (Cardno Forbes Rigby)
- David Gordon (DECC)
- Glenda Chalker (Cubbitch Barta Native Title Claimants Aboriginal Corporation)
- Cliff Foley, Wendy Lewis and Donna Whillock (Tharawal Local Aboriginal Land Council)
- Matthew Richardson, Sian Wilkins, Matthew Swan, Robert Suansri, Peter Crowe and Larisa Leybovich (Biosis Research)

ABBREVIATIONS

AHC	Australian Heritage Council
AHIMS	Aboriginal Heritage Information Management System
BHPBIC	BHP Billiton Illawarra Coal
CHL	Commonwealth Heritage List
CBNTCAC	Cubbitch Barta Native Title Claimants Aboriginal Corporation
DECC	Department of Environment and Climate Change
DEWH&A	Department of Environment, Water, Heritage and the Arts
GPS	Global Positioning System
GIS	Geographic Information System
GSV	Ground surface visibility
ICOMOS	International Council on Monuments and Sites
TLALC	Tharawal Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
MGA	Map Grid of Australia – unless otherwise specified all coordinates are in MGA
NHL	National Heritage List
NNTT	National Native Title Tribunal
NPWS	National Parks and Wildlife Service (now part of DECC)
PAD	Potential Archaeological Deposit
REP	Regional Environment Plan
RNE	Register of the National Estate
SHI	State Heritage Inventory
SHR	State Heritage Register
SMP	Subsidence Management Plan

CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

BHP Billiton Illawarra Coal (BHPBIC) are continuing and extending their underground coal mining operations at Appin Mine, west of Appin. Biosis Research Pty Ltd has been commissioned to conduct an archaeological and cultural heritage impact assessment of proposed Longwalls 705 to 710.

The majority of this area has been subject to previous archaeological investigation (Demkiw 1985; Sefton 1998, 1999; Dibden 2001, 2003; Navin Officer 2006; Biosis Research 2004, 2006a). As such, a detailed systematic survey of the area above the proposed longwall layout out was not undertaken. Rather, previously identified sites were relocated and their condition updated, and any previously unsurveyed landforms expected to contain archaeological sites likely to be subject to mining related subsidence movements were targeted.

As a result of previous archaeological work and the current archaeological assessment, nineteen Aboriginal sites are located within what is defined as the General SMP Area. These sites comprise 12 stone artefact scatter sites or isolated artefact occurrences, 4 shelters with deposit sites, 1 scarred tree and 1 axe grinding groove and 1 shelter with a hand stencil that is not considered to be Aboriginal in origin and is therefore not an archaeological site. Eighteen of these sites are registered on the Aboriginal Heritage Information Management System at DECC.

Three previously identified historic heritage item(s) are located within the General SMP Area of Longwalls 705-710. These include The Mountbatten Group (historic buildings and associated features), the Gilbulla Group (historic buildings), and the Upper Canal Sydney Water Supply. The Gilbulla Group property is situated on the margin of the SMP area to the north. The Mountbatten Group features and the Upper Canal Sydney Water Supply are situated outside the line of predicted 20 mm vertical subsidence, however both features were considered for ‘far field’ subsidence impacts as they are within the General SMP Area. The Upper Canal Sydney Water Supply is listed on the State Heritage Register. All of these sites are listed on the Register of the National Estate, the State Heritage Inventory, The National Trust Register and the Wollondilly LEP.

Potential Impacts to Aboriginal sites

Subsidence prediction data for Aboriginal archaeological sites within the SMP Area was supplied by MSEC (2008). The likelihood of significant impacts to these Aboriginal archaeological sites is considered to be low.

The open artefact scatters and isolated artefact sites can potentially be affected by cracking or mass movement of surface soils as a result of mine subsidence movements. Although the predicted cumulative subsidence movements are between 810-1510 mm, experience indicates that surface soil deformation will be highly unlikely in the area as mine depth of cover is greater than 500 m. It is therefore considered improbable that there will be any subsidence related impact to open artefact scatter sites and isolated artefact sites.

One scarred tree (Nepean River 7) is located above the chain and pillar between Longwalls 704 and 705. However, based on previous observations, and as described above, it is unlikely that mine subsidence movements will impact on this scarred tree (MSEC 2008:128).

Although the recorded grinding groove site (Unit e: Rubbish Dump, Didicoolum) could not be relocated during the Biosis Research survey in 2006, predictions and an impact assessment have been calculated regardless. The maximum predicted subsidence movements associated with this site are greater than the predicted amounts sufficient to result in fracturing of the sandstone bedrock. It is therefore possible that fracturing of the open sandstone bedrock on which the site is thought to be located might be subject to fracturing and cracking (MSEC 2008: 126).

The shelter with a hand stencil considered to be non-Aboriginal in origin (Upper Nepean Hand Stencils) is not a registered archaeological site. Nevertheless, subsidence predictions have been calculated, as some Aboriginal stakeholders consider this site to have cultural values. The predicted subsidence movements calculated for this site suggest that the risk of impact to this site is negligible (MSEC 2008: 126).

The four shelters with deposit or midden sites (Nepean River 4, Nepean River 5, Nepean River 6 and Nepean River No. 8) are located on the southern edge of the current SMP Area. The maximum predicted subsidence movements are expected to occur near the base of the Nepean River valley and are not expected to pose a risk of impact to the heritage values of the shelters, which are located along the valley sides (MSEC 2008: 126).

Potential Impacts to Historical sites

The Mountbatten Group, Upper Canal Sydney Water Supply and associated features, and Gilbulla Memorial Conference Centre are all located within the 500 m buffer Study Area. Only the Gilbulla Conference Centre is located within the predicted line of 20 mm vertical subsidence.

The Upper Canal is on the western margin of the SMP Area, and at least 500 m from the end of Longwall 705. As it is located outside the predicted 20 mm subsidence contour, it is unlikely to be subjected to any significant subsidence movements (MSEC 2008). It could, however, be subject to far-field horizontal movements. As such movements tend to be bodily movements associated with very low levels of strain, it is again unlikely that the canal would be impacted by far-field horizontal movements resulting from extraction of Longwalls 705 to 710 (MSEC 2008: 90).

Subsidence predictions have been calculated for wrought iron aqueducts where the Upper Canal crosses Leafs Gully, Mallaty and Nepean creeks. The maximum predicted total subsidence, upsidence and closure movements at the creek crossings are minimal, however, it has been recommended that these results are reviewed by the Sydney Catchment Authority (SCA) and that necessary preventative measures are implemented (MSEC 2008:116).

The Mountbatten Group is located on the south western edge of the study area, outside the 20 mm subsidence contour. As it is located outside the line of 20 mm vertical subsidence it is considered unlikely to experience any systematic subsidence movements resulting from the extraction of the proposed longwalls.

Gilbulla Memorial Conference Centre property is located on the north eastern edge of the 20 mm subsidence contour. The Main House building is located outside the 20 mm contour, however the 'Long House' is located just within the 20 mm line of vertical subsidence. The subsidence predictions for this structure are considered to be negligible as these structures are located 260 m north of Longwall 710 at their closest point (MSEC 2008).

SUMMARY OF RECOMMENDATIONS

Aboriginal archaeological sites

There are nineteen Aboriginal cultural heritage sites, one of which is not considered to be an Aboriginal archaeological site, situated within the General SMP Area.

Aboriginal Recommendations

Based on the subsidence predictions provided by MSEC (2008), it is unlikely that there will be impacts to the archaeological sites resulting from the proposed longwall mining.

Aboriginal archaeological sites that have some potential, however unlikely, to be impacted by the proposed longwall mining, will be subject to monitoring. This will involve a site inspection 3 months prior to extraction and a site inspection at the completion of relevant Longwalls for the following Aboriginal archaeological sites:

- *Nepean River No. 8 (Shelter with Deposit)*
- *Nepean River 4 (Shelter with Midden)*
- *Nepean River 5 (Shelter with Deposit)*
- *Nepean River 6 (Shelter with Deposit)*

Although not considered to be an archaeological site or Aboriginal in origin the monitoring program will also include:

- *Upper Nepean Hand Stencils (Non-Aboriginal Shelter with Hand Stencils)*

If any notable ground surface impacts occur across the undulating open landscape of the Cumberland Lowlands, then such impacts should be considered against the location of all Aboriginal archaeological sites recorded within the study area. No such impacts have ever been recorded in the past and it is extremely unlikely that impacts on surface Aboriginal sites will occur.

Ongoing consultation should continue between BHP Billiton Illawarra Coal, the Tharawal Local Aboriginal Land Council, Cubbitch Barta Native Title Claimants, and DECC as required.

A copy of this report should be distributed to the Registered Stakeholder Aboriginal communities for their review and comment on receipt of final comments from BHP Billiton Illawarra Coal.

Historical archaeological sites

There is one item listed on the NSW State Heritage Register - The Sydney Upper Canal, and there are two items listed on the NSW State Heritage Inventory - The Mountbatten Group and The Gilbulla Memorial Conference Centre.

Historical Recommendations

Upper Canal

It was predicted that the Upper Canal would not be impacted by the proposed longwalls. Pending SCA review of the subsidence predictions, no further archaeological or heritage assessment work is required and there is no requirement for statutory approvals. In all matters relating to the Upper Canal the existing CMP should be followed at all times.

Mountbatten Group

No further archaeological or heritage assessment work is required at the Mountbatten Group. No permits will be required from the NSW Heritage Office for the proposed longwall mining to proceed.

While there are no impacts predicted to any historical heritage items identified in this assessment the items that are associated with the Mountbatten Group will be included into a monitoring regime under the Property Subsidence Management Plan that has been developed in consultation with the property owner.

Gilbulla

No further archaeological or heritage assessment work is required at the Gilbulla Conference Centre. No permits will be required from the NSW Heritage Office for the proposed longwall mining to proceed.

While there are no impacts predicted to any historical heritage items identified in this assessment the items that are associated with the Gilbulla Conference Centre will be included into a monitoring regime under the Property Subsidence Management Plan that has been developed in consultation with the property owner.

1.0 INTRODUCTION

Cultural heritage legislation protecting Aboriginal and historical heritage places applies in New South Wales. These places are an important part of our heritage. They are evidence of more than 40,000 years of occupation of New South Wales by Aboriginal people, and of the more recent period of post-contact settlement.

Heritage places can provide us with important information about past lifestyles and cultural change. Preserving and enhancing these important and non-renewable resources is encouraged.

It is an offence under sections of legislation to damage or destroy heritage sites without a permit or consent from the appropriate body (see Appendix 3 for a discussion of relevant heritage legislation and constraints).

When a project or new development is proposed, it must be established if any cultural heritage places are in the area and how they might be affected by the project. Often it is possible to minimise the impact of development or find an alternative to damaging or destroying a heritage place. Therefore, preliminary research and survey to identify heritage places is a fundamental part of the background study for most developments.

The first stage of a study usually incorporates background research to collect information about the land relevant to the proposed project (the Study Area). A second stage often involves a field survey and assessment of this area.

Possibly the most important part of the study involves assessing the cultural heritage significance of heritage places in the study area. Understanding the significance of a heritage place is essential for formulating management recommendations and making decisions.

1.1 Project background

This report has been commissioned in order to identify and assess Aboriginal and historical cultural heritage values of the area above proposed Longwalls 705 to 710 within Appin Area 7, previously known as the Douglas Project, west of the township if Appin (Figure 1). Results of this investigation will be used to assess the impacts of subsidence on Aboriginal archaeological and cultural heritage sites and historical archaeological and heritage sites. Impacts to archaeological and cultural heritage sites have been made based on the subsidence predictions for the SMP Area developed by MSEC (2008).

Recommendations designed to minimise and manage impacts to cultural heritage places have been formulated according to legislative constraints and ‘best practice’ heritage management.

1.2 Study area

The study area is located south west of Sydney between Douglas Park and Menangle, within the Wollondilly Local Government Area (LGA). The proposed longwalls are situated on the transitional zone of the Woronora Plateau and the Cumberland Plain, known as the Cumberland Lowlands, where the open undulating plains meet the rugged sandstone plateau. The proposed longwall layout is primarily located within the undulating plain region, with the eastern margin bounded by the Nepean River and its tributaries.

Most of the study area comprises undulating plains dissected by a number of small creeks and drainage lines, including Foot Onslow Creek, Harris Creek and Navigation creeks and their associated tributaries. These areas have generally been cleared of vegetation for farming, resulting in extensive ground disturbance. Along the Nepean River, large stretches of native vegetation remain where the steep terrain has been unsuitable for farming.

Mapping of the study area (see Figures 2 and 3) shows the proposed longwall layout area (shown as a yellow area), and the General SMP Area (shown as an orange line) that represents the 35 degree angle of draw or the 20 millimetre subsidence contour, whichever is the greater area. For this project, the General SMP Area represents the study area.

1.3 Aims

The following is a summary of the major objectives of this assessment:

- Conduct heritage register searches to identify any previously recorded cultural heritage sites within the study area. Searches will include the Aboriginal Heritage Information Management System (AHIMS), the National Heritage List, Commonwealth Heritage List, Register of the National Estate, State Heritage Register, Local Environmental Plan and National Trust heritage lists.
- Conduct additional background research in order to recognise any identifiable trends in site distribution and location, in order to develop a Site Prediction Model.
- Consult with identified statutory stakeholders and stakeholders identified through DECC's *National Parks and Wildlife Act 1974: Part 6 Approvals – Interim Community Consultation Requirements for Applicants* for the study area.
- Undertake landform and transect survey of the study area where existing information is limited. Survey coverage will target landforms with high potential for heritage places within the study area, as identified through background research.
- Undertake targeted survey of all previously recorded sites within the study area, to reassess the condition of these sites.
- Record and assess sites identified during the survey in compliance with the guidelines endorsed by the NSW Department of Environment and Climate Change (DECC) and the NSW Heritage Office.

- Identify impacts to all identified Aboriginal and historical cultural heritage sites and places based on potential changes as a result of mining subsidence.
- Assess the heritage significance of all identified Aboriginal and historical cultural heritage sites and places.
- Make recommendations to manage potential subsidence impacts to cultural heritage values within the Appin Area 7 Longwalls 705-710 General SMP Area.
- Make recommendations to manage the cultural heritage values within the study area.

1.4 Consultation with the Aboriginal Community

In accordance with the DECC's *National Parks and Wildlife Act 1974: Part 6 Approvals – Interim Community Consultation Requirements for Applicants* Biosis Research notified the following bodies regarding the proposed Appin Area 7 Longwalls 705-710:

- Tharawal Local Aboriginal Land Council;
- The Registrar of Aboriginal Owners;
- Native Title Services;
- The Wollondilly Shire Council; and
- The NSW Department of Environment and Climate Change.

Public notifications following the DECC *Interim Community Consultation Requirements for Applicants* were made in February 2008 via the following local newspapers.

- *The Macarthur Chronicle*
- *Wollondilly Advertiser*

A register for interested parties was opened on 19 February 2008 and registrations were received by Biosis Research until 4 March 2008. Written responses to the notification were received from the following parties:

- Tharawal Local Aboriginal Land Council (Donna Whillock)
- Northern Illawarra Aboriginal Collective (NIAC – Chris Illert)
- Cubbitch Barta Native Title Claimants Aboriginal Corporation (Glenda Chalker)
- Office of the Registrar of Aboriginal Owners (Maurice Stewart)

Additional responses to the project were received from:

- Ngunawal Heritage Aboriginal Corporation (Melinda Tubolec)
- Campbelltown City Council
- DECC (Lou Ewins)

In accordance with the DECC's *National Parks and Wildlife Act 1974: Part 6 Approvals – Interim Community Consultation Requirements for Applicants* stakeholders were provided with a methodology for the proposed cultural assessment and given 21 days to review the methodology and provide feedback. No responses to the methodology were received.

Representatives from the following organisations participated in the fieldwork:

- Cubbitch Barta Native Title Claimants Aboriginal Corporation
- Tharawal Local Aboriginal Land Council

A copy of this report will be forwarded to all the above listed Aboriginal communities for comment. The Aboriginal communities will provide advice regarding the cultural significance of the heritage sites.

1.5 Terminology

For consistency with other reports associated with the Subsidence Management Plan (SMP) for this mining application, the following terminology is used:

- General SMP Area - the surface area that is likely to be affected by the proposed mining of Longwalls 705 to 710 in the Bulli Seam at Appin Area 7. The extent of the SMP area has been calculated by combining the areas bounded by the following limits: the 35 degree angle of draw line, predicted vertical limit of subsidence (20 mm) and areas sensitive to valley and far field movements.

- Subsidence – in terms of this assessment subsidence is taken to mean the sum total of vertical (upsidence and subsidence) and horizontal surface movements due to the extraction of coal using longwall mining techniques. The MSEC report (MSEC 2008) describes these mechanisms in detail.

- The MSEC Report – Mine Subsidence Engineering Consultants have prepared the subsidence predictions and impact assessment for this report. It is cited above as (MSEC 2008). The report will hereafter be referred to as the MSEC report unless otherwise stated.

2.0 ABORIGINAL CULTURAL HERITAGE ASSESSMENT METHODOLOGY

2.1 Philosophy

A methodology is a system of principles that are formulated to govern the way an assessment is carried out. In archaeological and cultural heritage assessments the methodology employed is influenced by several factors including: the type of development or project, environmental factors, ethnographic and historical land-uses, and previous archaeological and cultural heritage work.

2.2 Guiding Principles

The methodology employed for this investigation has been designed to conform to the requirements of the relevant advisory documents and guidelines as endorsed by the NSW Department of Environment and Climate Change (DECC). These guidelines and documents are:

- *National Parks and Wildlife Act* 1974: Part 6 Approvals – Interim Community Consultation Requirements for Applicants (DEC 2004);
- Draft Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation (DEC July 2005);
- The Australia ICOMOS Burra Charter, 1999;
- Working Draft Aboriginal Cultural Heritage Standards and Guidelines Kit (NSW NPWS 1997); and
- Guidelines for Aboriginal Heritage Impact Assessment (DRAFT) (DEC no date).

In line with these documents, the methodology adheres to the following principles:

- Aboriginal people are the primary determinants of the significance of their heritage;
- Input from those Aboriginal people with a cultural association to the land is an essential part of assessing the significance of Aboriginal heritage objects and values that could be impacted by an activity;
- Aboriginal heritage can have both cultural and scientific/archaeological significance and both should be the subject of assessment;
- Aboriginal community involvement needs to take place early in the assessment process to ensure that their values and concerns are fully taken into account, and so that their own decision-making structures are able to function adequately; and
- Consideration should be given to measures that could be implemented to avoid, mitigate or offset likely impacts.

The DECC *National Parks and Wildlife Act* 1974: *Part 6 Approvals – Interim Community Consultation Requirements for Applicants* states that the community consultation process ensures that Aboriginal communities have the opportunity to positively influence assessment outcomes by:

- Influencing the design of the assessment of cultural and scientific significance;
- Providing relevant information in relation to cultural significance values; and
- Contributing to the development of cultural heritage management recommendations.

2.3 Methodology

The following is a detailed outline of the methods employed for this assessment.

2.3.1 Background Research

The following activities were undertaken during the background research phase:

- Search for sites registered on the NSW DECC AHIMS for the study area and surrounding vicinity.
- Review of relevant site records for the study area and surrounds.
- Review of relevant reports from the region.
- Search of the NSW Heritage Office database and State Heritage Register.
- Search of the National Heritage List, Commonwealth Heritage List and Register of the National Estate.
- Inspection of heritage lists in relevant local planning instruments.
- Search of the National Trust Heritage Register.

This data was collated and mapped to show the locations of the previously recorded sites. The data was also used to formulate predictive statements regarding Aboriginal archaeological site distribution within the study area. The predictive statements were based on terrain units, and were used to help determine the specific locations of the field survey.

2.3.2 Cultural and Archaeological Survey

The cultural and archaeological survey was conducted as follows:

- Known sites were revisited to confirm their location, and to make a record of their current condition.
- Pedestrian survey was undertaken at selected representative areas.
- The location of all sites was recorded using a hand-held GPS unit.

- Survey data was recorded on purpose-designed recording forms.
- Details of each site was recorded using purpose-designed recording forms.
- Appropriate plans and maps were prepared.
- Photographs of all sites and features were taken.
- Appropriate Aboriginal Community representatives assisted with the field assessment.

2.3.3 Assessment of Significance

The NSW DECC recognises that 'Aboriginal community are the primary determinants of the significance of their heritage' (NSW DEC 2004). Biosis Research recognises that our role in the cultural heritage assessment process is to provide specialist skills, particularly in regard to archaeological and heritage management expertise. These specialist skills can be articulated and enhanced through consultation with the Aboriginal community, with the aim of providing a holistic assessment of cultural heritage significance.

Archaeologists study the material cultural heritage—artefacts, sites and structures—of past peoples and societies. However, not all places and sites of cultural heritage value and significance have material evidence. Places, sites and objects have heritage value because of what they mean to people, and because of the values they represent for people. Places, sites and objects will have different heritage values for different people. These different values may require negotiation among various stakeholders and can shape what decisions are made about conservation. Cultural heritage management is the process of investigation, consultation and making decisions about the conservation of heritage places through the assessment of heritage values.

Heritage management is based on the principle that the heritage significance of a place will guide all future decisions that affect the place. The determination of cultural heritage significance relies on a comprehensive approach to heritage assessments and to the values that are attached to heritage places. Cultural heritage significance can be considered to be the importance of a place, site or object arising from the combination of values attributed to it. These values determine the 'what' and 'how' of conservation and direct management decisions. The categorisation and significance of a place or site will also determine the statutory protection that may be afforded to it.

This approach is laid out in the Australia ICOMOS Burra Charter (1999), which has been adopted by cultural heritage managers and government agencies as the set of guidelines for best practice heritage management in Australia. The Burra Charter identifies the following categories of values: aesthetic, historic, scientific and social. Most assessment approaches also include a ranking of significance – high, moderate or low, for example. For each value associated with a place, an attempt is made to assess the degree or level of significance in terms such as *unique, important, representative, rare* and so on – which relies on a comparison of that value in relation to other places. One of the more common applications of

the significance assessment process is to mitigate or control landscape modifying activities, including the protection or conservation of identified heritage values.

Both professional and community understandings are important when determining heritage and its significance. 'Expert' interpretation will often need to be integrated with other understandings and assessments of heritage. This is particularly relevant in a discussion of Aboriginal cultural heritage, where there can be differences in the way places are valued and in understandings of how knowledge can be used. As a consequence, outcomes should rely on processes and practices that promote integration and an effective incorporation of different values in decision making.

For example, an 'archaeological' site can be of broader interest to groups other than archaeologists. There are additional scientific interests in archaeological sites than those that arise through archaeology alone. Many types of scientific research or 'informational' interests can use data from archaeological sites, and these can all contribute the 'scientific value' of a place or site. Also, the wider interests of the general community can be complementary to archaeological values. In terms of Aboriginal communities, heritage places – including those that are otherwise defined as 'archaeological sites' – will attract differing values. These may include custodianship obligations, education, family or ancestral links, identity, and symbolic representation.

History and traditions are important: this generation has an obligation to future generations to retain certain things as they are currently seen and understood. This includes retaining alternative understandings to those that come through scientific assessments. Heritage places are often more complex than is identified through the scientific determination of value. Cultural and social values can be complex and rich - the past is a vital component of cultural identity. Feelings of belonging and identity are reinforced by knowledge of the existence of a past, and this is further reinforced and maintained in the protection of cultural heritage.

Assessment of Cultural Heritage Significance

As well as the ICOMOS Burra Charter, DECC has endorsed the *Guidelines for Aboriginal Impact Assessment*. The relevant sections of this document are presented and discussed below.

The *Guidelines* state that an area may contain evidence and associations which demonstrate one or any combination of the following Aboriginal heritage values. The values described by the *Guidelines* are drawn from the Burra Charter.

Social value (sometimes termed Aboriginal value) refers to the spiritual, traditional, historical or contemporary associations and attachment that the place or area has for the present-day Aboriginal community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events. Communities can experience a sense of loss should a place of

social significance be damaged or destroyed. These aspects of heritage significance can only be determined through consultative processes with one or more Aboriginal communities.

Historic value refers to the associations of a place with a person, event, phase or activity of importance to the history of an Aboriginal community. Historic places may or may not have physical evidence of their historical importance (such as structures, planted vegetation or landscape modifications). Gaining a sufficient understanding of this aspect of significance will often require the collection of oral histories and archival or documentary research, as well as field documentation. These places may have 'shared' historic values with other (non-Aboriginal) communities. Places of post-contact Aboriginal history have generally been poorly recognised in investigations of Aboriginal heritage, and the Aboriginal involvement and contribution to important regional historical themes is often missing from accepted historical narratives.

Scientific value refers to the importance of a landscape, area, place or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.

Aesthetic value refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.

All Aboriginal sites and places, including those that are considered to be 'archaeological' – for example, middens or artefact scatters – may have a particular value and meaning to Aboriginal people.

Cultural Landscapes

In addition to these four definitions of value, the *Guidelines* also specify the importance of considering cultural landscapes when determining and assessing Aboriginal heritage values. The principle behind a cultural landscape is that 'the significance of individual features is derived from their inter-relatedness within the cultural landscape'. This means that sites or places cannot be 'assessed in isolation' but must be considered as parts of the wider cultural landscape. Hence the site or place will possibly have values derived from its association with other sites and places. By investigating the associations between sites, places and (for example) natural resources in the cultural landscape, the stories behind the features can be told. The context of the cultural landscape can unlock 'better understanding of the cultural meaning and importance' of sites and places.

Determination of Cultural Heritage Significance

The Burra Charter suggests that heritage practitioners 'should prepare a succinct statement of cultural significance, supported by, or cross referenced to, sufficient graphic material to help identify the fabric of cultural significance'. The statement must be clear and concise, and must not simply restate the physical or documentary evidence presented as part of the assessment.

This study will present determinations of cultural heritage significance as *statements of significance* that preface a concise discussion of the contributing factors to the cultural heritage significance.

Reference to each of the categories defined above will be made when evaluating cultural significance for sites and places. Nomination of the level of value—high, moderate, low or not applicable—for each relevant category will also be proposed. Consideration of the thresholds for each level of value for the categories will be guided by the contributing factors defined above for each category. The categories are:

- *Social value*
- *Historic value*
- *Scientific value*
- *Aesthetic value*
- *Cultural landscape value*

The determination of cultural landscape value will be applied to both individual sites and places (to explore their associations) and also, to the study area as a whole.

3.0 HERITAGE STATUS AND PLANNING DOCUMENTS

3.1 National Registers

3.1.1 The National Heritage List, Commonwealth Heritage List and Register of the National Estate

The *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) establishes two mechanisms for protection of heritage places. The National Heritage List provides protection to places of cultural significance to the nation of Australia. The Commonwealth Heritage List comprises natural, Aboriginal and historical heritage places owned and controlled by the Commonwealth and therefore mostly includes places associated with defence, communications, customs and other government activities.

Nominations to these two lists are assessed by the Australian Heritage Council (AHC), which also compiles the Register of the National Estate, a list of places identified as having national estate values. There are no management constraints associated with listing on the Commonwealth Heritage List or Register of the National Estate unless the listed place is owned by a commonwealth agency.

APPLICATION TO THE STUDY AREA – NATIONAL HERITAGE REGISTERS

There are two items listed on the Register of the National Estate within the General SMP area. The first item is the Upper Canal Water Supply System. The Mountbatten Group, including the Morton Park Bakery, Morton Park Circular Brick Garden, Morton Park Group and Morton Park Stable are also listed on the Register of the National Estate.

3.1.2 National Native Title Register

The Commonwealth *Native Title Act* 1993 (Cth) establishes the principles and mechanisms for the recognition of and determination of Native Title for Aboriginal people.

The purpose of searching the register is to identify any Traditional Owner groups with current registered claims close to the study area that may identify themselves as relevant stakeholders with traditional knowledge or experience.

APPLICATION TO THE STUDY AREA – NATIONAL NATIVE TITLE REGISTER LISTINGS

A search of the National Native Title Register, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements was completed on 21 January 2008. The search results identified one Native Title Claim lodged by the *Gundungurra Tribal Council Aboriginal Corporation #6* (reference NC97/7), encompassing a large area west of the Nepean River, including the present study area.

3.2 State Registers

3.2.1 National Parks and Wildlife Act 1974 Registers

The Department of Environment and Climate Change (DECC) maintains a database of Aboriginal sites within NSW under Part 6 of the NSW *National Parks and Wildlife Act* 1974. Aboriginal objects and places in NSW are legally required to be registered on the Aboriginal Heritage Information Management System (AHIMS) register.

The area searched on the AHIMS database was larger than the study area, as Aboriginal sites recorded within the wider area will provide a regional perspective on the types of sites that maybe expected to be found within the study area.

APPLICATION TO THE STUDY AREA – AHIMS DATABASE

A search of the AHIMS Database completed on 7 January 2008 identified 47 previously recorded Aboriginal sites within a 2 km x 2 km search area centred on the study area (see Section 5.4.). Eleven of these sites were situated within the current General SMP study area.

3.2.2 Heritage Act 1977 Registers

The Heritage Branch of the Department of Planning NSW maintains registers of heritage and archaeological items that are of State or local significance.

The State Heritage Register (SHR) contains items that have been assessed as being of State Significance to New South Wales. The State Heritage Inventory (SHI) contains items that are listed on Local Environmental Plans and/or on a State Government Agency's Section 170 registers that are deemed to be of local significance.

If an item or place does not appear on either the SHR or SHI this may not mean that the item or place does not have heritage or archaeological significance; many items have not been assessed to determine their heritage significance. An assessment is required for items that are 50 years or older. Items that appear on either the SHR or SHI have a defined level of statutory protection. This is discussed more fully in Appendix 2.

APPLICATION TO THE STUDY AREA – NSW STATE HERITAGE REGISTER LISTINGS

The General SMP Area contains one item listed on the State Heritage Register. The Upper Canal Water Supply System is listed on the State Heritage Register as a State Significant item currently managed by the Sydney Catchment Authority. As such the Canal is also listed on the Sydney Catchment Authority s.170 Heritage and Conservation Register.

APPLICATION TO THE STUDY AREA – NSW STATE HERITAGE INVENTORY LISTINGS

The General SMP Area contains two items that are listed on the State Heritage Inventory. These include The Mountbatten Group and The Gilbulla Memorial Conference Centre.

In addition, Section 170 of the NSW *Heritage Act 1977* requires that culturally significant items or places managed or owned by Government agencies be listed on departmental Conservation and Heritage Registers. Information in these Registers has been prepared according to NSW Heritage Office guidelines and should correspond with information in the State Heritage Inventory. As noted above, the Upper Canal Water Supply System is listed on the Sydney Catchment Authority s.170 Heritage and Conservation Register.

APPLICATION TO THE STUDY AREA – NSW HERITAGE ACT 1977 RELICS PROVISIONS

There are no identified archaeological sites within the General SMP Area; however, the relics provisions are applicable to relics regardless of heritage listing. Archaeological sites that may be identified in the study area during survey will be protected by the relics provisions of the NSW *Heritage Act 1977*.

3.2.3 Environmental Planning and Assessment Act 1979 Registers

The *Environmental Planning and Assessment Act 1979* includes provisions for local government authorities to consider environmental impacts in land-use planning and decision making. Such impacts are generally considered in relation to the planning provisions contained in the Local Environment Plan (LEP) or Regional Environment Plan (REP).

Local Environmental Plans: Each Local Government is required to create and maintain a LEP that includes Aboriginal and historic heritage items. Local Councils identify items that are of significance within their Local Government Area (LGA), and these items are listed on heritage schedules in the local LEP and are protected under the *EP&A Act 1979* and *Heritage Act 1977*.

APPLICATION TO THE STUDY AREA – WOLLONDILLY LEP 1991 SCHEDULE 1

Three items within the General SMP Area are listed in the heritage schedule of the *Wollondilly LEP 1991 Schedule 1*. These items include:

- "Upper Canal" Water Supply System
- Mountbatten Group: house, chapel and garden building
- Gilbulla (Anglican Conference Centre)

3.3 Non-Statutory Registers

3.3.1 The National Trust of Australia (NSW)

The National Trust of Australia (NSW) is a community-based conservation organisation. The Trust maintains a Register of heritage items and places. Although the Register has no legal foundation or statutory power, it is recognised as an authoritative statement on the significance to the community of particular items, and is held in high esteem by the public. The National Trust lists items or places that have heritage or cultural value to the community and, as such, the Trust encourages and promotes the public appreciation, knowledge, and enjoyment of heritage items for future and present generations.

APPLICATION TO THE STUDY AREA – NATIONAL TRUST OF AUSTRALIA (NSW)

The General SMP Area contains three heritage items classified (listed) by the National Trust of Australia. These items include:

- "Upper Canal" Water Supply System
- Mountbatten Group: house, chapel and garden building
- Gilbulla (Anglican Conference Centre)

3.4 Summary of heritage listings in the SMP area

There are fifteen previously identified heritage items within the General SMP area. These are summarised in Table 1 below.

Table 1: Summary of known heritage items within the study area.

ITEM	*RNE*	*CHL*	*NHL*	*AHIMS*	*SHR*	*SHI*	*WLEP 1991*	*NATIONAL TRUST*
Unit e: Rubbish Dump, Didicoolum				Y				
Unit d: Ground Axe Paddock: Didicoolum				Y				
Nepean River 4				Y				
Nepean River 5				Y				
Nepean River 6				Y				
Nepean River 7				Y				
Nepean River No. 8				Y				
Mountbatten 1				Y				
Mountbatten 2				Y				
Moreton Park Road 4				Y				
Moreton Park Road 5				Y				

ITEM	*RNE*	*CHL*	*NHL*	*AHIMS*	*SHR*	*SHI*	*WLEP 1991*	*NATIONAL TRUST*
Upper Canal	Y				Y	Y	Y	Y
Mountbatten Group	Y					Y	Y	Y
Gilbulla Group						Y	Y	Y

4.0 ENVIRONMENTAL CONTEXT

The environmental background to the study area is provided in order to give a context to the archaeological assessment. The environmental conditions of the study area may have influenced the land use by people in the past, the conditions will also affect the processes by which archaeological sites are preserved, and the environmental aspects of an area also influence the type of archaeological sites that are likely to be present. Environmental values of an area can also contribute to the cultural significance and attachments people have to a place.

The following background is a summary of information relevant to the current assessment of archaeological values of the study area.

4.1 Geomorphology

4.1.1 Geology, Landforms and Soil

The study area is located within the Sydney Basin, a geological province that consists of Permian and Triassic aged sedimentary rock. The surface geology is characterised by shales of the Wianamatta Group and sandstones of the Hawkesbury Sandstone, which both date to the middle-Triassic. Below this lie the sedimentary units of the Narrabeen Group, and the Illawarra Coal Measures which include the Bulli and Wongawilli coal seams (Branagan and Packham 2000: 56-8).

More specifically, the study area is situated on the transitional zone between two distinct physiographic regions: the Cumberland Plain and the Woronora Plateau (Hazelton and Tille 1990). The Cumberland Plain is more commonly characterised by a moderate undulating landscape formed by the weathering of the underlying Wianamatta shales, while the Woronora Plateau can be characterised by steep blocky valleys and cliff lines of the underlying Hawksbury sandstone, exposed by major rivers and creeks. Both the open undulating ridgelines and sandstone scarps of these features have the potential to contain archaeological sites.

The physiographic features of the landscape have been incised by the Nepean River, Foot Onslow Creek and the major feeder tributaries of Navigation and Harris creeks. Across the varying landscape of the study area, five soil landscapes have been defined (Hazelton and Tille 1990). Each soil landscape has distinct morphological and topological characteristics, resulting in each soil landscape having different archaeological potential. Because they are defined on a combination of soils, topography, vegetation and weathering conditions, soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure. A brief description of each landscape and associated archaeological potential follows.

Blacktown (bt)

The Blacktown residual landscape characterises much of the Cumberland Lowlands and the Woronora Plateau. It has gently undulating rises without rock outcrops (local relief to 30 m with slopes less than 5% grade). Broad rounded crests and ridges with gently inclined slopes are the dominant topography of this landscape (Hazelton & Tille 1990). The soils consist of shallow to moderately deep podzols. Due to their age and slow accumulation residual soil landscapes have reasonable potential to contain archaeological deposits in an open context, such as stone artefacts derived from occupation sites. However, the slow accumulation and high impact of extensive land clearing (usually associated with pastoral development) during more recent times often results in poor preservation of archaeological material.

Theresa Park (tp)

The Theressa Park Soil Landscape (fluvial) occurs along sections of Foot Onslow Creek, where deposits have been transported and then deposited on terraces across the creek floodplain (Hazelton & Tille 1990:82). The topography comprises floodplain with levees and meandering terraces. Frequent flooding is also likely to have occurred across this landscape, resulting in continuous fluvial processes. This has resulted in seasonal erosion of surface soils, with an increase in soil depth from the creek channel to the outer levees and terraces (Hazelton & Tille 1990:82). The accumulated soils across the levees and terraces that are not flood prone are likely to contain archaeological material, if they have not been subject to disturbance from land use, unlike those highly reworked deposits closer to the creek channel.

Picton (pn)

The Picton soil landscape occurs to the west of the freeway and rail corridor, and accounts for approximately 25% of the land surface of the study area. This landscape has steep to very steep hill slopes (local relief to 90 – 300m with slopes generally greater than 20% grade). Topographically this landscape is made up of steep, precipitous hills with concave upper slopes, irregular lower slopes and colluvial benches (Hazelton & Tille 1990). The soils are shallow, consisting of dark sandy loams and brown sandy and stony clays, there are no rock outcrops. In many places of the study area the loam soils on the upper slopes have eroded to leave exposed stony clay lag surfaces. When considered at a large scale the Picton landscape is a dynamic colluvial environment, but at a more local level it has the potential to accumulate archaeological materials in an open context, so stone artefacts and scarred trees might be expected to occur here, although the area has been extensively cleared for pasture.

Hawkesbury (ha)

The Hawkesbury soil landscape is characterised by rugged sandstone escarpment and ridges, with moderate to steep slopes and narrow, deeply incised valleys of the Woronora Plateau (Hazelton & Tille 1990). Sandstone rock outcrops are very common, and occur as boulders, benches and large blocks, often forming cliffs up to 10 metres high. The Hawkesbury soil landscape is confined to the margins of the major rivers including the Nepean and Georges,

and larger tributaries. The soils in this landscape are shallow, discontinuous and generally sandy. The Hawkesbury landscape is the most archaeologically sensitive landscape in the study area, as the blocks and weathered valleys provide overhangs with a suitable environment for rock art and in some cases the accumulation of cultural deposits; however deposits with the potential for deep, stratified archaeological sites are very limited.

Luddenham (lu)

The Luddenham Soil Landscape (erosional) occurs in small pockets along the length of the study area corridor. It comprises undulating rolling hillslopes and may include tors, benches and areas of rock outcrop. These soils may be derived from water-washed parent materials or derived from *in situ* weathered bedrock. The soil consists of shallow sandy clay on crests, and loamy sand on lower slopes and along drainage features (Hazelton & Tille 1990:72). In many instances, subsoils have formed *in situ* while topsoils have formed from materials washed from further up-slope. It is highly likely therefore that the lower, accumulated deposits that have not be subject to erosion may contain archaeological material.

4.2 Climate

The climate at Picton (8 kilometres west of the study area) generally consists of mild summers with an average maximum of 29.3 degrees Celsius and minimum of 15.4 degrees Celsius in February, and cold, wet winters with an average minimum of 1.7 degrees Celsius and a maximum of 16.8 degrees Celsius in July (Bureau of Meteorology website 2007, 1975 Mean Temperature). Recorded rainfall readings taken in 2007 indicate an average annual rainfall of 805.5 millimetres. The average number of rain days at Picton is 10 days during summer and 28 days during winter (Hazelton and Tille 1990). Whilst conditions and temperatures are wide ranging, the conditions in the study area can be summarised as being mild and very suitable for year round hunter-gatherer occupation of all parts of the region.

4.3 Flora and Fauna

Much of the study area comprises open grassed paddocks as a direct result of settlement and land clearing that has occurred in the area since early settlement c1811. Some remnant vegetation communities occur along the Nepean River. Small pockets of remnant vegetation also occur along minor drainage features and on some hill slopes.

The following vegetation communities are indicative of the species that once thrived across these areas prior to exploration and settlement in New South Wales. The following vegetation communities are located within the current Study Area (Biosis Research 2006b).

Cumberland Plain Woodland (CPW) occurs across the Cumberland Plain region, away from creeks and rivers. Major species of this vegetation community include Grey Box *Eucalyptus moluccana* and Forest Red Gum *E. tereticornis*, with Narrow-leaved Ironbark *E. crebra*, Spotted Gum *Corymbia maculata* and Thin-leaved Stringybark *E. eugenioides* occurring less frequently. The shrub layer is dominated by Blackthorn *Bursaria spinosa*, and it is common to

find abundant grasses such as Kangaroo Grass *Themeda australis* and Weeping Meadow Grass *Microlaena stipoides var stipoides* (NSW NPWS 2002).

Alluvial Woodland occurs along the floodplains and margins of major and minor creeks. Alluvial Woodland comprises *Eucalyptus amplifolia* and Forest Red Gum *E. tereticornis*, with *Angophora floribunda* occurring slightly less frequently. The lower stratum frequently includes *Acacia parramattensis subsp. parramattensis*, and less frequently *Casuarina glauca*, and sometimes *Angophora floribunda* and *Melaleuca linariifolia*. A shrub stratum is usually evident, but is often sparse and invariably dominated by *Bursaria spinosa*. Herb species are also common, including *Solanum prinophyllum, Pratia purpurascens* and *Commelina cyanea.*

Shale Sandstone Transition Forest (SSTF) occurs in the transition zone between the surrounding Hawkesbury Sandstone and the clay derived Cumberland Plain, with small patches occurring along Mallaty, Ouesdale, Leafs Gully and Nepean creeks. It is dominated by *Eucalyptus tereticornis*, with *E. eugenioides, E. crebra, E. fibrosa* with *E. punctata* occurring less frequently (Biosis Research 2007c). The sub-community SSTF – High Sandstone Influence is dominated in the understorey by sandstone shrub-layer species such as *Kunzea ambigua* and *Persoonia linearis* (NPWS 2001). The other sub-community SSTF – Low Sandstone Influence is dominated in the understorey by *Bursaria spinosa, Themeda australis* and *Echinopogon ovatus* (NPWS 2001).

Riparian Forest (RF) can be found along the main channel of the Nepean River gorge. The vegetation characterised by this community includes Broad Leaf Apple (*Angophera subvelutina*), (Cabbage Gum (*Eucalyptus amplifolia*), Bangalay (*Eucalyptus botryoids*) and River Peppermint (*Eucalyptus elata*). Originally the understorey would have had occasional dense pockets of low rainforest vegetation, such as Grey Myrtle (*Backhousia myrtifolia)* and grassy shrub layer with Blackthorn (*Bursaria spinosa*) (Biosis Research 2006b).

With such a variety of vegetation communities, this transitional zone would have provided a wide diversity of resources, in a relatively small geographic area, for the Aboriginal hunter-gatherer population. This diversity is even greater when it is considered how close the coastal resource areas are to the rugged plateau.

Land mammals such as kangaroos and arboreal mammals such as possums would have been important prey species. Birds, reptiles and fish would also have been important resources. As well as being important food sources, animal products were also used for tool making and fashioning myriad utilitarian items. For example, tail sinews are known to have been used as a fastening cord, while ‘bone points’, which would have functioned as awls or piercers, are often an abundant part of the archaeological record.

4.4 Resource Statement

The landscape would have provided various sources of stone material for the Aboriginal people, from which a range of stone tools could be manufactured. Raw materials types might have included quartz and quartzite, silcrete, and harder stone such as basalt which could be

sourced from the west. Locally, quartz would have been the main stone raw-material type suitable for tool manufacture that would occur in the vicinity of the study area in any abundance. This would be in the form of pebbles derived from the Hawkesbury sandstone. Such pebbles would have been available along the Nepean River channels as they eroded or weathered out of the sandstone. Other raw materials, including tuff, mudstone, silcrete, chert, quartzite and basalt would have been sourced outside the present study area, north and west from other areas of the Cumberland Plain.

Depending on seasonal variations the Nepean River flows all-year-round, providing an easily accessible source of water and other resources. Seasonal knowledge for harvesting plants and hunting food and material resources was an important factor in the timing of movements into, and out of the study area. This might have involved exploiting resources along the coast at one time of year and resources throughout the plateau at another. Various plant and animal species present within the study area would have provided a range of resources for Aboriginal people. Food, tools, shelter and ceremonial items were derived from floral resources, with the locations of many campsites predicated on the seasonal availability of resources. These include using wood to make implements; berries, leaves and tubers for food and medicines, as well as bark for shelter construction.

5.0 ABORIGINAL CONTEXT

5.1 Ethnohistory

Archaeological evidence clearly indicates that Aboriginal people have occupied the greater Sydney region for up to 20,000 years. Our knowledge of the social organisation and languages of Aboriginal people prior to European contact is, to a large extent, reliant on documents written by European people. Such documents contain the inherent bias of the class and cultures of these authors, however, they can be used in conjunction with archaeological information in order to gain a picture of Aboriginal life in the region. The majority of this information was gathered during the late nineteenth century, taking place in already decimated communities where significant disruptions to the pre-existing societies had already taken place.

According to Mathews and Everitt (1900:262), the *Gundangarra* occupied the coastal regions, from the Hawksbury River to Cape Howe, and extending inland to the Blue Mountains. The *Dharawal* speaking language group inhabited the coast from Port Hacking, south to Jervis Bay, and inland for a considerable distance (Mathews 1901:127).

These 'defined' language areas are considered to be indicative only, and would have changed through time, and possibly also changed depending on circumstances. It is more likely that language groups shared enough common dialect that definitive boundaries varied, and are not set along a single defined geological boundary. Many early sources identify the Nepean River as the boundary between the Tharawal (east) and the Gundangarra (west). However, the present study area is considered to be situated on the margin of the Gundangarra language group.

According to Barralier 1802 (1975:2-3) the present study area would have been inhabited by the *Gundangarra* language group. On his expedition through the Menangle region he describes the swamps in the Nepean River as excellent sources of fish, shellfish and eels, stating that;

> '*the people from this area usually fed upon opossum and squirrels, which are abundant in that country, and also upon kangaroo rats and kangaroo, but they can only catch this last one with greatest trouble, and they are obliged to unite in great numbers to hunt it.'* (Barralier 1802 (1975:2-3).

A variety of studies of the language groupings that made up the greater Sydney region have been summarised by Attenbrow (2002). Language groups were not the main political or social units in Aboriginal life. Instead, land custodianship and ownership centred on the smaller named groups that comprised the broader language grouping. There is some variation in the terminology used to categorise these smaller groups; the terms used by Attenbrow (2002) will be used here.

Land ownership was centred on small extended family groups or *clans* (also referred to as local descent groups, local clans or territorial clans). As it was normal practice to disallow intermarriage in close family bands, a number of groups would travel together making up larger units. These units are often referred to as *bands*.

Groups were delineated by physical boundaries within the landscape, such as watercourses and particular varieties of vegetation. Group members were usually united by common dialect, descent, history, and a shared 'Dreaming' ancestor, with each group led by influential individuals. In the Sydney area spiritual attachment and allegiance to land was centred on the clan. Bands were an economic, resource based grouping and do not seem to have been named, although in other parts of the country band-sized groupings were named and carried different emphasis to the cultural life of local people (Attenbrow 2002).

Gatherings of numbers of smaller groups such as bands occurred for ceremonial reasons or to share in seasonally abundant resources. These larger groupings could number many hundreds of individuals. Occasions for large gatherings included predictable seasonal events such as bird migrations but also one off ‘windfall’ events such as whale beachings (McDonald 1992a).

Interactions between different types of social groupings would have varied with seasons and resource availability. It has been noted that interactions between the groups inhabiting the multiple resources zones of the Sydney Basin (coastal and inland) would have varied but were continuous. This is reflected in the relatively homogenous observable cultural features such as art motifs, technology and resource use (McDonald 1992a).

It is likely that groups in different resource areas would have had regular contact, although it is not known exactly how much each group’s territory was restricted by a particular resource. It is known that some specific technology was used to adapt to the particular conditions of an area. Aboriginal people in the mountains were frequently observed wearing cloaks of animal skins in contrast to the coastal people, who were not noted to wear cloaks. Items such as grub catching ‘hooks’ described by Barrallier in 1802, special ‘squirrel traps’ in tree hollows and bird catching nets described by Collins (cited in McDonald 1992a) in and around Menangle, are evidence of specific locally adapted technology.

5.2 Contact History

The arrival of Europeans had a rapid and dramatic effect on the traditional Aboriginal lifestyle patterns in the Sydney region. Even so, evidence of the continued presence of Indigenous people, despite the disruptions to prior lifestyle, is also recorded and historically significant throughout the region. As in many places competition for land and resources and cultural differences led to conflict. This happened rapidly within the region and the study area following European settlement.

The arrival of settlers in the region around Appin and new competition for resources began to restrict the freedom of movement of the Indigenous inhabitants from around 1813 (McGill

1994). This was quickly followed by severe drought in 1814 and 1816. By 1814 numbers of Aboriginal people had begun to congregate in the Appin area in search of food and other resources. These people were not only the original inhabitants of the area but also other Aboriginal people from elsewhere who had been pushed off their own lands. In May 1814 the militia killed an Aboriginal boy. When others of the group sought revenge they attacked three militia members before they had time to reload killing one of them (McGill 1994). The trouble brewing between settlers and local inhabitants and the growing pressure on resources resulted in Governor Macquarie sending a punitive military expedition in 1816. The expedition ended in the 'Appin Massacre'. The militia claimed their intentions were to capture prisoners but as they found and pursued a group of Aboriginal people on Broughton's property panic ensued. Fourteen Aboriginal men, women and children were driven over a cliff to their deaths. The exact site of the massacre is not known but Broughton's original 1810 land grant was at Brooks Point.

5.3 Regional Overview

It is generally accepted that people have inhabited the Australian landmass for at least 50,000 years (Allen and O'Connell 2003). Dates of the earliest occupation of the continent by Aboriginal people are subject to continued revision as more research is undertaken. The exact timing for the human occupation of the Sydney Basin is still uncertain. The earliest undisputed radiocarbon date from the region comes from a rock shelter site on the western side of the Nepean known as Shaws Creek K2 which has been dated to 14,700 years before present (BP) (Attenbrow 2002: 20). This site is over 50 km north of the study area along the Nepean River. To the south along the coast just north of Shellharbour a site at Bass Point has been dated at 17,101 +/- 750 BP (Flood 1999). Archaeological evidence of Aboriginal occupation of the Cumberland Plains indicates that the area was intensively occupied from approximately 4,000 years BP (JMCHM 2007a). On the Woronora Plateau the oldest date for Aboriginal occupation recorded so far is 2,200 +/- 70 BP (Sefton 2002a). Such a 'young' date is probably more a reflection of poor site conditions for the preservation of datable material and sporadic archaeological excavation, rather than actual evidence of absence of an Aboriginal hunter-gatherer population prior to this time.

Results of archaeological work completed in the northern central and southern Cumberland Plain region have clearly identified that the predominant recorded sites on the Cumberland Plain are open camp sites (Kohen 1986; Smith 1989; Haglund 1989; McDonald 1992b; JMCHM 1996, 2007a, b & c; Dibden 2001, 2002, 2003). Towards the peripheries of the plain on Hawkesbury sandstone, shelters with art and/or deposit and grinding grooves have been recorded. Most recent archaeological studies have been impact driven assessments in response to increasing development activity in the region and changing legislation requirements.

The area along the Nepean and around Appin, Menangle and Douglas Park has been subject to reasonably continuous archaeological study during the last 20 years. The majority of this work has been undertaken for impact assessments related to longwall mining and residential

development (see Section 5.5.), with only a small amount of work associated with research grants and post-graduate theses, and limited archaeological excavations.

The most significant exploratory studies have been undertaken by the voluntary Illawarra Prehistory Group, which has successfully recorded hundreds of Aboriginal archaeological sites across the Woronora Plateau. The majority of these sites comprise sandstone shelters and overhangs containing art and / or archaeological deposit. The abundance of this site type is a reflection of the predominant incised Hawksbury Sandstone along major drainage features including the Nepean River, and its feeder tributaries, such as Harris, Foot Onslow and Navigation creeks. The incised sandstone gullies and valleys of the Nepean River result in significant sandstone cliff lines, and smaller outcrops and overhangs suitable for occupation or art depiction. Other site types do occur, and can include open artefact scatters, axe grinding grooves, and scarred trees. Open artefact sites are usually present on the undulating land above the gullies or within shelter sites, while scarred trees are limited to what little remnant vegetation remains. The low frequency of these recorded site types can be attributed to previous land use history, disturbance, visibility and exposure within the landscape.

The recorded frequency of sandstone overhang / rockshelter sites can also be attributed to the intense survey effort on the Hawksbury Sandstone landform across the Woronora Plateau. Sefton (1988:86, 1998:12) has completed extensive analysis of data collected from this work over the past 15 years that describes the frequency and distribution of art techniques on the Woronora Plateau (1988). As part of this analysis, Sefton (1998:12) has provided a review of the techniques and motifs of shelter art within the Georges River Basin. Her summary is reproduced in Table 2 below. It clearly shows that the most common defined art technique within sandstone shelters on the Woronora Plateau is charcoal drawings.

Table 2: Summary of art techniques by method of application and colour, Woronora Plateau (from Sefton 1998)

Summary of art techniques (Sefton 1998)				
Technique	**No. of Shelters**	**% of Shelters**	**No. of Motifs**	**% of Motifs**
Charcoal drawing	427	92	3906	78
Red stencil	86	18	490	9
Red drawing	86	18	183	4
White stencil	37	7	201	4
White drawing	38	8	119	2
Bichrome	28	6	46	1
Ochre painting	19	4	172	3

Charcoal drawing accounts for 78% of the total motifs in 92% of shelters that contain art. Whilst there is a wide diversity of charcoal drawn motifs, the majority of the motifs depict forms that are indeterminate, a situation arising from poor preservation, and also possibly the fact that some motifs are complete but not readily interpretable.

JMCHM work has resulted in the development of a predictive model for Aboriginal site distribution on the Cumberland Plain that will be applicable to the study area (1996; 1999). This has been developed using the Aboriginal occupation models proposed for the Camden area by Haglund (1989) and data collected from other areas of the Cumberland Plain where trends in the distribution of archaeological sites have been apparent. The following predictive model for the Cumberland Plain has been taken from JMCHM (1999) and will be used to devise the site prediction model for the study area (Section 4.5).

1) The size (density and complexity) of archaeological features will vary according to permanence of water, landscape unit and proximity to stone resources in the following way:

- At the headwaters of upper tributaries (first order creeks) archaeological evidence will be sparse and will comprise little more than background scatters of stone artefacts;
- At the middle reaches of minor tributaries (second order creeks) archaeological evidence will be sparse but indicate focussed activity;
- At the lower reaches of tributary creeks (third order creeks) archaeological evidence will indicate more frequent occupation and evidence of repeated, more concentrated activities;
- On major creek lines and rivers (fourth order creeks) archaeological evidence will indicate more permanent occupation which is of greater complexity;
- Creek junctions and swamps may provide foci for site activity;
- Ridgetop locations between drainage lines will usually contain limited archaeological evidence.

2) Where sandstone features occur (overhangs or platforms), these may have provided a focus for a number of activities including camping or art production or the sharpening of axes. Sandstone platforms may also have been used for the production of art (engravings) although these are very rare on the margins of the Cumberland Plain.

5.4 AHIMS Results

A search of the NSW DECC Aboriginal Heritage Information Management System (AHIMS) database was conducted on 7 January 2008. Forty seven previously recorded sites are located within a 2 km x 2 km search area centred on the study area (refer to Figure 2). Of these, eleven sites are located within Longwalls 705 to 710 General SMP Area (see Table 3 below).

It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area.

Of the forty seven sites recorded near the study area, the predominant site types are artefact scatter sites (66%). The remaining site types include shelter with art and/or deposit sites (13%), scarred trees (13%), axe grinding grooves (2%) and Potential Archaeological Deposits (6%). These site frequencies are representative of the site types previously located across the Cumberland Plain and the transitional zone between the Woronora Plateau and the Cumberland Plain.

Table 3 (following) provides details of the registered Aboriginal archaeological sites located within close proximity to the proposed Longwalls 705-710. Details of specific site location are considered sensitive and have not been included in this report.

Table 3: AHIMS sites registered within close proximity of the proposed Longwalls 705-710.

AHIMS SITE NO.	*SITE NAME*	*SITE TYPE*
52-2-1213	Unit e rubbish dump; Didicoolum	Axe Grinding Grooves
52-2-1214	Unit d ground axe paddock; Didicoolum	Open Campsite
52-2-2098	Nepean River 4	Shelter with Midden
52-2-2097	Nepean River 5	Shelter with Deposit
52-2-2095	Nepean River 6	Shelter with Deposit
52-2-2096	Nepean River 7	Scarred Tree
52-2-2239	Nepean River 8	Shelter with Deposit
-	Mountbatten 1	Open Campsite
-	Mountbatten 2	Open Campsite
-	Moreton Park 4	Open Campsite
-	Moreton Park 5	Open Campsite

The site types within the study area generally reflect the regional patterning, with a high frequency of open stone artefact sites on the plain and a number of shelter with deposit sites occurring on the incised Hawksbury sandstone along the Nepean River.

5.5 The Archaeological Record – Localised Studies

There have been a number of localised archaeological impact assessment surveys undertaken in the Douglas Park / Menangle area, many of which are associated with longwall mining for the Appin Mine (Sefton 1998, 1999; Biosis Research 2004, 2006a), and more recently for the Camden Gas Projects (Dibden 2001, 2003). The earliest work undertaken within the study area was a research project completed by Demkiw in 1985.

All of these studies resulted in the identification and assessment of Aboriginal archaeological sites. The following report summaries only include previous archaeological assessment work that has been undertaken within or in close proximity to the current study area (SMP area) (see Figure 3).

Demkiw (1985) conducted surveys of the property immediately south of current study area, known as 'Didicoolum' as part of an undergraduate archaeology course. These surveys were conducted around the unnamed tributary, which Demkiw refers to as Lyrebird Creek. Two sites from this study are registered on the AHIMS, axe grinding grooves (52-2-1213) and an open camp site (52-2-1214). As it is an undergraduate study rather than a management report Demkiw's work contains a number of anomalies. As well as the AHIMS registered sites, the report also contains descriptions of rockshelters (none containing art or artefacts), possible scarred trees, unusual sandstone artefacts and what appears to be a historically pecked and dressed sandstone block that Demkiw initially speculates may be Aboriginal art. The open camp site (52-2-1214) is of particular interest as it identifies a paddock from which several stone axes and other unusual artefacts have been recovered during tilling (Demkiw 1985:36). Some of these items may be artefacts, but the photographs and illustrations suggest otherwise for many of them. It is unlikely that all these items are artefacts, and it is unusual that a range of large artefacts such as grinders and axes should occur without an associated chipped stone assemblage. However, stone artefacts could be expected to occur on the undulating country above the Nepean River, especially near larger drainage features (which presumably provide an attraction for hunter-gatherer populations and definitely provide erosion and archaeological exposure).

It appears Demkiw may have been an influence on one of the more enigmatic Aboriginal heritage sites claimed to exist in the study area. The Menangle Eel Farm was listed on the non-statutory 'Register of Historic Places and Objects' of the Professional Historians Association of NSW in 2001. The register describes the feature as '5 acres of systematic pondage on Lyrebird Creek, a minor tributary of the Nepean, used for eel farming.' Demkiw presents no archaeological evidence for an eel farm here. He does, however, speculate that a small valley to the northwest of the 'Didicoolum' property may have been the location of swamps that were described by Barrallier in 1802 (Demkiw 1985: 45-47). Barrallier noted the Aboriginal population catching fish and eels in these swamps. Demkiw provides accurate coordinates for a chain of ponds on a tributary of Navigation Creek (3 km northwest of the Didicoolum), which are clearly visible on current topographic maps and aerial photography. Demkiw suggests that this location is the same as that where Barrallier described 'ditches' and mounded, denuded earth for watering cattle in 1802. Demkiw speculates that the features described by Barrallier are a corroborree ground and the ditches were used for 'trapping eels' (implying they were constructed specifically for this purpose by the Aboriginal population) (1985:47). All this speculation is placed within a wider discussion of other eel and fish traps that are well represented in the archaeological record elsewhere, and reflects the fancy for Aboriginal hunter-gatherer 'intensification' that was so much the fashion of academic Australian archaeology during the 1980s (Lourandos 1983, Lourandos and Ross 1994). In conclusion, there is no archaeological evidence for an 'eel farm' in this area.

Sefton (1998) conducted an archaeological survey of an area for proposed longwalls 16 and 17 and future mining extensions that took in both sides of the Nepean River, Simpsons, Elladale and Harris creeks. This study area covered the area to the south east of the present study area, focussing on suitable cliff lines suitable for occupation and art depiction. The

survey found that most of the Nepean River comprised large cliff lines with steep talus slopes that contained frequent overhangs. These overhangs had poor access and sloping sandstone floors containing little or no deposit, considered unsuitable for Aboriginal occupation. However, four archaeological sites were recorded, including one shelter with archaeological deposit, and three shelters with art, none of which are situated within the current SMP Area.. These sites occur on minor creeks lines, or where small side drainage features feed into the Nepean River, creating smaller more suitable sandstone overhangs. Sefton also identified seven overhangs with the potential for archaeological deposits, but these were not formally registered with DECC.

Sefton (1999) surveys were not as extensive as those conducted previously, but nevertheless covered both sides of the Nepean, the southern side of Ousedale Creek and an unnamed tributary (sometimes referred to as Lyrebird Creek). During these surveys six previously unknown sites were discovered: a shelter with art, four shelters with deposit and a single scarred tree. All of these six sites are within the current area of interest. In addition, Sefton identified three sites with potential archaeological deposit, which were not formally recorded.

Dibden (2001a) undertook the first archaeological and heritage assessment for the Camden Coal Bed Methane project, north east of the present study area. A total of thirteen Aboriginal archaeological sites were identified, including three low density artefact scatters and ten isolated artefact occurrences. All sites were identified on low gradient simple slopes or valley flats associated with ephemeral streams. A number of these were situated on valley flats nestled at the base of Razorback Range, indicating some use of the area, most likely for resources. These findings reflect the overall site model for the Cumberland Plain that suggests low-density stone artefact sites or isolated stone artefacts will occur along ephemeral water courses.

Dibden (2002a) completed an archaeological assessment for the proposed Camden Coal Bed Methane Project for a proposed gas gathering system at “Kay Park”, north west of the present study area. The assessment identified two low density artefact scatter sites (KPS1: 52-2-2267 and KPS2: 52-2-2268) along the proposed gas pipeline corridor. Both sites were assessed as being of low-moderate archaeological significance as they are situated on previously disturbed paddocks. An addendum to the assessment was completed by **Dibden (2002b)** to determine an alternative gas gathering route that would avoid the recorded sites KPS1 and KPS2. No Aboriginal archaeological sites or areas of potential were identified along the alternative pipeline corridor.

Dibden (2003) undertook an archaeological and cultural heritage assessment for Stage 2 of the Camden Gas Project. This involved a survey of almost 80 proposed gas well site locations and associated gathering systems to determine the presence and significance of Aboriginal heritage at each location (Dibden 2003: 3). This field survey resulted in the identification of 20 previously unrecorded Aboriginal archaeological sites, primarily comprising isolated artefact occurrences. In most cases, the artefacts were noted to be in their original depositional contexts. The majority of these sites are also considered to be of low significance, as these

sites have low research potential, have been subject to high levels of disturbance, have low aesthetic value and are representative of a common site type of the Cumberland Plain.

Dominic Steele Consulting Archaeologists (2005) completed an Aboriginal archaeological survey for 12 proposed gas production well sites, gathering systems and access routes on a Razorback property, north west of the current study area. A total of nine Aboriginal archaeological sites were identified. Six of these were isolated finds, and the other three sites were low – moderate density artefact scatters. The isolated finds were situated on moderate slopes near ephemeral creeks, where as the low-moderate density scatters were located adjacent to major drainage features and swamps. These results also reflect the current site prediction models for the region.

Navin Officer (2006) completed a detailed cultural heritage assessment of the proposed gas turbine power station near Leafs Gully, situated in the north east of the present study area. The majority of the study area was surveyed in detail, with the remainder being assessed on archaeologically sensitive landforms. This resulted in the identification of one area of Potential Archaeological Deposit (PAD) for Aboriginal cultural material across upper slopes and crests of a spur line complex that descends towards Leafs Gully and the Nepean River respectively (Navin Officer 2006:25). Navin Officer (2006:25) suggested that bioturbation within the sandy soils of LGPAD1 area causes stone artefacts to move down into the soil profile, thus remaining undetected during surface surveys. Despite moderate levels of disturbance due to previous land use, the likelihood of Aboriginal cultural material being present was considered high.

Biosis Research (2004) conducted surveys of several areas in and around Appin Area 7 (formerly known as Douglas Park) study area in 2004. These surveys took in portions of the undulating plateau above the Nepean River, as well as the rugged sandstone terrain that had been focused on by Sefton. The surveys revisited some previously recorded sites and discovered three new sandstone overhangs with potential archaeological deposit. They also noted the presence of potential scarred trees and located several features of historical interest. Of these sites, only three overhangs with potential archaeological deposit are within the current 705-710 SMP Area.

Biosis Research (2006a) completed a large scale EIS project for the proposed Appin Area 7 (formerly known as Douglas Area 7) longwalls 701-704. This study included the southern section of the present study area. Due to high levels of previous archaeological work throughout the region, the study involved complimentary surveys and reassessment of previously recorded archaeological sites. The complimentary field assessment identified four new Aboriginal archaeological sites, all of which were stone artefact scatters. All previously recorded Aboriginal rock art shelter sites were revisited and photos of the rock art taken at each site for comparison. A number of these archaeological sites were flagged for potential impacts by subsidence by MSEC (2006). Biosis Research (2006) recommended a continued program of monitoring of sites within the predicted area of subsidence impact.

5.5.1 Overhang and Rock Art Monitoring in the Illawarra Region

Longwall mining subsidence effects to the sandstone environments around the Sydney Basin have been incidentally documented for some time (Sefton 2000:12-13). In the southern coalfield Caryll Sefton has conducted a long term monitoring program, and reviewed the effects of longwall mining on sandstone overhang Aboriginal archaeological sites over a 10 year period (Sefton 2000). This review included data collected form the longwall mine areas of Tahmoor Mine, Appin Colliery, Tower Colliery, West Cliff Colliery, Metropolitan Colliery, Elouera Colliery and Cordeaux Colliery. At the time of the review 52 sandstone overhang sites had been monitored by Sefton prior to, during and after longwall mining in the vicinity of the sites (Sefton 1998: 15). Of the 52 sites monitored only 5 had evidence of impact from the longwall mining (Sefton 2000:17-18). The impacts can be grouped into four effect categories: cracking; movement along existing joints / bedding planes; block fall; and change of water seepage.

Sefton conducted a Principal Components Analysis using 16 variables recorded for all the sites, including the subsidence parameters (2000:30). Sefton found that the components most associated with observed changes were the overhang size (particularly length); wet overhangs; location near the valley bottom; proximity to the end of longwalls; and block fall type shelters. No monitored overhang has collapsed due to the effects of mining. High estimated strain values were also associated with observed changes (Sefton 2000:31). Sefton concludes that 'the over-riding factor which appears to be significant is overhang size where large overhangs are at greater risk (Sefton 2000:38). In particular, no monitored overhang less than 50 m^3 has suffered subsidence impacts, regardless of other risk components. Not all sites larger than 50 m^3 will be impacted. Of those monitored overhangs larger than 50 m^3 approximately one-fifth (5 of 23) have suffered impacts. The size and subsidence parameter data for the 5 monitored sites that have shown impacts are summarised in Table 4 below.

Table 4: Data for monitored sandstone overhangs that have shown subsidence impacts in the southern coal fields

Site name	Max predicted subsidence (mm)	Max predicted tilt (mm/m)	Max predicted tensile strain (mm/m)	Max predicted compressive strain (mm/)	Length (m)	Width (m)	Height (m)	Size (m^3)
WR1	638	-	0.4	0	8	3	4	96
WR2	341	-	0	0.1	50	9	6	2700
BR4	900	0	2.5	0	20	5	2	200
FRC152	345	1.7	0	0.15	20	3	1	60
P3	931	0	0.04	0	18	4	5	360
Data from Sefton 2000 pages 17 and 18								

Sefton (2000) also notes that the task of accurately predicting subsidence impacts to individual archaeological sites is 'difficult and complex'. However, the overall ability to confidently predict subsidence effects within the landscape is constantly improving. By using

Sefton's systematic monitoring framework both natural changes in sandstone overhangs, and changes attributed to longwall mining through overhang destabilisation may be documented.

Monitoring has continued since Sefton's (2000) major review, with monitoring undertaken by both Sefton and Biosis Research. To date 68 sites have been monitored, with only 6 having been damaged by subsidence movements. The results of the ongoing monitoring program demonstrate that the low probability of damage to sites from subsidence movements continues to remain valid.

Overhangs in the steep valleys and gullies of the Woronora Plateau are naturally and inherently unstable, and shelters are often formed by block fall via natural processes. Previous studies have shown that in most cases subsidence movements that can alter the stability of overhangs occur only directly over the mined longwall areas. A geotechnical study by SCT Operations concluded that 'outside of the mining area, subsidence movements are typically tensile or stretching in nature and so do not tend to result in increases in compressive stress that might impact on the stability of rock formations' (SCT 2005:12). This report also noted that overhang and cliff formations 'are relatively insensitive' to the levels of ground tilt associated with subsidence movements (SCT 2005:12).

5.6 Discussion and Predictive Model

The archaeological predictive model has been formulated based on the results of the location and type of Aboriginal sites that were recorded within the regional area, the results of the AHIIMS database search and information about previous archaeological work. This information has been broken down into patterns that have been compared to the character of the study area to allow for an understanding of Aboriginal archaeological potential.

Most of the sites described in Table 4 were identified as a result of surveys undertaken in response to proposed mining activities and recent gas production wells. As most of the study area comprises the Cumberland Plain, a greater frequency of open artefact scatter sites are present compared with shelter with art and/or deposit sites that more frequently occur along the incised sandstone valleys of the Nepean River and other major water lines.

Although some sections of the study area have been subject to intense archaeological survey, additional Aboriginal archaeological sites are likely to be encountered where survey has not been undertaken due to land access restrictions, and where ground surface visibility is good.

The following section discusses Aboriginal sites types with regard to the likelihood for such sites to occur within the present study area.

Rock shelters with art and/ or deposit

Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground as characterised by the cliff lines along the Nepean River and its tributaries. These naturally formed features may contain rock art, stone artefacts or midden deposits. The sites will only occur where suitable sandstone exposures or

overhangs possessing sufficient sheltered space occur, in areas where such geological features exist, such as the Hawkesbury Sandstone. Such topographical features occur within the present study area.

The AHIMS database search revealed a number of shelters with art and/or deposit sites occur along the Nepean River. Due to the extensive previous survey of the river, there is a low likelihood of identifying additional shelter with art and/or deposit sites.

Open campsites, artefact scatters and isolated finds

Open campsites and artefact scatter sites can range from high-density concentrations of artefacts to sparse low-density 'background' scatters. These represent a diversity of everyday activities, settlement, hunting and gathering and tool manufacture. Isolated stone artefact occurrences can be located anywhere in the landscape and most likely represent discard or loss during transitory movement.

The identification of these sites depends greatly on ground surface visibility, resulting in the boundaries of a site being defined by the visible extent of the artefacts on the surface. Paddock grasses and open woodland vegetation occur within the study area and are likely to obscure stone artefact scatters or isolated occurrences. However, the relatively frequent occurrence of these sites across the southern region of the study area indicates that where ground exposure does occur, there is a moderate likelihood of finding stone artefacts. Low density artefact scatters and isolated artefact occurrences are likely to be the most commonly occurring site types within the study area.

Thus, there is a moderate likelihood of identifying such sites within the present study area, where areas of open ground surface are visible, particularly within close proximity to Foot Onslow Creek and tributaries of Navigation and Harris creeks. Stone artefact sites that have been previously recorded have been located within close proximity to water sources and along ridgelines.

Axe Grinding Grooves

Axe grinding grooves are often found on large open and relatively flat areas of sandstone shelving and outcrops. Individual grooves are elongated, narrow depressions often found in sedimentary rock, such as sandstone, in association with water sources, including creeks and swamps. Water was essential in the shaping and sharpening process in the manufacture of each axe. In the Woronora Plateau region engraved channels, used to divert the run of water, are a feature associated with some axe grinding grooves.

Although only one grinding groove site has been previously identified within the study area to date, they are still considered a frequently occurring site type in the wider region. There is low potential for these to occur on sandstone exposures along major tributaries of the Nepean River and Foot Onslow Creek.

Scarred Trees

Scarred trees exhibit scars caused by the removal of bark used in the manufacture of shields, canoes, containers or shelters. These occur on older trees, generally of a size from which a suitable piece of bark can be removed. A small number of scarred trees are known to exist within close proximity to the study area.

Scarred trees can be expected to occur in all landscapes where stands of old growth timbers remain. Such stands should be present within the study area. The likelihood of mature trees exhibiting evidence of scarification being present within the study area is consequently considered to be low given that most of the study area has been cleared of trees.

Post-Contact Sites

These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area. Many of these sites can hold special significance for Aboriginal people and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with post-contact Aboriginal use. This site type is usually known from historical records or knowledge preserved within the local community. It is considered unlikely that any additional, unregistered post-contact sites will be present within the study area.

Aboriginal Places

Aboriginal *places* may not contain any "archaeological" indicators of a site, but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings. Often these places are significant in the living memory of a community. The likelihood of Aboriginal Places occurring will be identified through a separate Aboriginal Cultural Assessment involving consultation with the local Aboriginal community.

Aboriginal Resource and Gathering Sites

Aboriginal Resource and Gathering Sites are sites where there is ethnographic, oral, or other, evidence that suggest that natural resources have been collected and utilised by Aboriginal people. These natural resources have a cultural significance and connection for the Aboriginal community, such as ochre outcrops that were used for art or ceremonial purposes. These sites are still considered important places today. There are no such known sites within the study area however the likelihood of these sites occurring will be further identified through a separate Aboriginal Cultural Assessment involving consultation with the local Aboriginal community.

6.0 HISTORICAL CONTEXT

Historical research has been undertaken to identify the historical context of the study area. This history incorporates an understanding of land-use, building patterns and areas of disturbance. This research provides an understanding of the historical archaeological potential for the site.

The following historical background is based on information gathered from the NSW Lands and Title Office, local Appin Parish Plans, local history sources, subdivision plans containing survey information and a number of useful historical websites. Register searches of the National and Commonwealth Heritage Lists, The Register of the National Estate, the State Heritage Register and Inventory, the National Trust of Australia and the Heritage Schedule for the Wollondilly LEP were all competed (see Section 3.0).

All of this information was used to locate known and potential historical archaeological sites.

6.1.1 Establishment of Douglas Park

The study area is situated near Douglas Park in the Parish of Camden and the Wollondilly Shire. Explorations in the area of Camden and Appin began in 1790, two years after white settlement of New South Wales. Captain Watkin Tench, William Dawes and George Worgan set out on an expedition from Prospect in August 1790 to explore and record the unknown territory to the south. The published journals of Watkin Tench note that in seven days of walking:

> *Except for the discovery of a river, which is unquestionably the Nepean near its source, nothing very interesting was marked* (Tench 1979: 174).

Governor Hunter led two expeditions into the area in 1795 and in 1796. These expeditions were undertaken following the location of runaway cattle and it was during these trips that Governor Hunter adopted the term ‘Cow Pastures’ for the area and marked up maps accordingly. The area became a Government Reserve for the purpose of raising stock. The first house was referred to as Cowpastures House and was built as accommodation for constables minding cattle (Vincent 1995: 5). It was completed in early 1805 at Elderslie, near the ford crossing of the Nepean River (Vincent 1995: 5).

In 1802 Francis Barrallier, an Ensign in the New South Wales Corps and a surveyor, was given order by Governor King to attempt to find a path across the Blue Mountains. The attempt to find a path across the Blue Mountains failed, with Barrallier navigating his way south along the foot of the mountains into the Illawarra district. During this expedition Barrallier mapped the location of “Manhangle” swamp, named after the Aboriginal name for the swamp, it is noted in the journal that:

> *“…enormous eels, Fishes and various species of shells are found, which are sometimes used by the natives as food.”* (Barrallier 1802:2)

The swamp was recorded on the surveyed map by Barrallier.

George Caley attempted to follow the path of Barrallier later in 1802. Sent by Governor King as a botanist 'collector', Caley also failed in an attempt to find a crossing over the Mountains possibly due to his expertises as a botanist rather than as a surveyor. During his expedition, he explored the area around and beyond the Nepean River, leading to the discovery of Picton (Thirlmere) Lakes. He also camped on "Munangle" lagoon, presumably Menangle Swamp where it is reported that he met and interacted with Aborigines who were also at the lagoon, and gave them shelter during a thunder storm (Mylrea 2002:6-7).

Caley noted in his journal the damage that cattle grazing had done in the local area, likely to have been caused by the wild cattle on the 'Cow Pastures' (Burton 1992). He also reported on the increase in free settlers who were in the area harvesting the timber resources, mostly cedar, in the area for the growing shipbuilding industry in the Colony.

Fearing losing the Hawkesbury supply of cedar and other timbers of 'value', Governor King issued a general order to restrict timber felling along rivers and creeks (Rosen 1995). A 'prohibition' was also placed on crossing the Nepean River. This was to stop the spread of holdings and control them between the coast and the river to help in the development of the region (Moloney 1929).

In 1805 Governor King lifted his prohibition to grant the first allotments in the 'Cow Pastures': 5000 acres to John Macarthur and 2000 acres to Walter Davidson, who later sold his land to John Macarthur. No further land grants were made in the area until 1810, when Governor Macquarie began assigning smaller portions of land and also convicts to settlers in order to encourage farming. From c.1810 to c.1820 most of the land in the area was divided up into farming grants.

To the west Governor Macquarie made the first land grant at Appin, of 1000 acres, to Deputy Commissary General Broughton on 18 October 1811 (Browne 1949: 70). In 1815 Macquarie visited Appin and was impressed with the farming developments in the area. Macarthur was very successful in raising sheep and he continued to expand his acreage. Other settlers followed and also established cattle and wheat properties. Produce from the farms was transported by horse and bullock drays to Sydney via the Appin Road. The Appin Road was an important communication and access corridor in the early stages, however, it declined in importance once the Hume and Princes highways were built.

In 1821 Governor Macquarie gave 100 acres to Andrew Hume who had journeyed to NSW as an instructor in agriculture. The town of Appin was not surveyed until 1834, however, the agricultural value of the area was already known. Cows from the 'Cow Pastures' were herded and farmed in the district, as well as the farming of wheat, that lead to the establishment of several mills surrounding Appin (www.stonequarry.com.au/towns/appin.html).

The township of Camden was built on part of the land owned by Macarthur since the 1805 land grants. However, the town was not established until 1834, and allotments were sold in 1840-1841. Camden soon had a hotel, two churches, a post office and a court house.

Douglas Park was named after an early land grantee in the area. A land grant of 800 acres in 1822 was made in the name of Arthur Douglass, the eight year old son of Dr Henry Gratin Douglass. Dr Douglass came to Australia in 1821 and was born in Ireland of Scottish descent. He was the doctor in charge of the women's reformatory at Parramatta, known as the Factory. He was also the founder of the NSW Benevolent Society and was a supporter of the establishment of the University of Sydney. Dr H.G. Douglass died in 1865 and was buried at St John's Church, Camden.

Arthur Douglass named his estate Hoare Town and to fulfil the terms of the land grant lived there for three years with his mother (Mylrea 2000: 12, Wrigley 1988: 8). As the Hoare Town land grant was sold and sub-divided the area became known as Douglass's Park. This became Douglas Park, and in September 1904 council correspondence decreed that Douglas Park was the official name of the town (Vincent 1995: 53).

These early grants and subsequent subdivisions were used for 'mixed farming' to meet the growing demand in the Sydney and Parramatta Markets. Much of the area was cleared through the use of convict labour gangs and a range of crops were grown. For example, De Arrietta, who had Moreton Park immediately to the east of Douglas Park, cultivated tobacco on his property, while John Macarthur's land to the north of Douglas Park, near Camden, was used for sheep and dairy grazing.

The development of Douglas Park was likely to have been inhibited by its close location to both Camden and Appin. Camden, approximately 9 kilometres to the north was a government and economical centre, with a court and post office and public buildings constructed in 1840s. Appin, which was not surveyed and allotments sold until 1834, had a strong flour milling industry and infrastructure established.

The geographical location of Douglas Park was also a factor which restricted its growth. The early access into the area was along the 1805 Cowpasture Road. This road led to the early land grants of Macarthur in the Camden area. Another main road was built between Campbelltown and Picton, which passed by the first land grants to Arthur Douglass. This was reportedly an easier road to Picton, however, it bypassed many of the settler houses (Mylrea 2000: 44). People travelling into the Illawarra at this time would not travel along the Cowpastures or Campbelltown – Picton Road, but used the Appin Road, using Appin as a main staging post.

In 1832 a Great South Road was constructed that followed sections of the original Cowpasture Road and led to the southern districts of NSW. This road passed though Camden, missing Douglas Park to the east and it crossed over the Razorback Range (Mylrea 2000: 43).

The railway initially opened in 1858 from Sydney to Campbelltown. The railway was extended to Menangle in 1863, and later to Douglas Park and Picton in 1869. In 1882, a tramway was established connecting Camden and Campbelltown It operated until 1963, transporting silver ore from the mines of Yerranderie and milk from the local dairy farms. Campbelltown became the first country town to have piped water - supplied by the Upper Nepean scheme which commenced in 1888. In 1907 work was completed on Cataract Dam, the first of the Upper Nepean dams.

The new road and rail lines in the area aided in the beginning of suburban subdivisions in the 1880s occurring to the north at Minto, Ingleburn, Macquarie Fields and Glenfield. Morton Park Estate, located to the east of Douglas Park located on the land grant to De Arrietta was subdivided into 31 allotments in 1915 (DP8738). The division was mostly into 70 acre and above allotments; however, the proposed division of the estate also included approximately 15 allotments that were less than 20 acres in size.

Later in 1929 road access was upgraded with the building of the (old) Hume Highway that deviated away from the Great South Road. This road was also located to the east of Douglas Park, however, later arterial roads connected the (old) Hume Highway to the Campbelltown – Picton Road. This road was later superseded with the building of the F5 Freeway in 1980.

Within the Douglas Park area agricultural industries continue around the growth of regional centres, such as Camden. Sheep and Dairy farming continued, along with the establishment of Estate type pastoral leases, such as the Mountbatten Estate.

The Upper Canal

The oldest public utility within the study area is the Upper Canal, a component of the Upper Nepean Scheme. Higginbotham has prepared a Conservation Management Plan (CMP) for the Upper Canal, and this has been endorsed by the NSW Heritage Council (Higginbotham 2002). Historical information in the CMP was largely derived from the detailed heritage assessment of the Upper Nepean Scheme and the Upper Canal also prepared by Higginbotham (1992). Both these documents provide a detailed history of the Upper Canal, and form the basis of the following summary.

The Upper Nepean Scheme was Sydney's fourth source of water supply and was designed to provide a secure source of water for the growing population of Sydney. Constructed between 1880 and 1888, “the scheme diverted water from the Cataract, Cordeaux, Avon and Nepean rivers to Prospect Reservoir via 64 kilometres of tunnels, canals and aqueducts known collectively as the Upper Canal” (www.sca.nsw. gov.au/dams/history.html).

Construction of the Upper Canal was overseen by the Harbours and Rivers Branch of the Department of Public Works, although much of the work was completed by contractors. Design of the canal is attributed to Edward Moriarty, head of the Harbours and Rivers branch at the time.

> The canal transports water by gravity from the catchments in the Southern Highlands, through a 64.5 km long channel. From Pheasant's Nest Weir on the Nepean River, the Canal proceeds by Tunnel to the Cataract River at Broughton's Pass. A weir across the Cataract River diverts the flow of the river into the Cataract tunnel. From Broughton's Pass, the Upper Canal delivers water by gravity through open canal and tunnel to Prospect Reservoir, with a number of subsidiary off-takes such as the storage dams at Liverpool and Ingleburn, used to supply townships along its route including Camden and Campbelltown. From the Prospect Reservoir, the water is distributed to the Sydney water supply network.
>
> b cubed sustainability 2003:11

"The great merit of the Upper Nepean Scheme is that it was, and still is, a gravity supply" (Higginbotham 2002:8). The entirety of the system was designed to supply water by gravity, and there remain sections of Sydney, known as the 'gravitation zone', which still receive water by gravity (Higginbotham 2002:8).

The Upper Canal was designed and built in response to the conditions of the surrounding countryside. Section profiles were varied according to local conditions, in areas where the ground was soft, the Canal was V shaped and the sides pitched with shale or sandstone slabs. In other areas, the canal was U shaped and in these sections the canal was either cut directly into bedrock or the sides were walled with sandstone masonry. Tunnels were used under hills, unlined through bedrock or lined with brick or stone through softer materials. At the creek crossings (valleys) the water was carried across via wrought iron inverted syphons resting on stone piers (Higginbotham 2002:8).

Modifications were made to the surrounding landscape to prevent the entry of contaminated water into the supply system. These included the creation of bunds and drainage channels to direct water to culverts (carrying water under the canal) or flumes (carrying water over the canal). The flumes were mainly originally constructed from timber, but these were gradually replaced with wrought iron, and later, concrete flumes. Bridges carried public traffic over the canal, while smaller 'occupation bridges' allowed land owners with land on each side of the canal access to both parts of their holdings.

After travelling a distance of 39 ¾ miles (64 kilometres) from Pheasants Nest, water entered the Trafalgar Tunnel, where it passed over a measuring or gauging weir and then along the inlet race into Prospect Reservoir. This is the end of the Upper Canal System, the Prospect Reservoir and the Lower Canal comprising the remaining components of the Upper Nepean Scheme (Higginbotham 2002).

Development of the Upper Nepean Scheme continued, with upgrades and replacement of damaged materials. The largest development was the augmentation of the Scheme via the construction of four dams in the 1900s - Cataract Dam (1907), Cordeaux Dam (1926), Avon Dam (1927) and Nepean Dam (1935). Standard maintenance of the system has been an

ongoing and integral component of the Upper Canal and Upper Nepean Scheme since construction.

Moreton Park Estate or Mountbatten

The second land grant in the area of Douglas Park was to Jean Baptiste Lehimaz De Arrietta (also known as D'arriete and D' Arrietta) on 9 July 1822. Governor Thomas Brisbane granted De Arrietta 2000 acres of land. The land was known as Moreton Park (also Moreton Park Estate) and was bounded to the northwest by the extensive land grants of John Macarthur, to the west by Harris Creek, to the east by the Nepean River and to the southwest by the 320 acres granted to Arthur Douglass known as Hoare Town and then as Douglas Park (Mylrea 2000: 10-12).

De Arrietta is thought to be Australia's first settler of Spanish origin (Ballyn 2001). He was a colourful identity in the area of Camden and was credited as the first person to use guard dogs on long leads to protect property (Valentine 1939: 126). The land still known as Spaniards Hill, on the western side of Harris Creek, is named after him and was the site of the first school in Douglas Park. In 1862 a Catholic school was established on the crest of Spaniards Hill (Douglas Park School 1983: 10).

Sources are divided as to whether De Arrietta arrived in Australia as a free settler or a convict. Information in the Wollondilly Heritage Study notes that:

> *Jean Baptiste Lehemaz, [was] a Spaniard taken prisoner by the British and shipped to the colonies. Unsure as to whether to treat d'Arrietta as a gentleman or labour, the authorities granted him the land together with 25 convicts and required that he produce wine. D'Arietta planted tobacco instead. The crop failed and the convicts escaped*. (JRC 1993: WO 0085, page 4).

However, the notes accompanying the Colonial Secretary's papers describe De Arrietta as a native of Spain who arrived in Sydney as a free settler on the Duke of York in 1821 (Colonial Secretary papers microfiche). It was also noted that De Arrietta was in Spain during the Peninsular War helping the British Army with stores and some spying. He went to England, asked for payment and was promised a grant of land if he came to New South Wales. The land grant was made to him in consideration of the amount of capital he brought to the country and to foster his intention to cultivate the vine (Vincent 1995: 8). The conditions of the land grant were that the land not be sold or alienated for the period of five years and that he took 20 convicts to assist with the clearing and farming (Mylrea 2000: 8-9).

The New South Wales Colonial Secretary correspondence with De Arrietta records that he was granted the land in order to cultivate wine and olives and to rear sheep (Colonial Secretary correspondence July 31, 1821). He was also assigned 10 cows from the Government Stocks at Cowpastures in January 1822 and an additional 20 cows from the Government Stocks in April 1825 (Colonial Secretary correspondence). Despite this, it was recorded that

De Arrietta grew tobacco on the property and was not successful with this crop (Wrigley 1988: 8)

De Arrietta married and built a cottage on the land. This cottage appears to have later been resumed into the courtyard area of the 1860s homestead and kitchen. The Australian Heritage Database describes the cottage as a single-storey dwelling with a central door and two timber nine-paned windows. However, this entry goes on to note that little remains of the original fabric (Place ID 101973).

De Arrietta began to sell off sections of the original 2000 acre land grant during the 1830s due to a series of money problems. He died in 1837 or 1838 and his wife Sophia married a William Walker and moved to Sydney in 1838.

In 1831 Samuel Terry, a former convict, bought the land. He married a Rozetta Madden and kept the De Arrietta land in the family. However in 1866 Land Titles documents still refer to the land as "D'Arrietta's farm" (No. 7231, 12 March 1866). In 1865 Ellen Rozetta Hughes and her husband J. Hughes, who were related to Samuel Terry by marriage, built the existing Moreton Park homestead where J. Hughes died three years later. Ellen Rozetta Hughes then married Franklin McMullen and retained the property of Moreton Park, as well as other land holdings in the area.

In addition to the homestead, a sandstone kitchen building (bearing a plaque dated 1865) was constructed behind the main house, by the Hughes or McMullens. This building was later converted to a billiards room in the 1940s. The homestead, the kitchen, and the building retaining part of the original cottage, form a complex linked by a courtyard that may also date from the period. A simple sandstone chapel, which was later used as stables, is located nearby and appears to date from the Hughes or McMullen ownership. These buildings have been listed on the Australian Heritage Database and the State Heritage Register as being of local heritage significance.

A Land Titles document dated 31 May 1893 named Ellen Rosetta McMullen, wife of Franklin McMullen of Moreton Park as the owner and occupier of the land described as:

> *D'Arrieta's 2000 acre grant and containing by admeasurement two thousand four hundred and ninety seven acres exclusive of Railway and Roads commencing at the intersection of the east side of Harris Creek with the north side of the Nepean River and bounded thence on the west and south by Harris Creek bearing northerly and westerly to a Government road then again on the west by said road bearing northerly* …

The original land grant was subdivided in the 1920s or 1930s. In 1932 John Stanley Haddin was named as the owner of land encompassing "277 acres, one rood and 8 perches … being part of 2000 acres originally granted to Jean Baptiste Lehemaz de Arrietta by Crown Grant dated 9th of July, 1822" (Land Titles Volume 4533 Folio 199).

The 155-acre property containing the substantial 1865 homestead was bought by Mr Terpening, an American millionaire in the 1940s. He renovated the house and the property, which was then sold to Neville Hemsworth who renamed it 'Mountbatten' after Lord Louis Mountbatten. Hemsworth built a swimming pool and dance hall on the property and it was leased as a guest house in the 1940s and 1950s. Neville Hemsworth's daughter operated the property as a stud farm and riding school. Several buildings on the property, such as the circular garden building or aviary, the sheds and a silo date from this period. A photograph of the house and the round garden building (known as an aviary) appear in a 1972 photographic survey of historic houses of New South Wales (Leary 1972: 176).

The property has been continually used for pastoral activities and has had a number of owners. The estate became known as the Moreton Park Stud Farm from the 1950s onwards. The heritage aspects of the property listed to date incorporate mature trees from the original garden planting, outbuildings and the buildings known as The Mountbatten Group on the Heritage Registers. The Mountbatten Group are the 1865 homestead, kitchen / bakery, chapel / stables of that era and a later garden building / aviary and are listed on the Australian Heritage Database, the NSW Heritage Inventory and the Wollondilly Heritage Study Inventory for the Wollondilly LEP.

Gilbulla Memorial Conference Centre

Gilbulla Memorial Conference Centres was part of the Macarthur estates from the early years of the 19th century. From 1818 there was a small cottage on the property which was situated near an early Cobb & Co coaching route south. The cottage was later demolished to make way for a more imposing residence, designed by Sir John Sulman and erected in 1899 for Major General J.W. Macarthur-Onslow. In 1932 he exchanged house with his unmarried sister, Sibella, who was then living at nearby Camden Park. She was the last Macarthur occupant of the house and was known as "The Lady of the Manor of Menangle". Sibella had wide community interests and worked actively for her 'causes' which included support for the Kimberley Plan for Jewish colonisation in Australia and Red Cross Activities. After her death in 1943, Gilbulla became one of the Red Cross's rehabilitation centres and during this occupation the Long House was constructed.

In 1949 the Church of England acquired the house and present grounds from Camden Park Estate as a conference and retreat house which was also a memorial to the wartime work of the clergy of the Church of England, particularly the chaplains during WWII. Sydney clergy at the time provided the labour to build a log chapel. A log-cabin chapel was built on the site in 1952 by the clergy of the Diocese as a memorial to the chaplains who served in World War II. Local timber was used with the bark intact for all except the east wall which is plate glass, and the interior was furnished simply. Additional conference facilities were added in 1978 with the construction of motel style accommodation facilities and meeting hall. In 1981 the dining hall was constructed. In 1989 an all weather tennis court was built. Thus, the facilities at Gilbulla now comprise accommodation for up to 163 persons in 3 wings, 3 conference

rooms and 2 lounge rooms, a dining room, the log chapel and an historic Christian library, tennis court and swimming pool, and formal lawns and gardens (http://www.sds.asn.au/).

6.2 Previous Archaeological Work and Heritage Listings

Three previously listed heritage sites have been recorded within the study area. The first is the Sydney Water Upper Canal, which is listed on the NSW State Heritage Register, the Wollondilly LEP Heritage Schedule and the Register of the National Estate. The other two sites include the 'Mountbatten Group' and the 'Gilbulla Memorial Conference Centre', which are both listed on the NSW State Heritage Inventory, the Wollondilly LEP Heritage Schedules and the Register of the National Estate.

6.2.1 State Heritage Register

The State Heritage Register is a list of places and items of State heritage significance, endorsed by the NSW Heritage Council and the Minister of Planning. It was established under the *Heritage Amendment Act* 1998, and replaces the old system of Permanent Conservation Orders as a means of protecting items of State significance. The Register lists a diverse range of places, including archaeological sites, which are of particular importance to the State and which enrich our understanding of the history of NSW. These are legally protected under the NSW *Heritage Act* 1977 and require approval from the Heritage Council of NSW prior to undertaking any work that results in their alteration or modification.

The Register is included within the State Heritage Inventory, which is a database of all statutory protected heritage items in NSW (see below).

The Upper Canal Water Supply System is listed on the State Heritage Register as a State Significant item currently managed by the Sydney Catchment Authority. The canal was constructed between 1880 and 1888 and comprises a gravity system that includes a series of tunnels, open canals and aqueducts that conveys water 64 km from Pheasants Nest to the Prospect reservoir (Higginbotham 2002). The site has been listed on the State Heritage Register for its engineering and structural significance, a feat that was accomplished during the late 19th century.

6.2.2 State Heritage Inventory

The State Heritage Inventory (SHI) is a database of statutory listed heritage items in New South Wales that are protected by heritage schedules attached to local environmental plans (LEPs), regional environmental plans (REPs), or by the State Heritage Register.

> *The study area has two Local Heritage Listing on the State Heritage Inventory based upon the listing in the LEP (see below). The first listing is for the Mountbatten Group incorporating Mountbatten House also known as Moreton Park House, Moreton Park's former chapel and the Moreton Park garden building. The second listing is for*

Gilbulla Memorial Conference Centre Main House and grounds, including the gardens.

6.2.3 Local and Regional Environmental Plans

A Review of the Wollondilly Shire Council's Local Environmental Plan (1991) heritage list (schedule 1) reveals two items listed in the heritage schedule:

- Mountbatten Group: house, chapel, and garden building; lot 2 DP 576136 and lot A DP 421246 Duggan Street (Douglas Park)
- Gilbulla (Anglican Conference Centre); lot A DP 407248 and DP 370921 Moreton Park Road (Menangle)

Mountbatten / Moreton Park

The Mountbatten Group is principally comprised of three main items: Moretone Park House; The Moreton Park Stone Chapel; and the Moreton Park Garden building. In addition teher are several other features also associated with the property, such as wells, other garden and farm structures, although these are not listed (Biosis Research 2006).

Moreton Park House is described as a Victorian Georgian house constructed of sandstone, stone and slate. It is evaluated as both representative and associative for historic criteria and as representative aesthetically.

The Mountbatten stone chapel is listed as rare historically, with low representative aesthetic qualities.

The Moreton Park Garden building is representative historically and aesthetically.

Gilbulla (Anglican Conference Centre)

Built in 1904 and designed by notable late 19th century NSW architect Sir John Sulman, Gilbulla is a large Edwardian residence. Although the original building and surrounds have been continuously added to over the 20th century adding different forms, styles and fabrics, the original residence remains in good condition.

6.2.4 Register of the National Estate

The Register of the National Estate contains lists and descriptions of places that are protected under the EPBC Act by the same provisions that protect Commonwealth heritage places. These provisions require that actions:

- taken on Commonwealth land which are likely to have a significant impact on the environment will require the approval of the Minister,

- taken outside Commonwealth land which are likely to have a significant impact on the environment on Commonwealth land, will require the approval of the Minister, and

- taken by the Australian Government or its agencies which are likely to have a significant impact on the environment anywhere, will require approval by the Minister.

The information on a place or object contained in the Register of the National Estate has been provided to or obtained by the Australian Heritage Council (or the former Australian Heritage Commission).

- The Mountbatten Group Moreton Park has an Indicative listing on the Australian Heritage Database. 'Indicative' is described as data has been provided to or obtained by the Heritage Division and entered on the database, however a formal nomination has not been made and the Department has not prepared all the data necessary for a nomination.

- Moreton Park Bakery, also known as the kitchen is at the rear of the homestead forming a courtyard area with the original cottage. It is of sandstone construction. The register entry contains internal and external descriptions.

- Moreton Park Early Dwelling, a single storey building of sandstone, brick, timber weatherboards with a gabled roof lying south about 30 metres from the main homestead.

- Moreton Park Circular brick garden structure with red tiled roof representative of early 20th century garden forms. This listing also includes notes on the garden and recommends further investigation of the garden, an early stone rubble wall and early timber bridge along the route of the original road.

6.2.5 Site Prediction Model

Given the nature of historic development within the study area, it is unlikely that further historical sites, additional to those already discussed, will be present. Should any additional sites be identified, they are likely to be associated with known development, being components of Appin Road construction and development, pastoral use, including domestic remains or farming associated remains, or features associated with the Upper Canal.

7.0 SURVEY METHODS

The eastern edge of the study area has been subject to previous archaeological survey in response to mining activities and other infrastructure development (Sefton 1998, 1999; Navin Officer 2006; Biosis Research 2004, 2006a) (see Figure 3). This archaeological work has provided intense survey coverage of the Nepean River and its tributaries. Such areas have been the focus of this work, as the incised Hawksbury sandstone is the most archaeologically sensitive landscape on the Woronora Plateau, containing sandstone overhang art and occupation sites. However, the central and western parts of the study area have been subject to little archaeological work (Biosis 2006a; Dibden 2003). The previous archaeological survey effort is clearly shown in Figure 3.

When undertaking assessments for potential subsidence impacts, the archaeological sites likely to exhibit the affects of subsidence movements are generally the focus of the assessment. Based on previous monitoring results on the effects of subsidence on archaeological sites, sandstone overhangs with art or archaeological deposit, and grinding groove sites are more likely to be adversely impacted than open artefact scatter or occupation sites.

Using the results of monitoring work and previous archaeological assessment along the Nepean River corridor, and understanding the nature of the potential Longwall 705-710 mine subsidence impacts (MSEC 2008), the survey methods employed involved:

- Relocation and reassessment of all previously recorded Aboriginal and historical archaeological sites within the SMP Area; and,

- Sample survey for archaeological sites in areas not previously surveyed, particularly within the central and western sections of the study area;

The targeted site assessment of Aboriginal and historic archaeological sites was undertaken concurrently. Thus, particular attention was be paid to key historic features and sensitive landforms (sandstone outcrops or scarred trees), and areas identified in the predictive modelling as having a high likelihood for the presence of archaeological sites. This included areas of exposure and any raised flat areas along the creek lines, drainage features and ridge lines, inspection of all old growth trees for scarring and sandstone overhangs likely to yield art or deposit.

Notable features within the study area corridor were recorded using a GPS. A GPS ‘track’ was also recorded and stored showing all survey movements within the study area, effectively serving as continuous ‘survey transects’. Survey conditions and variables were recorded for the study area, whilst the extent of survey was determined after downloading the GPS data into a GIS. All archaeological site records were made on specifically designed recording forms for shelter and open sites. Topographic and aerial maps and a GPS were used to navigate across the study area and to locate previously recorded archaeological sites.

Eastern Study Area - Nepean River Corridor

The survey team consisted of two archaeologists and one representative from each of the relevant Aboriginal communities. During the process of site relocation, team members walked along the eastern banks of the Nepean River targeting sandstone overhangs within the approximate site locations that match the original sites' descriptions on the site cards. Any incidental unrecorded sandstone overhangs of interest were inspected in detail. No access was possible along the western sides of the Nepean River. Where access was restricted, previous archaeological results were used for the assessment of site condition for this impact assessment.

Specific rock shelter observations include:

- Presence Aboriginal art
- Condition of panel on which art is located
- Art condition
- Presence of graffiti
- Presence of micro-organisms
- Presence of geological features such as bedding planes, cracks and weathering processes
- Condition of shelter floor ie. intact or disturbed deposits
- Presence of artefacts

Central and Western Area – Foot Onslow Creek / Spaniards Hill

The survey team consisted of two archaeologists and one representative from each of the relevant Aboriginal communities. Areas of exposure were targeted along both Foot Onslow Creek and a major tributary of Navigation Creek for the identification of grinding grooves and open stone artefact scatter sites. Throughout those private properties where access is possible, exposures included cattle tracks, farm vehicle tracks, dams, creek banks, drainage lines, sheet erosion, at the base of trees, fence lines, ploughed areas and patchy exposures in open grazed paddocks. These areas were the focus of the survey team. Heavily grassed paddocks and hill slopes were not assessed in detail as no ground surface visibility was present to allow inspection. For the open artefact scatter sites in this area, an updated site description and condition assessment were completed.

7.1.1 Aboriginal Participation

Aboriginal representatives from the Tharawal Local Aboriginal Land Council and the Cubbitch Barta Native Title Claimants Aboriginal Corporation participated in the survey. Representatives from both of these communities were involved in the initial archaeological field work for some sections of the current study area (Sefton 1998, 1999; Biosis Research

2006). The representatives were asked to provide comment on the cultural significance of the locality and any archaeological objects or areas that were recorded during this survey.

7.1.2 Archaeological Survey Constraints

With any archaeological survey there are several factors that influence the effectiveness or the likelihood of finding sites. The factors that contribute most to how detectable archaeological sites may be are summarised as *visibility* and *exposure*. A brief discussion of these factors is presented below.

Visibility

In most Aboriginal archaeological reports and guidelines, visibility refers to *ground surface visibility*, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (NSW NPWS 1997: Appendix 4). The visibility of sandstone overhang sites however is not considered here and differs to the visibility of other archaeological sites. The obtrusiveness of sandstone rock shelter and overhang sites, even in heavily vegetated areas is always high, so these sites are likely to be detected and inspected during survey. In comparison the obtrusiveness of surface sites, such as axe grinding grooves, engraved channels and motifs on sandstone platforms, or stone artefact scatters, which occur virtually anywhere, is low to very low because of the limited ground surface visibility described above.

Sandstone shelter sites aside, the primary factor that affects visibility across most of the study area is vegetation cover. Grassed paddocks obscure large areas of the ground surface throughout the open paddocks and creek lines in the central and western sections of the study area.

Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed, and attempts to describe the relationship between those conditions and factors that may allow for the exposure of (buried) archaeological materials. While also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke and Smith 2004: 79, NSW NPWS 1997: Appendix 4).

Factors that affect archaeological exposure include the natural geomorphic process acting on a landscape—whether it is aggrading, stable or eroding—and the level of previous disturbance which will expose or potentially bury archaeological sites. A number of geomorphic processes were observed within the study area corridor, including fluvial, erosional and residual components within the general landscape. Residual landscapes are likely to accumulate archaeological material over long periods but are not particularly likely to reveal buried artefacts. Erosional landscapes within the study area, particularly areas with shallower soils may expose artefacts as surface expressions. Fluvial areas associated with each of the creek banks will have been affected by various episodes of depositional and erosional processes

caused from the varying flow levels of the creeks. These processes are most likely to have washed away any Aboriginal archaeological material associated with these areas.

Exposures occurred most frequently within the erosional and fluvial landscapes, as a result of surface disturbance, while exposures within residual landscapes were limited to intrusive processes, such as ploughing.

Disturbance

Disturbance in the study area is associated with natural and human agency. Natural agents generally effect small areas and include the burrowing and scratching in soil by animals such as wombats, foxes, rabbits and wallabies, and sometimes exposure from slumping or scouring. Disturbance associated with recent human action is prevalent in the study area, and covers large sections of the land surface. The agents include farming practices such as the initial vegetation clearance for the creation of paddocks, ploughing and cropping, fencing, sheep and cattle grazing and stock movement, unsealed tracks, excavation of dams and clearance of creek and drainage channels, and stone quarrying activities on the eastern side of the Nepean River associated with the Sydney Water Canal. Overall, the study area displays moderate levels of disturbance.

Accessibility

There were some issues of access for a number of private properties on sections of Foot Onslow Creek and the western side of the Nepean River within the study area. Those properties on the open plain adjacent to Foot Onslow Creek are likely to contain open stone artefact scatter sites, with some potential for grinding groove sites. The western side of the Nepean River comprises steep sandstone cliff lines and two small side drainage features that are likely to contain sandstone overhangs suitable for Aboriginal art and deposit sites. Although these properties may contain unrecorded archaeological sites, previous assessment of the area indicates that it is unlikely that these site types will be impacted by subsidence movements.

Recorded Site Accuracy

As has been the case with many recent archaeological surveys, sites that have been previously recorded are not always easily relocated. This can be attributed to the original method of site recording. If sites were originally recorded by hand on a 1:25,000 map sheet, there is likely to be some inaccuracies. This coupled with a change in co-ordinate systems, from AMG to MGA, increases the likelihood of inaccuracies from the original recorded site co-ordinates. Quite often, recorded sites can be inaccurate to between 20 to 100 metres.

Safety

There are many small to moderate sandstone outcrops in the eastern section of the study area, and the edges of these were not approached closer than 2 m by the survey team. In some areas, though not common, the vegetation is impenetrably thick posing a risk of eye injury,

falls and cuts or abrasions. In some places, areas were avoided or unapproachable due to terrain and vegetation. This is not considered to be a significant constraint to the adequacy of the survey of these areas.

7.2 Survey Results

A total of nine new Aboriginal archaeological sites were identified during the current archaeological surveys for proposed Longwalls 705-710. These sites include two open artefact scatter sites and seven isolated artefact occurrences. These sites were identified along the banks of Foot Onslow Creek and a Navigation Creek feeder tributary.

Of the previously recorded Aboriginal archaeological sites within the SMP area, only four could be accessed for reassessment, and only one of these could be relocated. A number of sites could not be reassessed due to access restrictions, and those that could be accessed could not be relocated due to thick grass cover obscuring their location.

Recorded Aboriginal archaeological sites within the SMP study area comprise open stone artefact scatters, isolated artefact occurrences, sandstone shelters with deposit, and one scarred tree. All sites were located within close proximity to water or along the top of small ridges or hills.

The effective survey coverage of the study area is considered to be very low, primarily due to seasonal grass cover within the road reserve and adjacent private properties. Areas of ground surface visibility were limited to stock tracks, unsealed tracks, erosion on slopes and creek banks, farm dams, sheet wash and patchy grass cover. Visibility of sandstone overhangs however was good, although due to the steep nature of this section of the Nepean River, very few were suitable for Aboriginal use or occupation.

7.2.1 Existing Condition of the Study Area

The study area is dissected by the Nepean River, Foot Onslow Creek and the major feeder tributaries of Harris and Navigation creeks. The eastern side of the study area comprises the deeply incised Nepean River, exhibiting sheer, sandstone cliff lines (Plate 1). Very few sandstone outcrops suitable for Aboriginal use or occupation occur along this section of the Nepean River (Plate 2). However, a number of side drainage features that intersect with the river do contain more suitable overhangs, such as the Nepean River 8 shelter with deposit site.

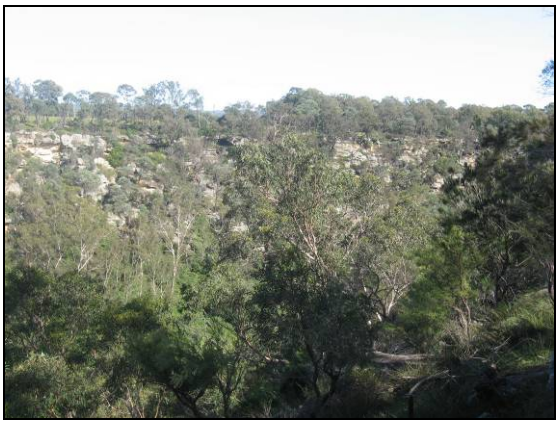


Plate 1: Sheer sandstone cliff lines along the western side of the Nepean River, exhibiting no

Plate 2: Large sandstone overhang that contains no suitable living floor or surfaces for art, located on the

suitable overhangs or outcrops for Aboriginal art or occupation.

eastern side of the Nepean River.

Most of the study area however comprises open, cleared undulating hills, dissected by small water lines, including Foot Onslow Creek, and tributaries of Harris and Navigation creeks. Continuous agricultural land use practices have resulted in the removal of vegetation that has subsequently caused severe erosion on hill slopes and along creek lines and drainage features (Plate 3 and Plate 4).

Plate 3: Heavily eroded slopes of upper ridge line on Spaniards Hill in the foreground, with Foot Onslow Creek valley in the background, facing north east

Plate 4: View back along the feeder tributary of Foot Onslow Creek, with Spaniards Hill ridge line in background

7.2.2 Aboriginal Archaeological Sites within SMP Area

One previously recorded Aboriginal archaeological site (Nepean River No. 8) was relocated during the current assessment. The site was rephotographed and reassessed for changes since the original site recording and a new, more accurate, site position was recorded using a hand held GPS. Information regarding those Aboriginal shelters with art and/or deposit that could not be accessed was summarised from the previous assessment undertaken by Biosis Research in 2006. No previously recorded Aboriginal stone artefact sites could be relocated due to poor ground surface visibility.

The following section is an overview of each previously recorded site, summarising site features, contents and condition. The sites are split into three sections, a) those sites that could be relocated b) those sites that could not be accessed but were assessed as part of the Douglas Area 7 (now referred to as Appin Area 7) assessment (Biosis Research 2006), and c) newly recorded archaeological sites.

7.2.2.1 Relocated Aboriginal Sites

Nepean River No. 8 **Shelter with Deposit**

This shelter with archaeological deposit is located in a moderate sandstone overhang line situated on the upper cliff line on the eastern side of the Nepean River, north of where a minor tributary meets the river gully (Plate 5). The overhang has been formed by cavernous weathering and block fall, resulting in an overhang measuring 16 m x 3.8 m x 2.1 m comprising a sizable living area. A number of horizontal bedding planes run along the upper and lower sections of the overhang. Some roof collapse has occurred on the lip of the shelter at the centre. Extensive weathering and previous water seepage have rendered the shelter surface unsuitable for art. A sizable sandstone lip runs along the back of the shelter for its entire length, however, no engravings or markings are present (Plate 6).

Plate 5: Sizable sandstone overhang at site 52-2-2239 – shelter with deposit

Plate 6: No art is present within this shelter, however the living area is large with good deposit

Although none of the originally identified stone artefacts could be relocated, a number of other stone artefacts were identified in two heavily eroded sections of the drip line (Plate 7). As with many shelters in the region there is evidence of recent historical use, with a small wall constructed at the northern end of the shelter (Plate 8).

Plate 7: A number of stone artefacts were identified in the drip line

Plate 8: Small historic wall constructed at northern end of shelter

Water seepage over the lip of the shelter has 'washed' the surface of the shelter wall. Some surfaces also contain small hair line cracks. The most significant impact to the surface of the shelter wall is granular weathering.

The deposit consists of a medium yellow brown sand where there is no block fall, creating a large open living area of approximately 14 m². The deposit is estimated to be approximately 30 cm deep and a single quartz artefact was identified within this area. The deposit remains undisturbed although some surface movement from small animals was evident. Overall, the shelter is relatively stable and considered to be in good condition.

7.2.2.2 Aboriginal Sites with No Access

The following sites could not be relocated due to site access restrictions and as a result the following information has been taken from the previous archaeological assessment work (Sefton 1999; Biosis Research 2006a). Additional information and photographs of each site can be found in:

Biosis Research (2006), *Douglas Area 7 Project Environmental Impact Statement Appendix H: Impacts on Indigenous and Historical Archaeology Revised Report. A report to BHP Billiton Illawarra Coal.*

Nepean River No. 6 Shelter with stone artefacts and archaeological deposit

Caryll Sefton recorded this shelter site in 1999. The shelter comprised a large sandstone overhang located on the lower sandstone cliff line within the small tributary gully line. The shelter at the time contained undisturbed brown loamy sand deposit with one silcrete stone artefact located in the drip line. The walls of the shelter were covered in algae, lichen and mould due to wet conditions within the shelter that would have been unsuitable for art.

This site was relocated in 2006 during archaeological surveys for Appin Area 7 Longwalls 701-704 (Biosis Research 2006a). At the time, the silcrete artefact originally recorded could not be relocated in the drip line. The deposit on the floor of the shelter had sustained significant damage and disturbance due to recent activities within the shelter. These activities included recent human activity on the floor of the shelter, construction of a fireplace and a pile of timber and animal bones. At the eastern end of the shelter, two small retaining walls have also been constructed. The floor of the shelter was littered with rubbish, including metal pots and pans, and a number of cigarette butts. No Aboriginal art is located within this overhang due to significant natural weathering process, including water seepage, algal growth and mould. Up to 70% of the shelter walls contained recent non-Aboriginal graffiti/art work. This shelter has been vandalised and archaeological deposits have been disturbed between 1999 and 2006. This property on which this site is located could not be accessed during the current assessment.

Nepean River No. 7 **Scarred Tree**

Caryll Sefton recorded this scarred tree in 1999 and it was relocated and assessed by Biosis Research in 2006. The scarred tree was described as being in good health and containing a large scar on the south eastern face of the tree. The tree height was approximately 15 m with a circumference of 2.6 m. The description states that the scar is 1.8 m long and 0.30 m wide, with a regrowth of 0.15 m.

The scarred tree is situated on the northern upper bank of the small tributary. The tree remains in good health and in the same conditions in which it was recorded. There is one distinctive axe mark located approximately 0.15 m below the top of the scar. The tree is considered to be in good condition.

Didicoolum Unit E, Rubbish Dump **Axe Grinding Grooves**

The area where this site was originally recorded by Demkiw (1985) was resurveyed by Biosis Research in 2006, however evidence of the site could not found. Demkiw (1985) recorded several grinding grooves in a minor drainage feature that flows into the Nepean River, containing occasional sandstone floaters. During the 2006 Biosis Research survey, a number of natural features that may have been mistakenly recorded as grinding grooves were identified, however these did not satisfy the usual criteria for an axe grinding groove – elongated, shallow, smoothed concave depressions that form grinding facets. At the time of the survey, large sections of the drainage feature were obscured by blackberry bushes, and there is still the possibility that the original grinding groove is situated in these areas.

Didicoolum Unit D, Ground Axe Paddock **Open Camp Site**

This site was originally recorded by Demkiw (1985). The site was recorded as a number of stone artefacts and other unusual artefacts located in an open paddock. During the 2006 Biosis Research field survey, the area was revisited and the paddocks extensively surveyed. Flaked stone artefacts were recorded by Biosis Research at the site, however no ground edge artefacts could be relocated. The site was in fair condition.

Mountbatten 1 **Isolated Artefact**

This site was identified during archaeological surveys for Appin Area 7 Longwalls 701-704 (Biosis Research 2006a). This site comprises an isolated stone artefact exposed in the scald of an existing farm vehicle track on the saddle, on the lower slopes of the eastern ridge line of Spaniards Hill. The track appears to have been used continuously, causing erosion along its entire length. The site consists of one multi-directional tuff core. No further cultural material was identified and due to the high levels of ground surface visibility, it is unlikely that further stone artefacts will occur here.

Mountbatten 2 **Isolated Artefact**

This site was identified during archaeological surveys for Appin Area 7 Longwalls 701-704 (Biosis Research 2006a). This site comprises an isolated stone artefact exposed in the scald of an existing farm vehicle track on the top of the major ridge that runs along to meet Spaniards Hill. The track appears to have been used continuously, causing erosion along its entire length. The site consists of one tuff flake. No further cultural material was identified and due to the high levels of ground surface visibility, it is unlikely that further stone artefacts will occur here.

Moreton Park 4 **Isolated Artefact**

This site was identified during archaeological surveys for Appin Area 7 Longwalls 701-704 (Biosis Research 2006a). This site comprises an isolated stone artefact exposed along an existing Telstra easement in an open flat paddock above the Nepean River. The site consists of one distal quartz flake. The area appears to have been moderately disturbed from land use practices and the excavation of the Telstra cable. It is unlikely that further cultural material will be located here.

Moreton Park 5 **Open Camp Site**

This site was identified during archaeological surveys for Appin Area 7 Longwalls 701-704 (Biosis Research 2006a). This site comprises an extensive, wide spread moderate-density scatter of stone artefacts along the upper banks of a minor feeder drainage feature that flows west into the Nepean River. Most of the material was found on the edge or on top of exposed sandstone floaters along the edge of the drainage feature. It comprises at least 30 artefact spread across an area of 300 - 400 m around the lip of the drainage feature. Raw materials recorded include black fine grained volcanic material, chert, silcrete, quartz, quartzite and mudstone. Artefact types identified include un-retouched flakes, cores, worked blades, scrapers and points. Although the area has been subject to vegetation clearance and grazing, it is likely that further cultural material will occur here.

Upper Nepean Hand Stencils **Shelter with non-Aboriginal hand stencils**

This site comprises a possible shelter with art and was identified by Biosis Research in 2006. The sandstone overhang is located on the upper southern slope of a small tributary which runs into the Nepean River. Access to the site can be obtained from the Nepean River. The shelter is approximately 8 m long x 2.6 m wide x 2.3 m in height. The soil deposit within the shelter consists of medium yellow brown sand. The shelter has been formed by weathering and the surface of the shelter is uneven as a result. There are two red hand stencils located in the south eastern corner of the shelter. It is assumed that both stencils have been made using ochre however the colouring and nature of the stencil suggest that it may be some other medium. The antiquity of these hand stencils is uncertain and it is likely that these have been created in the last 10 years. This site was not previously recorded by Caryll Sefton despite her thorough survey of the drainage feature gully line. This site is not considered to be an Aboriginal archaeological site.

7.2.2.1 New Aboriginal Archaeological Sites

A number of new Aboriginal archaeological sites were recorded during the assessment, all of which comprised open stone artefact scatters or isolated artefact occurrences.

Navigation Creek AS 1 **Open Camp Site**

This site comprises a low-density scatter of stone artefacts on the eastern and western banks of a feeder tributary of Navigation Creek. The site is located on the eroded banks of the tributary adjacent to an existing farm dam. The tributary is surrounded by undulating cleared farmland. The stone artefacts have been manufactured from various raw materials, including quartz, quartzite, mudstone and silcrete. Most of the artefacts were un-retouched waste flakes. One core and one medial retouched flake were also recorded. Despite significant erosion along the banks of the drainage line at this point, it is likely that undisturbed sections of the tributary will contain further sub-surface archaeological material.

Navigation Creek IA 1 **Open Camp Site**

This site comprises two stone artefacts located on the south eastern bank of a feeder tributary of Navigation Creek. Both artefacts were situated on two small separate exposures on a cattle access track that runs beside, and then down into the drainage channel. The first flake is located on the top of the bank, and comprises a mudstone flake fragment. One additional quartzite flake was identified on the slopes of the bank, 70 m from the first occurrence. It is possible that on the break of the slope along this section of the tributary that further, sub-surface cultural material will occur.

Foot Onslow Creek AS 1 **Open Camp Site**

This site consists of a moderate density open artefact scatter across a wide area on the western bank and a small island of Foot Onslow Creek. The material was identified across the top of the small island and across the top of the western creek bank as a result of erosion caused by cattle trampling. The stone artefacts have been manufactured from various raw materials, including silcrete, quartz, quartzite, mudstone and fine grained volcanic. Most of the artefacts were un-retouched waste flakes. However, two core rejuvenation flakes and a scraper were also recorded. Despite significant erosion along the banks of the creek banks it is likely that undisturbed sections will contain further sub-surface archaeological material.

Foot Onslow Creek IA 1 **Isolated Artefact**

This site is a single stone artefact eroding from the edge of the Foot Onslow Creek bank where the cattle have been accessing the creek channel, trampling the bank and causing erosion and archaeological exposure. It comprises a single quartz flake. It is likely that further sub-surface cultural material would occur along the banks of Foot Onslow Creek, although it may be disturbed by erosional processes and trampling from stock.

Foot Onslow Creek IA 2 **Isolated Artefact**

This site is a single stone artefact eroding from the edge of the Foot Onslow Creek bank where the cattle have been accessing the creek channel, trampling the bank and causing erosion and archaeological exposure. The artefact was a mudstone micro-blade core. It is likely that further sub-surface cultural material would occur along the banks of Foot Onslow Creek, although it may be disturbed by erosional processes and disturbance from stock.

Foot Onslow Creek IA 3 **Isolated Artefact**

This site is a single artefact that was identified eroding from the top 15 cm of the western bank of Foot Onslow Creek. The western banks have been heavily eroded from cattle trampling and water erosion. It is also situated in close proximity to an existing BHP Billiton Illawarra Coal Borehole site. It comprises a large black glass bottle base that appears to have been worked on at least three sides. It was most likely used as a tool itself rather than as a core from which flakes were manufactured. The depth at which the artefact was eroding indicates that it is likely that further sub-surface cultural material would occur along the banks of Foot Onslow Creek, although it may be disturbed by erosional processes and trampling from stock.

Foot Onslow Creek IA 4 **Isolated Artefact**

This site comprises a single stone artefact on the top of the eroded Foot Onslow Creek bank on the eastern side of a small island where the creek is split into two channels. This has been created by a small side drainage line to the east, with the main creek channel occurring to the west. The artefact is a red quartzite flake. Reasonable ground surface visibility occurred along the bank; however no further material could be identified. There is low potential for further artefacts to occur along the bank, although large sections of this have been washed away over time.

Foot Onslow Creek IA 5 **Isolated Artefact**

This site comprises a single stone artefact on a small area of exposure between an existing farm vehicle track and the property boundary fence line. It is 250 m west of Foot Onslow Creek on relatively flat, open grazed paddocks. The artefact is a red silcrete flake. No further cultural material was identified along the exposed fence line and farm vehicle track, and it was determined that it is unlikely that further material will occur here.

Foot Onslow Creek IA 6 **Isolated Artefact**

This site comprises a single ground edge axe on the upper slopes of a moderate ridge at the head of Foot Onslow Creek. The small area of exposure has been created by cattle in an otherwise open grazed paddock. No other cultural material was identified within the area of exposure. The axe appears to have a ground edge however has then been reworked through flake removal and could have been used as a core. It measures 92 mm x 76 mm x 30 mm. The raw material of the naturally rounded pebble appears to be a hard volcanic, sourced from outside the study area. It is unlikely that further material will occur on the upper slope and

that this find is a result of a single event, where the axe has been dropped on route or discarded.

7.2.3 Historic Sites

The current survey resulted in the assessment of previously recorded historical archaeological sites, including the Upper Canal, The Mountbatten Group and the Gilbulla Memorial Conference Centre. Below is a summary of these historic features.

Upper Canal

This site is located 500 m from the end of Longwall 705 at its closest point. The Upper Canal comprises the main alignment (either via tunnel or channel) as well as several individual elements such as overbridges, culverts, aqueducts and flumes. The canal has been constructed form locally quarried rock. The Upper Canal has undergone many modifications since its original construction and no longer functions as it was originally designed to. Along a number of minor tributaries that flow westwards into the Nepean River, extensive quarrying of sandstone has taken place for its use in the construction of the Canal channel.

The Mountbatten Estate Group

Below is a synopsis of the description of the houses from the Australian Heritage Database register listings (http://www.environment.gov.au/cgi-bin/ahdb/search.pl).

Homestead

The homestead has a high pitched slate roof and twelve tall, rendered chimneys. Along the front of the building and returning along the south east is a verandah, with a corrugated iron roof supported by wrought timber posts. French doors with skylights and external shutters flank the central timber four panelled front door that has acid etched sidelights and highlight windows. Two wings form a courtyard at the rear. The roof to the south east wing is slate, and to the north west wing corrugated iron. The house has five bedrooms and two bathrooms, with a central hallway. Ceilings are 4 m high with closed throat cove cornices, indicative of the period. The 300 mm high timber skirtings have lambs tongue details at the top. Most internal joinery appears original, though painted white throughout. The fairly austere marble fire places are not original, but were installed as part of the refurbishment work by Audrey De Graff in 1994.

Kitchen / Bakery

The long, rear wings of the house enclose an attractive courtyard, highlighted at the rear by a bold sandstone rectangular building with a corrugated iron roof. The building is in rock faced ashlar sandstone with a vast external sandstone chimney on the southern wall. Two short gable parapeted walls with openings connect the bakery to the homestead. A set of Moorish style iron gates close one of the openings. Internally, the walls are of exposed sandstone blocks, with a new lined ceiling with exposed timber beams. A timber fire surround

with mantle (not original) is flanked by a small oven and a warming drawer (original). Above the central fire place is the motto "Enough and to Sapre A.D. 1865". Small rectangular openings in the sandstone walls have sash timber windows and the floor is polished timber boards.

Chapel / Stables

Approximately 80 m to the south-west of the homestead lies a rectangular sandstone building of rough pointed ashlar coursing. It has a high circular window in the north and south wall. There are no windows on the eastern wall. The windows on the western wall have fine dressed stone sills and lintels. The small square window on the lower section of the northern wall does not and may have been added when the interior was lined. In 1984, the corrugated iron roof was reportedly new. A skillion roof has been attached to the western wall. A dormer window is set above the skillion roof

The interior of the chapel / stables has not been described since 1984. At that stage it was divided into three rooms and a loft. The northern room 3.9 m x 2.2 m was lined with timber T & G boarding, and timber flooring placed over the original sandstone floor. The central room was unlined and has a stone paved floor with shaped cut-outs indicative of feed troughs. Three air holes approximately 30 cm in diameter in the stone work are located in the lower section of the external wall. Various steel hooks and rings were driven into the stone walls. Various cut-outs in the stone, for the lodging of timber brackets or beams, are evident in all walls. A ladder partially covers the window and leads to the loft above. The ledged and braced door is swung on bank and gudgeon hinges and can be fastened on the outside by a steel pin through a large eyebolt. Two horses could be accommodated in comfort. The southern room measured 4 m x 4 m with a stone paved floor. This room also contains an air vent. It would have been used for cart storage and has double swung doors to allow a clear access. The Loft has a full door to the dormer to allow access for or the feed to be hauled up. No evidence of lifting gear remains. Several references (eg Colonial Heritage p176) indicate that this building was a small stone Chapel used by the De Arrietta family and now extensively altered. The detailing in the sandstone for the air vents and supports for rails for the horse stalls, suggest the original use was for the household carriage and horses, probably built around 1865 when the Bakery was erected.

During the 2006 assessment undertaken by Biosis Research, additional features associated within this group were identified, notably two wells (Biosis Research 2006).

The Gilbulla Memorial Conference Centre

Below is a synopsis of the description of the Gilbulla Memorial Conference Centre from the State Heritage Inventory register listing (http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690092).

Gilbulla was part of the Macarthur estates from the early years of the 19th century. From 1818 there was a small cottage on the property which was situated near an early Cobb & Co

coaching route south. By the 1890s the cottage had been demolished to make way for a more imposing residence, the present Main House built by Major-General the Hon. J.W. Macarthur-Onslow as a home for his family. In 1932 he exchanged house with his unmarried sister, Sibella, who was then living at nearby Camden Park. She was the last Macarthur occupant of the house and was known as "The Lady of the Manor of Menangle". Sibella had wide community interests and worked actively for her 'causes' which included support for the Kimberley Plan for Jewish colonisation in Australia and Red Cross Activities. After her death in 1943, Gilbulla became one of the Red Cross's rehabiliation centres and during this occupation the Long House was constructed. In 1949 the Church of England acquired the house and present grounds from Camden Park Estate as a conference and retreat house which was also a memorial to the wartime work of the clergy of the Church of England, particularly the chaplains during WWII. Sydney clergy at the time provided the labour to build a log chapel. Local timber was used with the bark intact for all except the east wall which is plate glass, and the interior was furnished simply. Additional conference facilities were added in 1978 and a new dining wing in 1981.

8.0 SIGNIFICANCE ASSESSMENT

8.1 Introduction to the Assessment Process

Heritage assessment criteria in NSW fall broadly within the significance values outlined in the Australia ICOMOS Burra Charter (Australia ICOMOS 1999). This approach to heritage has been adopted by cultural heritage managers and government agencies as the set of guidelines for best practice heritage management in Australia. These values include historical, aesthetic, social and scientific significance. The significance of Aboriginal and historic sites and places will be assessed on the basis of the significance values, the details of which are outlined in Appendix 2.

As well as the ICOMOS Burra Charter significance values guidelines, various government agencies have developed formal criteria and guidelines that have application when assessing the significance of heritage places within NSW. Of primary interest are guidelines prepared by the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWH&A) and the NSW Department of Environment and Climate Change (DECC) and the Heritage Branch of the NSW Department of Planning. The relevant sections of these guidelines are detailed in Appendix 2.1. It includes the assessment of Aboriginal significance based on Part 1 of the *DECC Guidelines for Aboriginal Heritage Impact Assessment* (1997), which are based on the ICOMOS Burra Charter significance values. In addition to the previously outlined heritage values, the *DECC Guidelines* also specify the importance of considering cultural landscapes when determining and assessing Aboriginal heritage values (see Appendix 2).

8.1.1 Aboriginal Archaeological Sites - Assessment of Significance

Table 5 presents the results of the significance assessment of the sites recorded within the SMP Area. Of the Aboriginal archaeological sites recorded, 2 (10%) have high significance; 1 (5%) has moderate significance; 3 (15%) has low-moderate significance, and 13 (70%) have low archaeological significance. Updated assessments of significance could not be determined for all previously recorded sites as none could be relocated during the field survey. Using the assessment criteria detailed in Appendix 2.1, information provided in previous archaeological survey reports and details on each registered site cards will assist in detailing the significance rating for each site.

Table 5: Archaeological significance assessment for registered Aboriginal sites identified and considered as part of the proposed Longwall 705-710 study.

SITE NAME	*DISCUSSION OF CONTRIBUTING FEATURES AND ASPECTS*	*ARCHAEOLOGICAL SIGNIFICANCE*
Nepean River No. 8	*General:* This site contains a low density of artefacts in a closed, undisturbed context. There is a limited diversity of artefact types and raw materials present on the surface, however, further subsurface cultural material is highly likely. *Representativeness*: The site contains a low density of flaked stone artefacts, making it a representative example of a common class of sites. *Rarity:* Stone artefact sites of low density within sandstone overhangs are not a rare occurrence. This site provides little value under the rarity criterion. *Research Potential:* The deposit within the shelter is undisturbed and could yield research information on occupation of sandstone overhangs along the Nepean River. *Aesthetic:* The site is situated on the top most cliff line offering views of the Nepean River below, giving the site some aesthetic value.	Moderate
Nepean River No. 4	*General:* This site contains a low density of stone artefacts in a closed, disturbed context. There is a limited diversity of artefact types and raw materials present on the surface. *Representativeness*: The site contains a low density of flaked stone artefacts, making it a representative example of a common class of sites. *Rarity:* Low density stone artefact sites within sandstone overhangs are not a rare occurrence. This site provides little value under the rarity criterion. *Research Potential:* The deposit within the shelter is highly disturbed from human activity and erosion, although some sections of deposit remain intact. The deposit is therefore considered to have some research potential. *Aesthetic:* The site is situated in the steep and dramatic setting of the main cliff line of the Nepean River aesthetic value.	Moderate
Nepean River No. 5	*General:* This site contains a low density of stone artefacts in a closed context. There is a limited diversity of artefact types and raw materials present on the surface. *Representativeness*: The site contains a low density of flaked stone artefacts in a sandstone shelter, making it a representative example of a common class of sites. *Rarity:* Low density stone artefact sites within sandstone overhangs are not a rare occurrence. This site provides little value under the rarity criterion. *Research Potential:* The deposit within the shelter is undisturbed and the deposit is therefore considered to have good research potential. *Aesthetic:* The site is situated in the steep and dramatic setting of the main cliff line of the Nepean River aesthetic value.	Moderate
Nepean River No. 6	*General:* This site contains a low density of stone artefacts in a closed, disturbed context. There is a limited diversity of artefact types and raw materials present on the surface. *Representativeness*: The site contains a low density of flaked stone artefacts, making it a representative example of a common class of sites. *Rarity:* Low density stone artefact sites within sandstone overhangs are not a rare occurrence. This site provides little value under the rarity criterion. *Research Potential:* The deposit within the shelter is highly disturbed from human activity and the deposit is therefore considered to have limited or no research potential. *Aesthetic:* The site is situated at the bottom of a small drainage line giving it no aesthetic value.	Low

SITE NAME	*DISCUSSION OF CONTRIBUTING FEATURES AND ASPECTS*	*ARCHAEOLOGICAL SIGNIFICANCE*
Nepean River No. 7	*General:* This is a well preserved, living scarred tree. It has value as an example of this site type in a specific environmental context, in association with other site types / features (stone artefacts and shelters with art and/or deposit). *Representativeness*: The site is a good example, giving it moderate representative value. *Rarity:* Scarred trees are uncommon in this region. *Research Potential:* The site has low potential beyond its current recording. *Aesthetic:* The site has some value under this criterion due to its relationship with the Nepean River, and surrounding native vegetation.	High
Unit d: Ground Axe Paddock, Didicoolum	*General:* This site comprises only a small number of stone artefacts, no axes could be relocated. The site contains a limited diversity of artefact types and raw materials at the surface. *Representativeness*: The site contains only a small number of stone artefacts, giving it limited value against this criterion. *Rarity:* Stone artefact sites are not rare. *Research Potential:* There is limited potential for intact cultural material due to past land use practices. *Aesthetic:* Located on a farm vehicle track the sites has low aesthetic value.	Low
Unit e: Rubbish Dump, Didicoolum	*General:* This site contains a single grinding groove in an open context in a drainage feature with limited sandstone exposures. *Representativeness*: The site contains only a single grinding groove that could not be relocated and the site is considered to be representative of other grinding groove sites in the region. *Rarity:* In general, such grinding groove sites are not rare. This site provides little value under the rarity criterion. *Research Potential:* There is some potential for additional grinding grooves to occur here, although unlikely. *Aesthetic:* The site is situated at the bottom of a small drainage line giving it no aesthetic value.	Low
Mountbatten 1	*General*: This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located on the upper slopes of a ridge with a vista of the surrounding region, the site has some aesthetic value.	Low
Mountbatten 2	*General:* This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located on the upper slopes of a ridge with a vista of the surrounding region, the site has some aesthetic value.	Low

SITE NAME	*DISCUSSION OF CONTRIBUTING FEATURES AND ASPECTS*	*ARCHAEOLOGICAL SIGNIFICANCE*
Moreton Park Road 4	*General*: This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located in the highly disturbed Telstra easement, the site is considered to have no aesthetic values.	Low
Moreton Park Road 5	*General:* This site contains a low density of stone artefacts in an open, relatively undisturbed context. There is a moderate diversity of artefact types and raw materials present at the surface. *Representativeness*: The site contains a low density of flaked stone artefacts, making it a representative example of a common class of sites. *Rarity:* Low density stone artefact sites above the Nepean River are not uncommon, however, the site remains relatively undisturbed. This site provides limited value under the rarity criterion. *Research Potential:* The site is situated in a relatively undisturbed context and could yield research information on occupation of the Nepean River. *Aesthetic:* The site is situated at the top of a small drainage line giving it limited aesthetic value.	High
Navigation Creek AS 1	*General:* This site contains a low density of stone artefacts in an open, partially disturbed context. There is a moderate diversity of artefact types and raw materials present at the surface. *Representativeness*: The site contains a low density of flaked stone artefacts, making it a representative example of a common class of sites. *Rarity:* Low density stone artefact sites on minor drainage features are uncommon in the immediate region. This site provides some value under the rarity criterion. *Research Potential:* The site is situated in a relatively undisturbed context and could yield research information on occupation of the upper reaches of Navigation Creek and the foot hills of Razorback Range. *Aesthetic:* The site is situated at the banks of a Navigation Creek feeder creek, giving it limited aesthetic value.	Moderate
Navigation Creek IA 1	*General:* This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording.. *Aesthetic:* Located on the upper slopes of a ridge with a vista of the surrounding region, the site has some aesthetic value.	Low

SITE NAME	*DISCUSSION OF CONTRIBUTING FEATURES AND ASPECTS*	*ARCHAEOLOGICAL SIGNIFICANCE*
Foot Onslow Creek AS 1	*General:* This site contains a moderate density of stone artefacts in an open, partially disturbed context. There is a moderate diversity of artefact types and raw materials present at the surface. *Representativeness*: The site contains a moderate density of flaked stone artefacts, making it a representative example of a common class of sites. *Rarity:* Moderate density stone artefact sites on minor drainage features are common in the region. This site provides limited value under the rarity criterion. *Research Potential:* The site is situated in a partially disturbed context and could yield further research information on occupation of the major creeks within the Cumberland Lowlands. *Aesthetic:* The site is situated along the banks of Foot Onslow Creek, giving it limited aesthetic value.	Low
Foot Onslow Creek IA 1	*General*: This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located on the bank of Foot Onslow Creek, the site has no aesthetic value.	Low
Foot Onslow Creek IA 2	*General*: This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located on the bank of Foot Onslow Creek, the site has no aesthetic value.	Low
Foot Onslow Creek IA 3	*General*: This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located on the bank of Foot Onslow Creek, the site has no aesthetic value.	Low
Foot Onslow Creek IA 4	*General*: This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located on the bank of Foot Onslow Creek, the site has no aesthetic value.	Low

SITE NAME	*DISCUSSION OF CONTRIBUTING FEATURES AND ASPECTS*	*ARCHAEOLOGICAL SIGNIFICANCE*
Foot Onslow Creek IA 5	*General:* This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site has a limited number of artefacts and hence low representative value. *Rarity:* Isolated stone artefact occurrences are not rare. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located on an open flat paddock some distance from the creek, the site has little aesthetic value.	Low
Foot Onslow Creek IA 6	*General:* This site contains an isolated artefact occurrence in an open context, giving only limited value under the general criteria. *Representativeness:* The site contains a single artefact, however, the type of artefact present is a representative example a rare class of artefacts, providing some representative value. *Rarity:* Isolated stone artefact occurrences are not rare, however, the identification of this type of stone tool is not common, providing some rarity value. *Research Potential:* Isolated artefacts have limited research potential beyond their basic recording. *Aesthetic:* Located on the upper slopes of a ridge with a vista of the surrounding region, the site has some aesthetic value.	Low

Statement of Cultural Significance

All Aboriginal cultural heritage sites located in the study area are considered to be of cultural significance to the Tharawal Local Aboriginal Land Council and the Cubbitch Barta Native Title Claimants Aboriginal Corporation, and it is important that comment on the area is provided directly by members of these Aboriginal communities. Written comments from these Aboriginal stakeholders are provided in Appendix 1.

In particular, it should be noted here that identified site known as the Upper Nepean Hand Stencils was recorded at the request of some members of the Aboriginal stakeholders who visited the site and indicated to the survey team that the site possessed cultural values. It is therefore considered to have cultural value to the Aboriginal community. The site does not have any archaeological or scientific significance.

The sites are evidence of past Aboriginal occupation and use of the area, and are the main source of information about the Aboriginal past. In addition, any recorded (and unrecorded) pre-contact sites are of cultural significance because they are rare or, at least, uncommon site-types. In particular, many sites in the greater Sydney region have been destroyed as a result of land clearance and land-use practices in the historical period.

Cultural landscape values / significance

We firstly approach the assessment of cultural landscape values by considering the value of the assemblage of sites within the identified SMP Area (study area) – an assemblage of sites in a wider context of other sites, and in the context of the fragmented, localised bushland

environment. It is important to note that the value of the cultural landscape as a social phenomenon does not have to rely on robust archaeological interpretation; but rather is a contemporary expression of value to the Aboriginal community, archaeologists, and the community at large. We believe this is in-line with current approaches and policy directions for the NSW DECC (NSW NPWS n.d., Byrne, Brayshaw and Ireland 2001).

The current study area is situated on the Cumberland Lowlands, between the Woronora Plateau and the Cumberland Plain, in an area that has been subject to moderate levels of disturbance from various land uses including agriculture and housing development. As a landscape, the study area contains limited value as only a small number of archaeological sites occur there and the majority of the study area has been cleared and been subject to some level of disturbance, the effect of which is to fragment and disassociate the sites from each other and the landscape. However, it is situated within a physiographic 'transition' zone, giving it a higher variation of site types, including isolated stone artefacts, open campsites, scarred trees, sandstone overhangs with art and / or deposit. These sites provide a record of Aboriginal use of the study area prior to European arrival in the region. In addition, the presence of many archaeological sites in the region is a well known fact amongst local Aboriginal communities. This gives the landscape value as a well known though often inaccessible (many places being in private land or restricted access areas such as water catchments) cultural resource for the local Aboriginal communities. Overall, the low frequency of known sites and high historical impact to the landscape of the study area suggest it must be considered to have low value as a cultural landscape.

8.2 Historic Sites – Assessment of Significance

8.2.1 Heritage Assessment Criteria

The State Heritage Register, which was established by the amendments to the NSW *Heritage Act* in 1999, has a separate set of significance assessment criteria broadly based on those of the Australia ICOMOS Burra Charter (1999) (see Appendix 2.2 for details of assessment criteria).

8.2.2 Historic sites – assessment of significance

Three heritage items are located within the SMP Study Area. One is listed on the Stage Heritage Register and the other two are listed on the State Heritage Inventory.

State Heritage Register

The Upper Canal Water Supply System

The Upper Canal is significant as a major component of the Upper Nepean Scheme. As an element of this Scheme, the Canal has functioned as part of Sydney's main water supply system for over 120 years. As part of this System, the Canal is associated with Edward Moriarty, Head of the Harbours and Rivers Branch of the NSW Public Works Department. The Canal is aesthetically significant, running a serpentine route through a rural bushland setting as an impressive landscape element with sandstone and concrete-lined edges. The Canal is significant as it demonstrates the techniques of canal building, and evidence of engineering practice. The Canal as a whole is an excellent example of 19th century hydraulic engineering, including the use of gravity to feed water along the canal. The Upper Canal has been assessed as being of *state* significance under all heritage assessment criteria. The listing also includes a number of infrastructure elements, such as flumes, canal overbridges, canal tunnels, culverts, mile markers and aqueducts.

State Heritage Inventory

Gilbulla Memorial Conference Centre

Previous assessment of the Gilbulla Memorial Conference Centre for the Wollondilly Heritage Study was undertaken by JRC Planning Services (JRC 1990). The following Statement of Significance was prepared by JRC (1990) and is presented below in *italics*.

The "Gilbulla" property is historically significant through its associations with the initial pastoral expansion of the area. It has significant links with the Macarthur family extending back to its establishment as part of John Macarthur's estates in the initial decades of the 19th century. In the final years of the century it became home to the Macarthur-Onslow's maintaining the family association for another four decades. Apart from family links the Gilbulla property has more general historical and social significance arising from its various subsequent roles as a Red Cross centre during WWII and as an Anglican conference and

retreat centre which commemorates the role of chaplains during the War. Aesthetically, the Main House and grounds has significance as a grand Edwardian country residence though extensively added to and altered post WWII. It also has significance through its associations with notable architect, Sir John Sulman and its visual similarities to the Menangle Store (http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690092).

The State Heritage Inventory listing information for Gilbulla identifies that the property has: State level historical and aesthetically representative significance; Regional representative significance; and Local level social significance.

Discussion

The assessment of significance for this site considers the property's association with the early settlement of the area and social links with the wider community. Gilbulla's links with the Macarthur family and architect Sir John Sulman result in the Gilbulla property having State wide historical and aesthetically representative significance. The Gilbulla property site is also considered to be socially representative at a Regional level, and to be of Local level social significance (although the Regional significance classification is no longer used by the Heritage Branch). While Gilbulla does contain some values of State significance, the property has not been included on the State Heritage Register or protected under s.60 of the *Heritage Act 1977*. Rather, Gilbulla is afforded statutory protection as per its Local significance values under the *Wollondilly LEP 1990* and the *Environmental Planning and Assessment Act 1979*.

The Mountbatten Group / Moreton Park Group

Previous assessment of the Mountbatten Group for the Wollondilly Heritage Study (JRC 1990) has considered the group and individual buildings / components within the group. The following Statements of Significance have been prepared by JRC (1990) and are presented below in *italics*.

The Mountbatten Group / Moreton Park Group

The Moreton Park property (formerly Mountbatten) is significant because of its historical associations with the early settlement of the Douglas Park area and because of its unusual association with the convict era through its original owner, d'Arietta, and its convict labour force. The property has aesthetic significance as a landmark created by the planting and building cluster on a knoll which is highly visible from the surrounding area (http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690085).

The State Heritage Inventory listing information for this group identifies that the Mountbatten Group has State level historical significance and Regional level aesthetically representative significance.

Moreton Park House

Moreton Park House provides evidence of early and subsequent settlement phases in the area generally, and more particularly of associations with the development of country estates. The house is also of local and regional aesthetic significance as a fine example of a substantial early residence, and more particularly as a good and relative intact representation of a Georgian country homestead, this significance is enhanced by the building's retention of much of its original fabric and features (http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690086).

The State Heritage Inventory listing information for Mountbatten House identifies that the house has State level historical significance and Regional level aesthetically representative significance.

Mountbatten Stone Chapel

Moreton Park's former Chapel building has regional historic significance generally as part of this important early homestead complex, and more particularly as a rare example of a private family chapel. Aesthetically, the building is also locally significant as an interesting representative of the early stone buildings of the area generally and ecclesiastical buildings in particular. Its simplicity of form and detailing befit the nature of its original use, but its significance has been adversely affected by the building's extensive alterations and additions, change of use and deterioration / destruction of original fabric and features (http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690087).

The State Heritage Inventory listing information for the Mountbatten Stone Chapel identifies that the building has Regional level historical significance and Local level aesthetically representative significance.

Mountbatten Garden Building

The Moreton Park Garden building is of social and historic significance generally as a component of the varied group of early structures making up the Moreton Park group, and more particularly as an integral component of the early garden layout. Aesthetically the building is an interesting representative of early 20th century garden structures which retains much of its original form and fabric but whose change of use and altered context have affected its expression of its original role (http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690088).

The State Heritage Inventory listing information for the Mountbatten Garden Building identifies that the building has Local level aesthetically representative significance.

Discussion

The significance that has been placed on the items highlights the association of the site with the early settlement in the area. This statement of significance classed the buildings and the

groups as possessing State, significance against the historical value criterion. The items and group were assessed to have Regional and Local level significance against the aesthetic / representativeness criterion (although the Regional significance classification is no longer used by the Heritage Branch). While the items and group do contain some values of State significance, they have not been included on the State Heritage Register or protected under s.60 of the *Heritage Act 1977*. Rather, the group and items are afforded statutory protection as per their Local Significance values under the *Wollondilly LEP 1990* and the *Environmental Planning and Assessment Act 1979*.

9.0 IMPACT ASSESSMENT

9.1 Potential Subsidence Impacts

The potential impacts that result from subsidence relate to the tilt and strain that occurs during and after the coal has been extracted. The discussion below is based on MSEC (2008) predictions for the proposed 705-710 Longwall mining area.

Subsidence

Subsidence refers to vertical and associated horizontal displacement of a point. In the case of this study it refers to subsidence resulting from the extraction of coal using longwall methods. The magnitude of subsidence is usually expressed in millimeters (MSEC 2008).

Tilt

Tilt is calculated as the change in subsidence between two points divided by the distance between those points. Tilt is, therefore, the first derivative of the subsidence profile. The convention usually adopted is for a positive tilt to indicate the ground increasing in subsidence in the direction of measurement. The maximum tilt, or the steepest portion of the subsidence profile, occurs at the point of inflection in the subsidence trough, where the subsidence is roughly equal to one half of the maximum subsidence. Tilt is usually expressed in millimetres per metre (MSEC 2008).

Strain

Strain is caused by bending and differential horizontal movements in the strata. Measured strain is determined from monitored survey data by calculating the horizontal change in length of a section of a subsidence profile and dividing this by the initial horizontal length of that section. If the section has been extended, the ground is in tension and the change in length and the resulting strain are positive. If the section has been shortened, the ground is in compression and the change in length and the resulting strains are negative. The unit of measurement adopted for strain is millimetres per metre. The maximum strains coincide with the maximum curvature and hence the maximum tensile strains occur towards the sides of the panel whilst the maximum compressive strains occur towards the bottom of the subsidence trough (MSEC 2008).

9.2 Aboriginal Archaeological Heritage Sites

Predicted mining subsidence movements and potential impacts to Aboriginal sites located within the SMP Area have been identified by MSEC (2008). Table 6 below shows the results of the subsidence modelling. The values, given in millimetres per metre, indicate the maximum parameters within a 20 metre radius of each site. The predicted tilts and strains at each site are the maximum values which occur anytime during or after the extraction of the proposed longwalls (MSEC 2008).

Table 6: Maximum cumulative subsidence, tilt and strain predictions for each of the Aboriginal archaeological sites within the SMP Area: Provided by MSEC 2008).

Site Name	Site Type	Maximum Predicted Cumulative Subsidence (mm)	Maximum Predicted Cumulative or Travelling Tilt (mm/m)	Maximum Predicted Cumulative or Travelling Tensile Strain (mm/m)	Maximum Predicted Cumulative or Travelling Compressive Strain (mm/m)
Unit e: Rubbish Dump, Didicoolum	Axe Grinding Groove	1095	3.4	1.2	0.2
Unit d: Ground Axe Paddock, Didicoolum	Open Camp Site	885	3.7	0.4	0.3
Nepean River 4	Shelter with Midden	95	0.8	0.1	<0.1
Nepean River 5	Shelter with Deposit	70	0.6	<0.1	<0.1
Nepean River 6	Shelter with Deposit	120	0.8	<0.1	<0.1
Nepean River 7	Scarred Tree	785	3.3	0.4	0.1
Nepean River No. 8	Shelter with Deposit	<20	<0.1	<0.1	<0.1
Upper Nepean Hand Stencils	Shelter with Non-Aboriginal Hand Stencils	125	0.8	<0.1	<0.1
Morton Park Road 4	Isolated Artefact Occurrence	1275	5.4	1.0	0.5
Morton Park Road 5	Open Camp Site	1135	5.1	1.3	0.4
Mountbatten 1	Open Camp Site	810	2.9	0.3	0.3
Mountbatten 2	Open Camp Site	1230	1.9	0.3	0.2
Foot Onslow Creek AS1	Open Camp Site	1400	1.8	0.4	0.9
Foot Onslow Creek IA 1	Isolated Artefact Occurrence	1085	1.9	0.4	0.3
Foot Onslow Creek IA 2	Isolated Artefact Occurrence	1025	2.8	1.1	0.2
Foot Onslow Creek IA 3	Isolated Artefact Occurrence	1025	5.0	1.2	0.2
Foot Onslow Creek IA 4	Isolated Artefact Occurrence	1390	1.7	0.4	1.4
Foot Onslow Creek IA 5	Isolated Artefact Occurrence	1505	6.8	0.4	1.8
Foot Onslow Creek IA 6	Isolated Artefact Occurrence	1420	1.8	0.4	0.3

There are a total of 12 open stone artefact sites located within the General SMP area, including Unit d: Ground Axe Paddock, Didicoolum, Morton Park Road 4, Morton Park Road 5, Mountbatten 1, Mountbatten 2, Foot Onslow Creek AS1, and Foot Onslow Creek IA 1 to Foot Onslow Creek IA 6. This type of site can be potentially be affected by cracking of surface soils as a result of mine subsidence movements. Soil cracking is dependant on the thickness and inherent plasticity of the soils that overlie the bedrock (MSEC 2008:126-127). The width and frequency of surface cracks is also dependant upon pre-existing jointing patterns in the bedrock. Previous soil cracking in the region has been extremely rare and generally minor when it has occurred. Surface soil cracking is uncommon where mine depths are greater than 500 m, such as they are at Appin Colliery (MSEC 2008:126-127). It is therefore considered unlikely that there will be any subsidence related impact to open artefact scatter sites and isolated artefact occurrences.

One scarred tree (Nepean River 7) is located above the chain and pillar between Longwalls 704 and 705. However, based on previous observations on impacts to trees, it is unlikely that mine subsidence movements will impact on this scarred tree (MSEC 2008:126).

Although the recorded grinding groove site (Unit e: Rubbish Dump, Didicoolum) could not be relocated during the Biosis Research survey in 2006, predictions and impact have been

calculated regardless. The maximum predicted subsidence movements associated with this site are greater than the predicted amounts sufficient to result in fracturing of the bedrock. It is therefore possible that fracturing of the open sandstone bedrock on which the site is alleged to be located might be subject to fracturing and cracking (MSEC 2008: 126).

Although this shelter with non-Aboriginal art site (Upper Nepean Hand Stencils) is considered to be non-Aboriginal in origin and is not a registered archaeological site, subsidence predictions have been calculated, as some Aboriginal stakeholders consider this site to have notable cultural values. The predicted subsidence movements calculated for this site suggest that the risk of impact to this site is negligible (MSEC 2008: 126).

The remaining sites are shelters with deposit or midden (Nepean River 4, Nepean River 5, Nepean River 6 and Nepean River No. 8), two of which are located within the SMP Area and two of which are located on the margin of the SMP Area. The maximum predicted subsidence movements are expected to occur near the base of the Nepean River valley and are not expected to be significant in the locations of these shelters, which are located along the valley sides (MSEC 2008:126). It is unlikely that subsidence will cause impacts to these sites.

In summary, none of the known Aboriginal archaeological sites within the study area are at risk of significant impacts from the proposed mining. Large sections of the longwall goafs occur under pastures and hills with relatively deep soils. These areas are both comparatively less archaeologically rich and less sensitive to subsidence movements because the soil is unconsolidated material with high tolerance limits to subsidence effects.

9.3 Historical Archaeological and Heritage Sites

The Upper Canal

The Upper Canal is situated east of the SMP Area, located at a distance of 500 m east of Longwall 705 at its closest point. As it is located outside the predicted 20 mm subsidence contour, it is unlikely to be subjected to any significant subsidence movements, even if the predicted movements were increased by factors of up to 2 times (MSEC 2008:116). It could however be subject to far-field horizontal movements. As such movements tend to be bodily movements associated with very low levels of strain, it is again unlikely that the canal would be impacted by far-field horizontal movements resulting from extraction of Longwalls 705 to 710 (MSEC 2008:116).

The Canal crosses a number of drainage features, including Leafs Gully, Mallaty and Nepean creeks, and therefore may be subjected to valley related movements and far-field effects (MSEC 2008). Three wrought iron aqueducts associated with the Upper Canal are situated at the Leafs Gully, Mallaty and Nepean creek crossings, just outside the general SMP Area; however, as they cross these drainage features, they could be subject to valley related movements. These features are over 500 m from the end of the longwalls at their closest points. Predicted subsidence movements for the Wrought Iron Aqueducts situated on Leafs

Gully, Mallaty and Nepean creeks indicate unlikely impacts, as they are all located more than 500 m from the proposed longwalls (Table 7).

Table 7: Maximum Predicted Total Subsidence, Upsidence and Closure Movements at the Aqueducts at Leafs Gully, Mallaty and Nepean Creek crossings.

Wrought Iron Aqueduct	Crossing	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Upsidence (mm/m)	Maximum Predicted Total Closure (mm/m)
A4	Mallaty Creek	<5	5	5
A5	Leafs Gully	<5	5	10
A6	Nepean Creek	<5	<5	<5

Other notable features associated with the Upper Canal include two concrete viaducts, three bridges where the Upper Canal maintenance road crosses drainage lines, and Devines Tunnel No 1 and 2, all of which are situated outside the current SMP Area. All of these features could be subject to far-field horizontal movements as a result of the extraction of the proposed longwalls (MSEC 2008: 118-119). However, all of these far-field horizontal movements are expected to be bodily movements associated with very low levels of strain and are unlikely to result in impacts to any of these features.

Heritage Inventory Sites

The Mountbatten Group is located on the south western edge of the study area, outside the limit of 20 mm vertical subsidence. As it is located outside the general SMP Area it is considered unlikely to experience any systematic subsidence movements, or impacts to heritage values resulting from the extraction of the proposed longwalls (MSEC 2008:37).

The Gilbulla Memorial Conference Centre comprises a number of building structures, including the Main House and associated 'Long House', several other buildings used for accommodation and meetings, chapel, library and formal lawns and gardens. The Main House building was constructed in 1899, and is situated just outside of the limit 20 mm vertical subsidence and general SMP Area, while the adjoining 'Long House', built in the 1940s, is situated just within the general SMP Area (MSEC 2008:115; Map 01).

The subsidence predictions for this structure are considered to pose a negligible risk of impact to the site's heritage values as these structures are located 260 m north of Longwall 710 at their closest point (see Table 8.) and it is unlikely that any impact from subsidence will occur.

Table 8. Subsidence prediction for Gilbulla Memorial Conference Centre Main House and associated 'Long House' Wing building (MSEC 2008:115).

Location	Structure	Maximum Predicted Cumulative Subsidence (mm)	Maximum Predicted Cumulative Tilt (mm/m)	Maximum Predicted Cumulative Tensile Strain (mm/m)	Maximum Predicted Cumulative Compressive Strain (mm/m)

Gilbulla Memorial Conference Centre	B14j (Main House and Wing Building)	<20	0.3	0.1	<0.1

9.4 Recommendations

Ideally heritage management involves conservation of sites through the preservation and conservation of fabric and context. In cases where conservation is not possible or practical, several options for management are available. For archaeological sites management often involves mitigation through the salvage of features or artefacts and retrieval of information through excavation or collection, and interpretation, especially where impact cannot be avoided. The impact assessment presented in the previous section demonstrates that, taking into consideration what we know from previous monitoring programs associated with longwall mines, overall there is a low risk of impact to archaeological sites within the proposed Longwall 705-710 area.

Aboriginal archaeological sites

There are nineteen Aboriginal cultural heritage sites, one of which is not considered to be an Aboriginal archaeological site, situated within the General SMP Area.

Aboriginal Recommendations

Based on the subsidence predictions provided by MSEC (2008), it is unlikely that there will be impacts to the archaeological sites resulting from the proposed longwall mining.

Aboriginal archaeological sites that have some potential, however unlikely, to be impacted by the proposed longwall mining, will be subject to monitoring (Figure 5). This will involve a site inspection 3 months prior to extraction and a site inspection at the completion of relevant Longwalls for the following Aboriginal archaeological sites:

- *Nepean River No. 8 (Shelter with Deposit)*
- *Nepean River 4 (Shelter with Midden)*
- *Nepean River 5 (Shelter with Deposit)*
- *Nepean River 6 (Shelter with Deposit)*

Although not considered to be an archaeological site or Aboriginal in origin the monitoring program will also include:

- *Upper Nepean Hand Stencils (Non-Aboriginal Shelter with Hand Stencils)*

If any notable ground surface impacts occur across the undulating open landscape of the Cumberland Lowlands, then such impacts should be considered against the location of all Aboriginal archaeological sites recorded within the study area. No such impacts have ever been recorded in the past and it is extremely unlikely that impacts on surface Aboriginal sites will occur.

Ongoing consultation should continue between BHP Billiton Illawarra Coal, the Tharawal Local Aboriginal Land Council, Cubbitch Barta Native Title Claimants, and DECC as required.

A copy of this report should be distributed to the Registered Stakeholder Aboriginal communities for their review and comment on receipt of final comments from BHP Billiton Illawarra Coal.

Historical archaeological sites

There is one item listed on the NSW State Heritage Register - The Sydney Upper Canal, and there are two items listed on the NSW State Heritage Inventory - The Mountbatten Group and The Gilbulla Memorial Conference Centre.

Historical Recommendations

Upper Canal

It was predicted that the Upper Canal would not be impacted by the proposed longwalls. Pending SCA review of the subsidence predictions, no further archaeological or heritage assessment work is required and there is no requirement for statutory approvals. In all matters relating to the Upper Canal the existing CMP should be followed at all times.

Mountbatten Group

No further archaeological or heritage assessment work is required at the Mountbatten Group. No permits will be required from the NSW Heritage Office for the proposed longwall mining to proceed.

While there are no impacts predicted to any historical heritage items identified in this assessment the items that are associated with the Mountbatten Group will be included into a monitoring regime under the Property Subsidence Management Plan that has been developed in consultation with the property owner.

Gilbulla

No further archaeological or heritage assessment work is required at the Gilbulla Conference Centre. No permits will be required from the NSW Heritage Office for the proposed longwall mining to proceed.

While there are no impacts predicted to any historical heritage items identified in this assessment the items that are associated with the Gilbulla Conference Centre will be included into a monitoring regime under the Property Subsidence Management Plan that has been developed in consultation with the property owner.

REFERENCES

Allen, J. and O'Connell, J.F. 2003, The long and the short of it: Archaeological approaches to determining when humans first colonised Australia and New Guinea. *Australian Archaeology*, Number 57, pp5-19.

AMBS, 1996, *Archaeological Survey of Longwall Mining Application 14 & 15, Tower Colliery, Douglas Park*, Report for BHP Collieries Division.

Attenbrow, V. 2002, *Sydney's Aboriginal Past: investigating the archaeological and historical records*, UNSW Press, Sydney.

Australia ICOMOS 1999, *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter), revised edition*, Australia ICOMOS, Canberra.

Ballyn, S. 2001, "Jean Baptiste Lehimaz De Arrietta", *The La Trobe Journal*, No.68 Spring.

Barralier, F. 1802, *Journal of the expedition into the interior of New South Wales*. Printed in 1975, Marsh Walsh Publishing, Melbourne.

b cubed sustainability 2003a, *Upper Canal Known Drainage Hot Spots Heritage Impact Statement.* Technical report to SMEC Australia and The Sydney Catchment Authority.

b cubed sustainability 2003b, *Upper Canal 17 Flow Control Facilities Heritage Impact Statement*. Technical report to SMEC Australia and The Sydney Catchment Authority.

b cubed sustainability 2003c, *Upper Canal: Aqueduct Scour Valve Access Platforms Heritage Impact Statement.* Technical report to the NSW Department of Commerce and The Sydney Catchment Authority.

Biosis Research 2004, *An Archaeological Reconnaissance Survey of Appin Area 7: Nepean River, New South Wales*. A report to BHP Billiton Illawarra Coal.

Biosis Research 2006a, *Douglas Area 7 Longwalls 701 to 704: Impacts on Indigenous and Historical archaeological sites.* Technical report to BHP Billiton Illawarra Coal.

Biosis Research 2006b, *Douglas Area 7: Impacts of Subsidence on Terrestrial Flora and Fauna.* Report to BHP Billiton Illawarra Coal.

Botanic Gardens Trust 2005, PlantNET - The Plant Information Network System of Botanic Gardens Trust: Version 2.0. 2005. 2005. Sydney, Australia. 2005

Bowdler, S. 1981, 'Unconsidered trifles? Cultural resource management, environmental impact statements and archaeological research in New South Wales', *Australian Archaeology*, vol 12, pp. 123-133.

Branagan, D. & Packham, G. 2000, *Field Geology of New South Wales*, New South Wales Department of Mineral Resources, Sydney.

Browne, John, 1949, "Reminscences of Appin; A paper read before the Campbelltown and Airds Historical Society", June 4, 1949 *Reprint of the Campbelltown and Airds Historical Society Journal and Proceedings*, Volume 1, Number II, Campbelltown.

Burton, C. 1992, 'Chapter 3: Landscape', in Sue Rosen Pty. Ltd. (ed) *Hawkesbury-Nepean Historic Environmental Changes Study. Volume II*, Water Resources Branch - Water Board, Sydney-Illawarra-Blue Mountains.

Byrne, D., H. Brayshaw and T. Ireland 2001. *Social Significance: a Discussion Paper*. NSW National Parks and Wildlife Service, Sydney.

Demkiw, R. 1985. The Koori of the Manhangle: Survey of a Possible Aboriginal Site in the Menangle / Douglas Park Area, New South Wales. Unpublished Manuscript.

Dibden, J. 2001a, *Camden Coal Bed Methane Project Archaeological and Heritage Assessment*. A report to Harvest Scientific Services on behalf of Sydney Gas Operations NL.

Dibden, J. 2001b, *Thirteen Gas Well Sites - Aboriginal Archaeology*. A report to Harvest Scientific Services.

Dibden, J. 2002a, *Camden Coal Bed Methane Project - Kay Park Pipeline Archaeological and Heritage Assessment*. A report to Harvest Scientific Services on behalf of Sydney Gas Operations NL.

Dibden, J. 2002b, *Addendum to Report Camden Coal Bed Methane Project – Kay Park Pipeline Archaeological and Heritage Assessment.* A report to Sydney Gas Operations NL.

Dibden, J. 2003, *Camden Gas Project Stage 2 - Camden, NEW South Wales*. A report to Sydney Gas Operations Pty Ltd.

Dominic Steele Consulting Archaeologists. 2005, *Aboriginal Cultural Heritage Survey and Assessment Report, Camden Gas Project Stage II –EMAI Property Menangle, NSW: Fifteen New proposed Gas Wells and Gathering Systems*. Report for Sydney Gas Joint Venture December 2005.

Douglas Park Public School Centenary Committee, 1983, *Centenary of Public Education, Douglas Park 1883-1983*, Douglas Park Public School Centenary Committee.

Flood, J. 1999, *Archaeology of the dreamtime: the story of prehistoric Australia and its people (revised edition)*, Angus and Robertson, Sydney.

Haglund, L. 1989, *Department of Housing Project 144 Residential Estate - Narellan: Preliminary Archaeological Investigation of Archaeological Sites 2 and 5*. A report to BMIT Chow & Associates.

Hazelton, P.A. & Tille, P.J. 1990, *Soil Landscapes of the Wollongong-Port Hacking 1:100 000 Sheet*, Soil Conservation Service of NSW, Sydney.

Higginbotham, T. 1992, *Heritage Study of the Upper Canal, Prospect Reservoir & Lower Canal (Upper Nepean Scheme) Report in Three Volumes.* Technical report to The Water Board.

Higginbotham, T. 2000, *Statement of Heritage Impact for the Proposed Preventative and Remedial Works to the Upper Canal due to Mine Subsidence, Longwalls 18-22 (Tower Colliery), together with Conservation Management Plan.*

Higginbotham, T. 2001, *Statement of Heritage Impact for the Proposed Preventative and Remedial Works to the Simpson's Creek Aqueduct on the Upper Canal.* Technical report to BHP Illawarra Coal.

Higginbotham, T. 2002, *Conservation Management Plan for the Upper Canal, Pheasant's Nest to Prospect Reservoir, NSW*. Technical report to The Sydney Catchment Authority.

Higginbotham, T. 2004, *Cataract Tunnel, Upper Canal, Brookes Point Road, Near Appin, NSW: Statement of Heritage Impact and Conservation Management Plan for the Proposed Preventative and Remedial Works due to Mine Subsidence. Longwalls 407-408, Appin Colliery.* Technical report to The Sydney Catchment Authority and BHP Illawarra Coal.

Hiscock, P. 1986, 'Technological change in the Hunter River Valley and its implications for the interpretation of late Holocene change in Australia', *Archaeology in Oceania*, vol 21, no 1, pp. 40-50.

Jack, R. I. and D. N. Jeans 1996, *Regional Histories of NSW*. Heritage Office and Department of Urban Affairs and Planning, Sydney.

JMHCM, 1996, *Camden Bush Corridor Management Plan*. An unpublished report for Edaw on behalf of Camden Shire Council.

JMCHM, 1999, *Survey for Archaeological Sites: Proposed Rouse Hill Stage 2 Infrastructure works at Rouse Hill, Parklea & Kellyville, NSW*. Report to GHD.

JMCHM 2007a, *Archaeological investigation of the Turner Road and Oran Park Precincts within the South West Growth Corridor, Camden, NSW*. An unpublished report to APP on behalf of the Growth Centres Commissions and Camden City Council.

JMCHM 2007b, *Archaeological investigation of the Oran Park Precinct within the South West Growth Corridor, Camden, NSW: Stage 2 Report.* An unpublished report to APP on behalf of the Growth Centres Commissions and Camden City Council.

JMCHM 2007c, *Archaeological investigation of the Oran Park Precinct within the South West Growth Corridor, Camden, NSW: Stage 3 Report.* An unpublished report to APP on behalf of the Growth Centres Commissions and Camden City Council.

JRC Planning Services 1993, *Wollondilly Heritage Study.* Technical report to Wollondilly Council and the Department of Planning.

Kohen, J. 1986, *Prehistoric settlement in the West Cumberland Plain: resources, environment and technology.* An unpublished PhD Thesis, Macquarie University, Sydney.

Lambert, D. 1984, Impacts of Subsidence Resulting from Underground Mining on an Aboriginal Rock Art Site Near Buli, NSW. Unpublished paper prepared for NPWS, NSW.

Leary, F. 1972, *Colonial Heritage: historic buildings of New South Wales*, Angus and Robertson.

Liston, C. 1988, The Dharawal and Gandangara in Colonial Campbelltown, New South Wales, 1788-1830. *Aboriginal History 12(1):48-62.*

Lourandos, H. 1983, 'Intensification: a Late Pleistocene-Holocene Archaeological Sequence from Southwestern Victoria', *Archaeology in Oceania* 18: 81-97.

Lourandos, H. and A. Ross 1994, 'The Great Intensification Debate: Its History and Place in Australian Archaeology. *Australian Archaeology* 39:54-63.

Macarthur Regional Organisation of Councils, 2000, *Macarthur Heritage*, Macarthur Regional Organisation of Councils.

Marquis-Kyle, P. & Walker, M. 1992, *The Illustrated Burra Charter: Making Good Decisions about the Care of Important Places*, Australia ICOMOS, Brisbane.

Mathews, R. 1901. 'The Thurrawal Language (including Gundungarra and Dharrak languages, with vocabularies' in *Journal & Proceedings of the Royal Society of New South Wales.* 35:127-160.

Mathews, RH and Everitt, MM 1900 The organisation, language and initiation ceremonies of the Aborigines of the south-east coast of New South Wales. *Journal and Proceedings of the Royal Society of New South Wales* 34:262-281.

McDonald, J. 1992a, 'Chapter 2: Aboriginal Usage of the Hawkesbury-Nepean In Prehistory', in Sue Rosen Pty. Ltd. (ed) *Hawkesbury-Nepean Historic Environmental Changes Study. Volume II*, Water Resources Branch - Water Board, Sydney-Illawarra-Blue Mountains.

McDonald, J. 1992b, *Archaeological Survey of Spring Farm, Camden.* An unpublished report to PPK Consultants, Camden.

McNamara, J.L. 2000, *Life at the Cordeaux River, NSW.*, Mount Kembla, NSW.

McGill, R. 1994, *The Appin Massacre*, Unpublished essay, lodged at Campbelltown Library.

Moloney, J.J. 1929, *Early Menangle*, The Australian Society of Patriots Dally Branch, Newcastle.

MSEC 2005. *The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Surface and Sub-surface Features Due To Mining Longwalls 31 to 33 at West Cliff Colliery in Support of an SMP Application.* Report Prepared for BHP Billiton - Illawarra Coal. Report Number MSEC208, Revision B., Mine Subsidence Engineering Consultants.

MSEC 2007. *The prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Surface Infrastructure resulting from the straction of proposed Longwalls 34 to 46 in Area 5 West Cliff Colliery in support of the SMP Application.* Report prepared for BHP Billiton - Illawarra Coal. Report Number MSEC326, Revision A.

Mylrea, Peter 2000, "Speculation on the Appin Aboriginal Massacre of 1816" Grist Mills Vol 13 No. 3. *Journal of Campbelltown and Airds Historical Society Inc*., December 2000, pp. 57-68.

Mylrea, Peter J. 2002, *Camden District A History to the 1840s*, Camden Historical Society Inc.

Mulvaney , D.J. 1975, *The Prehistory of Australia*, Penguin, Harmondsworth.

Navin Officer 1992, *Archaeological Survey of Alternative Pipeline Easements: Appin - Rosemeadow, Macarthur Water Quality Project, NSW.* A report to Mitchell McCotter & Associates Pty Ltd.

Navin Officer 2002b, *Westcliff Longwall Panels 5A5-5A14, North of Appin: Review of Listed Items of Historic Cultural Heritage*. A report to IEC for BHP Billiton.

Navin Officer 2006, *Gas Turbine Power Station Leafs Gully, NSW - Cultural Heritage Assessment.* A report to URS Australia Pty Ltd.

New South Wales Colonial Secretary Papers 1788-1825, Mitchell Library Microfiche 15.

NSW Heritage Office 1996a, *NSW Heritage Manual*, NSW Heritage Office and Department of Urban Affairs & Planning, Sydney.

NSW Heritage Office 1996b, *Regional Histories of New South Wales*, NSW Heritage Office and Department of Urban Affairs and Planning, Sydney.

NSW NPWS 1997, *National Parks and Wildlife Service 'Guidelines for Archaeological Survey Reporting'*, Cultural Heritage Services Division, Sydney.

NSW NPWS, 1997, *Aboriginal Cultural Heritage Standards and Guidelines Kit.* Hurstville, NSW.

NSW NPWS, 1997, *Part 6 Approvals - Interim Community Consultation Requirements for Applicants (DECC December 2004)*. Cultural Heritage Services Division, Sydney.

NSW NPWS 2002, *Interpretation Guidelines for the Native Vegetation Maps of the Cumberland Plain, Western Sydney*. Threatened Species Unit, Conservation Programs and Planning Division Central Directorate. NSW National Parks and Wildlife Service.

Pearson, M. & Sullivan, S. 1995, *Looking After Heritage Places*, Melbourne University Press, Melbourne.

Proudfoot, Helen, 1973 *Campbelltown, Camden and Appin, Volume 3,"South of Campbelltown to Appin*".

Rosen, S. 1995, *Losing ground: an environmental history of the Hawkesbury-Nepean catchment area.*, Hale & Iremonger, Sydney.

Rosenfeld, A. 1988, *Rock Art Conservation in Australia*, Australian Government Publishing Service, Canberra.

SCT Operations, 2005, *Assessment of Impacts on Archaeological Sites in Appin Area 3*; report prepared for BHP Illawarra Coal.

Sefton, 1988, Site and Artefact Patterns on the Woronora Plateau. M.A. Thesis, University of Wollongong.

Sefton, C. 1995, *Archaeological Investigation of Longwall 27 and future mining Extensions, Appin Colliery*, Report for Colliers Division, BHP Steel.

Sefton, C. 1996, *Archaeological Investigations of Area 4, Appin Colliery*, report for Collieries Division, BHP Australia Coal.

Sefton, C. 1998, *Archaeological Investigation of Longwalls 1-6 Area 5 West Cliff Colliery*, for Collieries Division, BHP Coal.

Sefton, C. 1999, *Archaeological Investigation of Longwalls 18-24 Tower Colliery*, for BHP Coal - Illawarra Collieries,

Sefton, C. 2000, *Overview of the Monitoring of Sandstone Overhangs for the Effects of Mining Subsidence Illawarra Coal Measures*, for Collieries Division, BHP Coal.

Sefton, C, 2002, *Archaeological Investigation of Proposed Longwalls 406 to 408, Appin Colliery*, report for BHP Carbon Steel Materials Illawarra Coal.

Smith, L. J. 1989. *Archaeological site survey and analysis of sites on the Northern Cumberland Plain.* Report prepared for National Parks and Wildlife Service.

Stedinger Associates 2004, *Monitoring Excavations beside the Upper Canal at Menangle Park, Broughton Anglican College Water Main Project.* Technical reprot to Root Projects Australia Pty Ltd.

Sullivan, S. & Bowdler, S. 1984, *Site surveys and Significance Assessment in Australian Archaeology, Proceedings of the 1981 Springwood conference on Australian Prehistory, Research School of Pacific Studies, Australian National University, Canberra*, Research School of Pacific Studies, Australian National University, Canberra.

Tench, Watkin, 1979, *Sydney's first four years: being a reprint of A narrative of the expedition to Botany Bay and, A complete account of the settlement at Port Jackson / by Watkin Tench ; with an introduction and annotations by L.F. Fitzhardinge*, Library of Australian History, Sydney, 174-175.

Tindale, N.B. 1974, *Aboriginal Tribes of Australia*, Australian National University, Canberra.

Turbet, P. 2001, *The Aborigines of the Sydney District Before 1788 - Revised Edition*, Kangaroo Press, Sydney.

Vincent, L. 1995, *Ghost of Picton Past.* Published by Liz Vincent. Picton, NSW, Australia.

Wedderburn Parish Map 1972

Wrigley, J.D. 1988, (Ed.) *Pioneers of Camden* (Including Derivations of Street Names), Camden Historical Society.

Zola, N. and B. Gott 1992, Koorie Plants, Koorie People: Traditional Aboriginal Food, Fibre and Healing Plants of Victoria. Koorie Heritage Trust, Melbourne, Victoria.

Websites

www.lia.nsw.gov.au/facts/history.html LIA 2004, History of Lake Illawarra. Lake Illawarra Authority

http://www.bom.gov.au/weather/nsw/ Bureau of Meteorology website 2007

www.stonequarry.com.au/towns/appin.html Towns and Villages of the Wollondilly Region of NSW, History of Appin

www.sca.nsw. gov.au/dams/history.html Sydney Catchment Authority, Upper Canal

http://www.illawarracoal.com An Unofficial History of Coal Mining in the Illawarra

http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690092 Heritage Branch, NSW Department of Planning, Accessed 20 June 2008

http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690085 Heritage Branch, NSW Department of Planning, Accessed 20 June 2008

http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690086 Heritage Branch, NSW Department of Planning, Accessed 20 June 2008

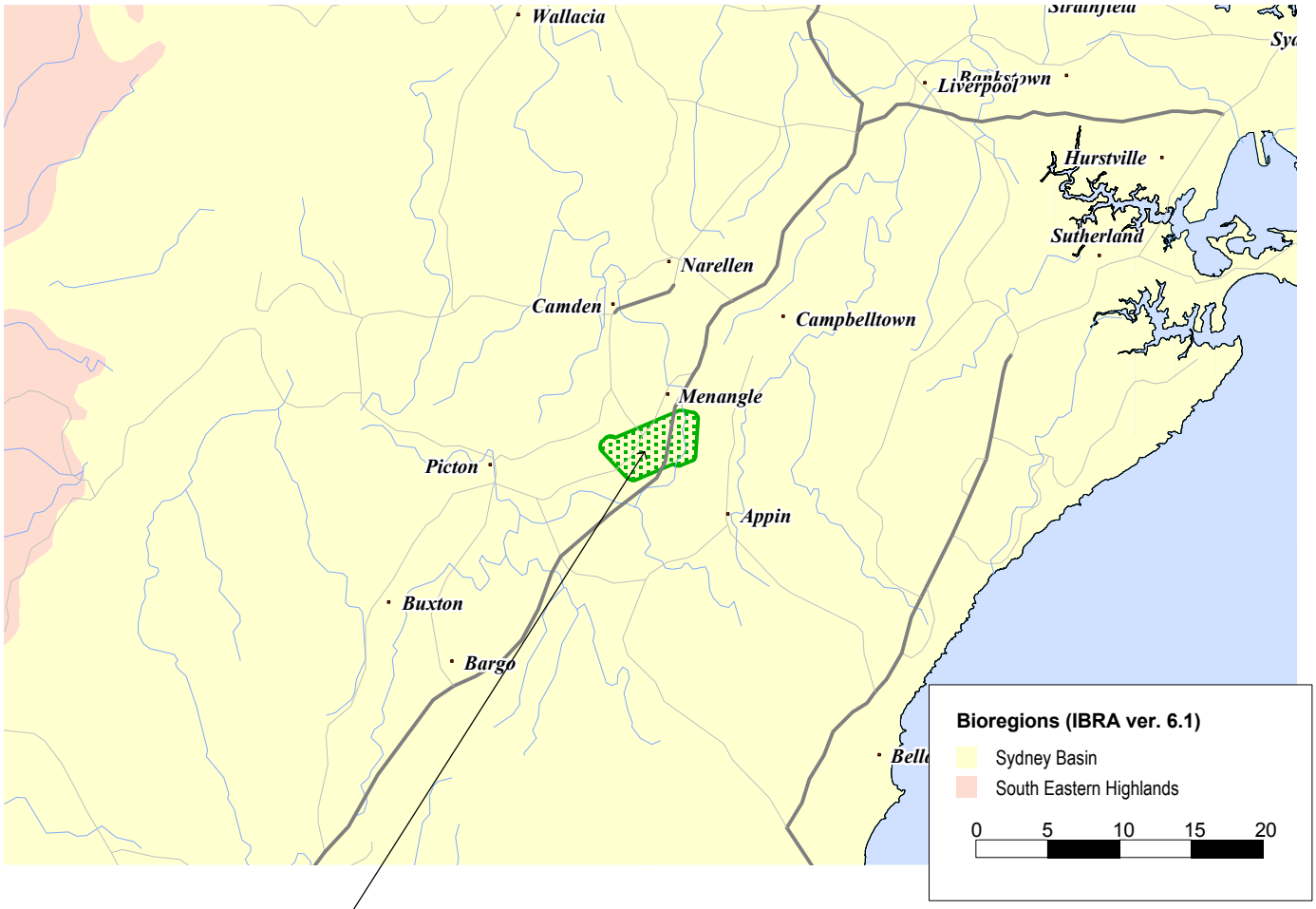
http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690087 Heritage Branch, NSW Department of Planning, Accessed 20 June 2008

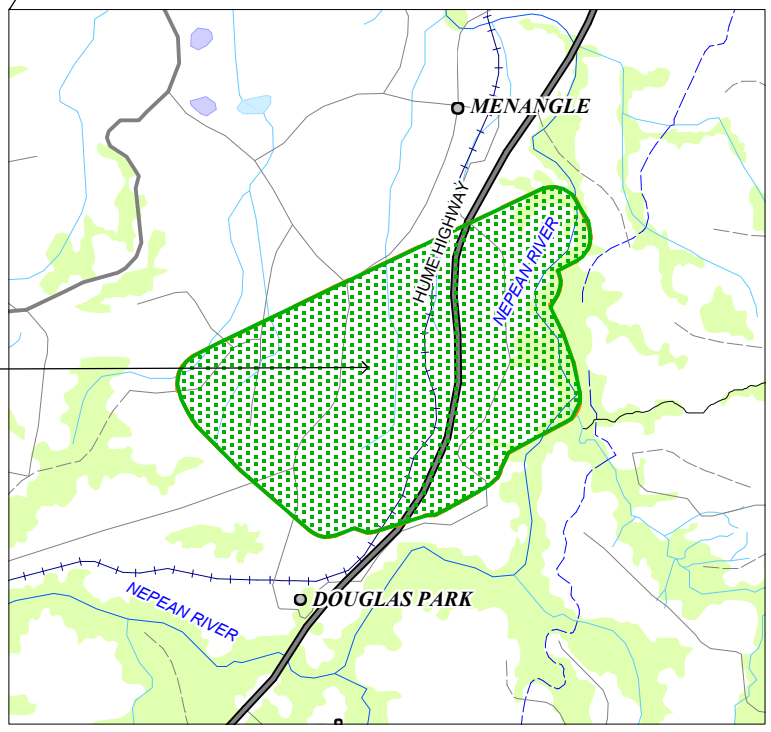
http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690088 Heritage Branch, NSW Department of Planning, Accessed 20 June 2008

http://www.heritage.nsw.gov.au/07_subnav_01_2.cfm?itemid=2690092 Heritage Branch, NSW Department of Planning, Accessed 20 June 2008

http://www.environment.gov.au/cgi-bin/ahdb/search.pl Department of Environment, Water, Heritage and the Arts, Accessed 20 June 2008

FIGURES





Study area

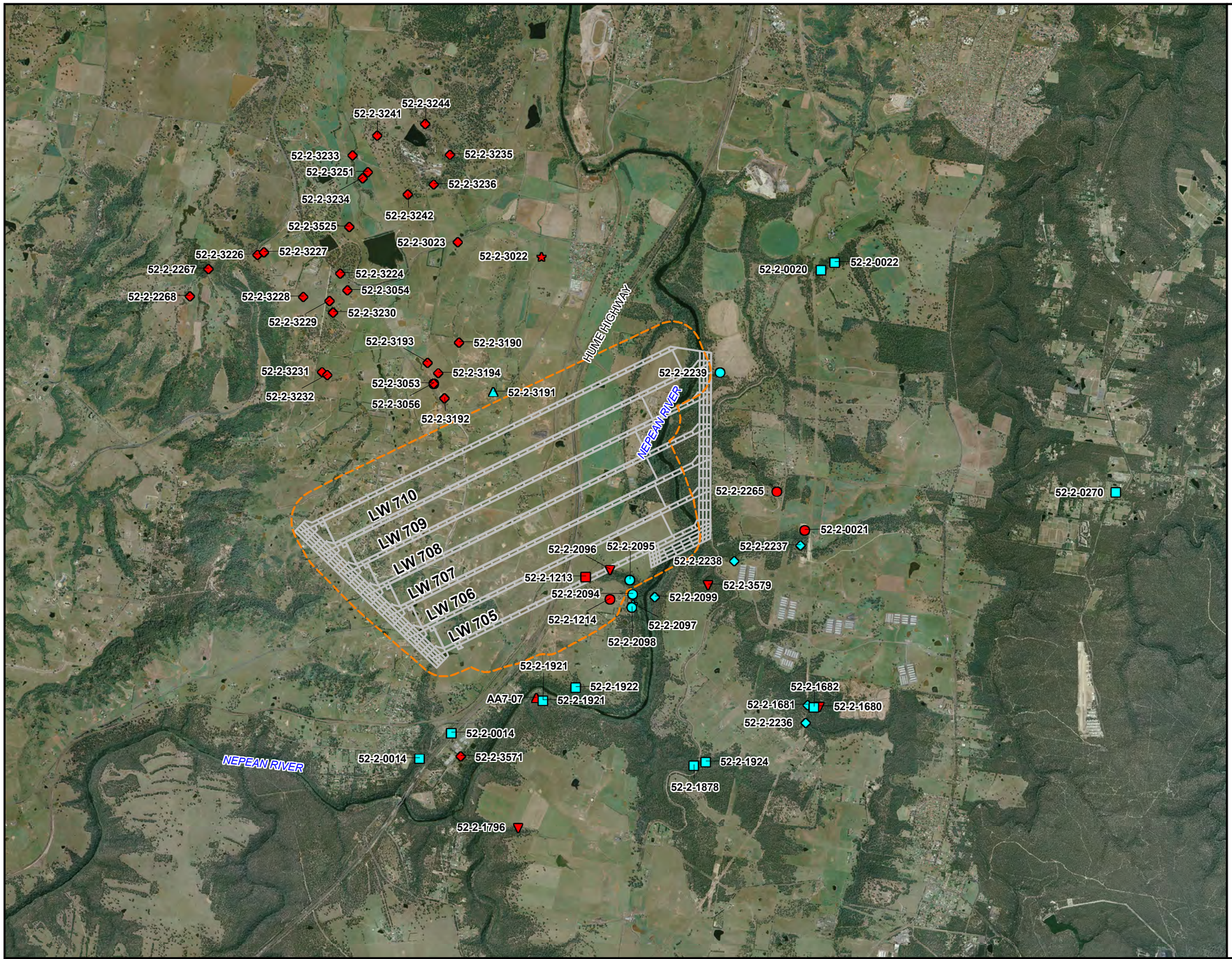
BIOSIS RESEARCH Pty. Ltd.
8 Tate St
WOLLONGONG
NEW SOUTH WALES 2500

Figure 1: Location of the Study Area in a regional context.

Date: 20 June 2008
Checked by: MT
File number: S4970
Loc:-...\4000\4900\4970\MApping\reportS4970F1_region.WOR

Scale: 0 1 2 3 4 kilometres

N W E S



Legend

AHIMS site types

- Axe Grinding Groove
- None
- Open Camp Site
- PAD
- Rock overhang with PAD
- Scarred Tree
- Shelter with Art
- Shelter with Art, Shelter with Deposit
- Shelter with Deposit
- Shelter with Midden
- Stone Artefact

Survey Areas

- SMP Area
- Proposed Mine Layout

Acknowledgements: BHPB/Illawarra Coal and DECC

BIOSIS RESEARCH Pty. Ltd.

8 Tate Street
Wollongong
NEW SOUTH WALES 2500

Figure 2: AHIMS search results within 2km of the Study Area.

Date: 20 June 2008

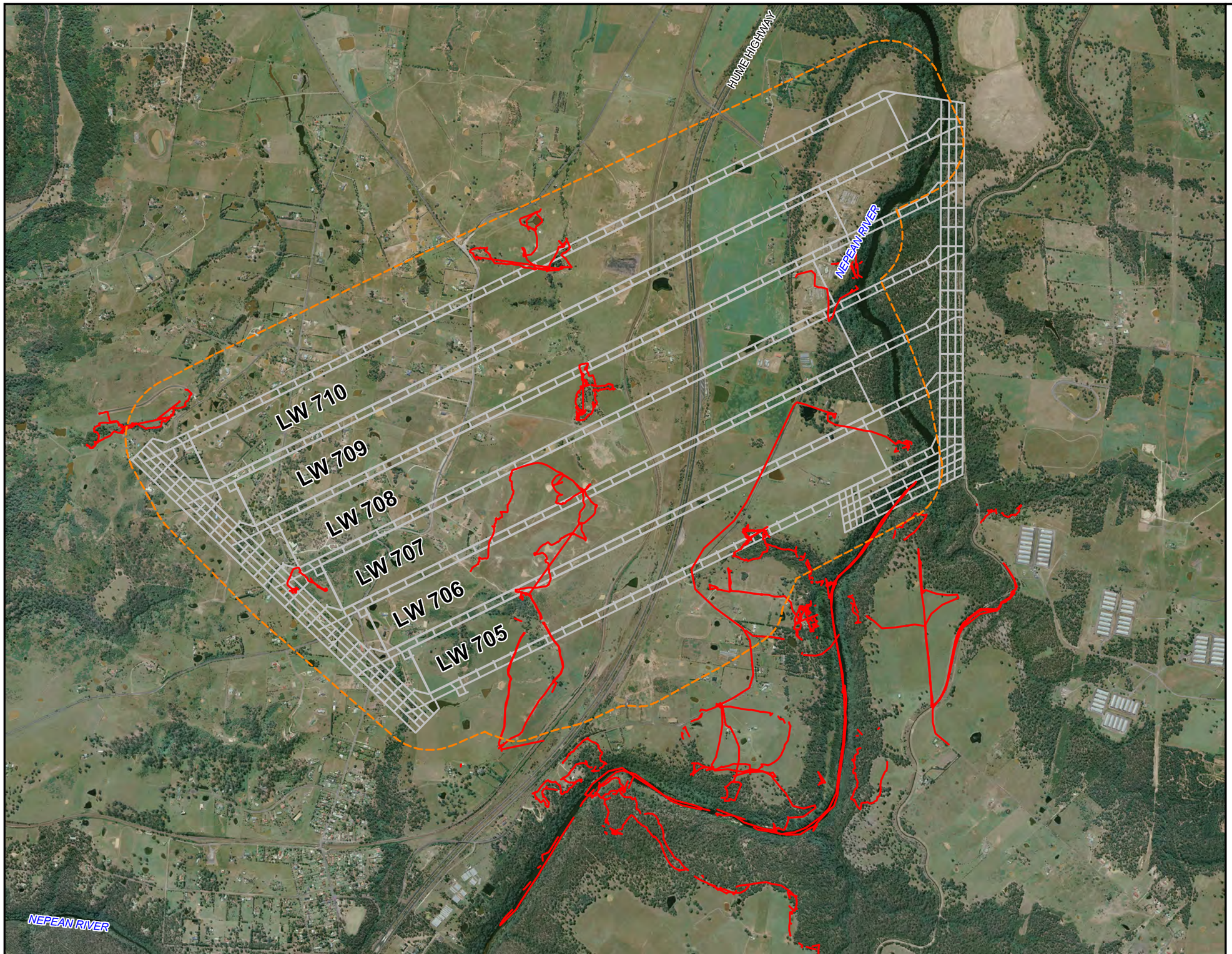
Checked by: MT | File number: S4970

Location:-..4000\4900s\4970\Mapping\report\S4970 F2_AHIMS.WOR

Scale: 0 0.5 1.0 1.5 2.0 2.5 kilometres

N W E S

Figure 2: AHIMS search results within 2km of the Study Area.



Legend

- Survey Transects
- SMP Area (20mm)
- Proposed Mine Layout

Acknowledgements: BHPB/Illawarra Coal
This product incorporates Data which is copyright to the Commonwealth of Australia (c.2003-)

BIOSIS RESEARCH Pty. Ltd.

8 Tate Street
Wollongong
NEW SOUTH WALES 2500

Figure 3: Survey transects

Date: 20 June 2008

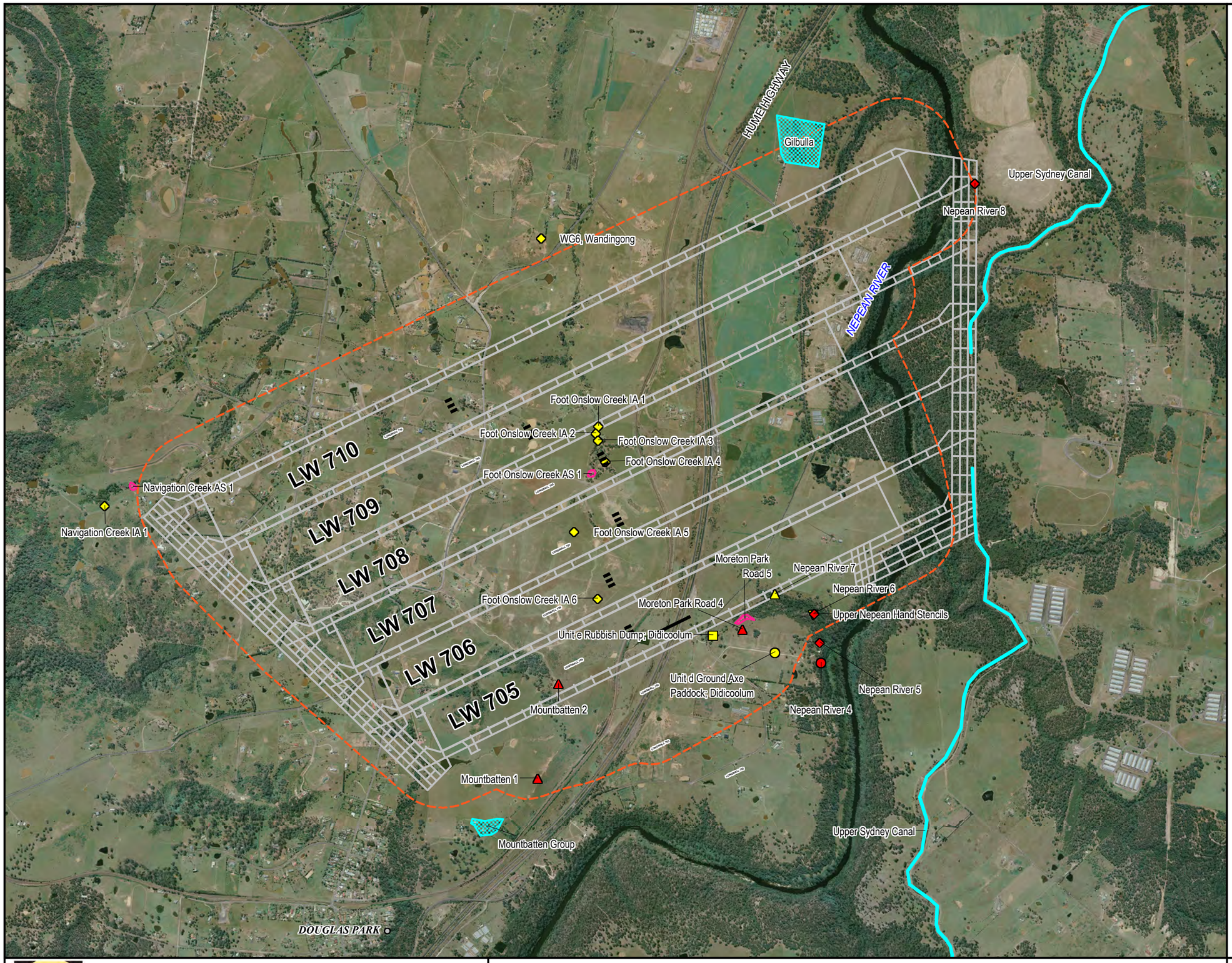
Checked by: MT | File number: S4970

Location:-..4000\4900s\4970\Mapping\report\S4970 F3_survey.WOR

Scale: 0 0.25 0.5 0.75 1.0 1.25 kilometres

N W E S

Figure 3: Survey transects



Legend

Aboriginal site

- Axe Grinding Groove
- Isolated Artefact
- Open Camp Site
- Scarred Tree
- Shelter with Art
- Shelter with Art, Shelter with Deposit
- Shelter with Deposit
- Shelter with Midden
- Stone Artefact

Heritage areas

- Artefact Scatter
- Historic site

Survey areas

- SMP Area (20mm)
- Proposed Mine Layout

Acknowledgements: BHPB/Illawarra Coal
This product incorporates Data which is copyright to the Commonwealth of Australia (c.2003-)

BIOSIS RESEARCH Pty. Ltd.
8 Tate Street
Wollongong
NEW SOUTH WALES 2500

Figure 4: Aboriginal and historic sites within the Study Area.

Date: 20 June 2008
Checked by: MR/MT
File number: S4970
Location:-..4000\4900s\4970\Mapping\S4970 F4_sites.WOR

Scale: 0 0.25 0.5 0.75 1.0 1.25 kilometres

N W E S

Figure 4: Aboriginal and historic sites . within the Study Area.

Legend

Monitored Aboriginal sites

- Shelter with Art
- Shelter with Deposit
- Shelter with Midden

Survey areas

- SMP Area (20mm)
- Proposed Mine Layout

Acknowledgements: BHPB/Illawarra Coal
This product incorporates Data which is copyright to the Commonwealth of Australia (c.2003-)

BIOSIS RESEARCH Pty. Ltd.

8 Tate Street
Wollongong
NEW SOUTH WALES 2500

Figure 5: Monitored Aboriginal sites.

Date: 20 June 2008

Checked by: MR/MT | File number: S4970

Location:-..4000\4900s\4970\Mapping\S4970 F5_Monitored sites.WOR

Scale: 0 0.25 0.5 0.75 1.0 1.25 kilometres

N W E S

Figure 5: Monitored Aboriginal sites.

APPENDICES

APPENDIX 1:

1.0 ABORIGINAL COMMUNITY COMMENT

TO BE INCORPORATED WHEN RECEIVED.

APPENDIX 2:

2.0 ASSESSMENT OF SIGNIFICANCE

2.1 Significance Assessment Process

Heritage assessment criteria in NSW fall broadly within the significance values outlined in the Australia ICOMOS Burra Charter (Australia ICOMOS 1999). This approach to heritage has been adopted by cultural heritage managers and government agencies as the set of guidelines for best practice heritage management in Australia. These values include:

- **historical** significance (evolution and association) refers to historic values and encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the 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.

- **aesthetic** significance (Scenic/architectural qualities, creative accomplishment) refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.

- **social** significance (contemporary community esteem) refers to the spiritual, traditional, historical or contemporary associations and attachment that the place or area has for the present-day community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed. These aspects of heritage significance can only be determined through consultative processes with local communities.

- **scientific** significance (Archaeological, industrial, educational, research potential and scientific significance values) refers to the importance of a landscape, area, place or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.

The significance of Aboriginal and historic sites and places will be assessed on the basis of the significance values outlined above. As well as the ICOMOS Burra Charter significance values guidelines, various government agencies have developed formal criteria and guidelines that have application when assessing the significance of heritage places within NSW. Of

primary interest are guidelines prepared by the Commonwealth Department of Environment, Water, Heritage and the Arts(DEWH&A) and the NSW Department of Environment and Climate Change (DECC) and the Heritage Branch, NSW Department of Planning. The relevant sections of these guidelines are presented below.

Aboriginal Sites – Assessment of Significance

The following Aboriginal significance assessment is based on Part 1 of the *DEC Guidelines for Aboriginal Heritage Impact Assessment* (1997). These guidelines state that an area may contain evidence and associations which demonstrate one or any combination of the ICOMOS Burra Charter significance values outlined above in reference to Aboriginal heritage. Reference to each of the values will be made when evaluating Aboriginal significance for sites and places.

In addition to the previously outlined heritage values, the *DEC Guidelines* also specify the importance of considering cultural landscapes when determining and assessing Aboriginal heritage values. The principle behind a cultural landscape is that 'the significance of individual features is derived from their inter-relatedness within the cultural landscape'. This means that sites or places cannot be 'assessed in isolation' but must be considered as parts of the wider cultural landscape. Hence the site or place will possibly have values derived from its association with other sites and places. By investigating the associations between sites, places, and (for example) natural resources in the cultural landscape the stories behind the features can be told. The context of the cultural landscape can unlock 'better understanding of the cultural meaning and importance' of sites and places.

Although other values may be considered – such as educational or tourism values – the two principal values that are likely to be addressed in a consideration of Aboriginal sites and places are the cultural/social significance to Aboriginal people and their archaeological or scientific significance to archaeologists. The former is discussed in greater depth below, as it is more comprehensively addressed in the Guidelines for Aboriginal Impact Assessment. However we note here that it is best practice for archaeologists when undertaking significance assessments to keep in mind that scientific assessments are part of a larger picture.

The determinations of Aboriginal significance for sites and places will then be expressed as *statements of significance* that preface a concise discussion of the contributing factors to Aboriginal cultural heritage significance. Nomination of the level of value—high, moderate, low or not applicable—for each relevant category will also be proposed and presented in a summary table.

Aboriginal community or cultural values

The NSW DECC recognises that 'Aboriginal community are the primary determinants of the significance of their heritage' (NSW DEC 2004). Biosis Research recognises that our role in the cultural heritage assessment process is to provide specialist skills, particularly in regard to archaeological and heritage management expertise. These specialist skills can be articulated

and enhanced through consultation with the Aboriginal community, with the aim of providing a comprehensive assessment of cultural heritage significance.

The heritage assessment criteria outlined above that relate to community or cultural values include social, historic and aesthetic value. Social and aesthetic values are often closely related. Social value refers to the spiritual, traditional, historical or contemporary associations and attachment that the place or area has for the present-day Aboriginal community. Aesthetic values related to Aboriginal sites and places that may contain particular sensory, scenic, architectural and creative values and meaning to Aboriginal people. Historic value refers to the associations of a place with a person, event, phase or activity of importance to the history of an Aboriginal community. Gaining a sufficient understanding of this aspect of significance will often require the collection of oral histories and archival or documentary research, as well as field documentation. Places of post-contact Aboriginal history have generally been poorly recognised in investigations of Aboriginal heritage, and the Aboriginal involvement and contribution to important regional historical themes is often missing from accepted historical narratives.

These aspects of heritage significance can only be determined through consultative processes with one or more Aboriginal communities. In terms of Aboriginal communities, heritage places – including those that are otherwise defined as 'archaeological sites' – will always attract differing values. These may include custodianship obligations, education, family or ancestral links, identity, and symbolic representation. History and traditions are important: this generation has an obligation to future generations to retain certain things as they are currently seen and understood. This includes retaining alternative understandings to those that come through scientific assessments. Heritage places are often more complex than is identified through the scientific determination of value. Cultural and social values can be complex and rich - the past is a vital component of cultural identity. Feelings of belonging and identity are reinforced by knowledge of the existence of a past, and this is further reinforced and maintained in the protection of cultural heritage.

Statement of Cultural Significance

All Aboriginal cultural heritage sites located in the study area are considered to be of cultural significance to the Tharawal Local Aboriginal Land Council and the Cubbitch Barta Native Title Claimants Aboriginal Corporation, and it is important that comment on the area is provided directly by members of these Aboriginal communities. The sites are evidence of past Aboriginal occupation and use of the area, and are the main source of information about the Aboriginal past. In addition, any recorded (and unrecorded) pre-contact sites are of cultural significance because they are rare or, at least, uncommon site-types. In particular, many sites in the greater Sydney region have been destroyed as a result of land clearance and land-use practices in the historic period.

Aboriginal (Scientific) Significance

Archaeological significance (also called scientific significance) refers to the value of archaeological objects or sites as they relate to research questions that are of importance to the archaeological community, including indigenous communities, heritage managers and academic archaeologists. Generally the value of this type of significance will be determined on the basis of the potential for sites and objects to provide information regarding the past life-ways of people (Burke and Smith 2004: 249, NPWS 1997). For this reason, the NSW NPWS summarises the situation as 'while various criteria for archaeological significance assessment have been advanced over the years, most of them fall under the heading of archaeological research potential' (NPWS 1997: 26). The NPWS criteria for archaeological significance assessment are based largely on the Register of the National Estate Criteria, and under the heading of 'research potential' include the following aspects and definitions (NPWS 1997):

General site considerations, including factors such as:

- *Site intactness or integrity:* This includes the state of preservation of archaeological objects, as well as the stratigraphic integrity of the site, the taphonomic processes acting on the site, the impact of past artefact collections made at the site.

- *The connectedness* of the site to other sites – when considered as part of a larger assemblage or landscape the site may have greater research potential than if it was simply considered in isolation.

- *Chronological potential* refers to the potential of a site to provide a dateable framework extending back into the past. The potential antiquity of a site is also an important consideration, as older sites are relatively less common than younger sites. In many cases stratified, dateable artefact bearing deposits are sufficiently rare to be a very valuable resource.

Representativeness

- *Representativeness* refers to the ability of a site or object to serve as a representative example of sites in the same class. This aspect of value is only meaningful when considered in conjunction with a conservation goal, and must be determined against the archaeological record at various scales of consideration - local, regional and continental for example. It takes into account site and object variability, connectedness and a consideration of what is already, and likely to be, conserved. Burke and Smith (2004: 247) define representativeness as 'an assessment of whether or not a place is a good example of its type, illustrating clearly the attributes of its significance.'

Rarity

- *Rarity* is, of course, closely related to representativeness (if a site is rare, it is likely to have high representative value), and will include a consideration of those issues

discussed under general site considerations. In many ways, the determination of rarity is a summation of exceptional research potential, or a representative of a small class of sites or objects. Burke and Smith (2004: 247) further describe rarity as 'an assessment of whether the place represents a rare, endangered or unusual aspect of our history or cultural environment that has few parallels elsewhere.'

Research Potential

Research potential is essentially a summation of the above values in the general, representativeness and rarity criteria (NPWS 1997). Pearson and Sullivan note that Aboriginal archaeological sites are generally of high research potential because 'they are the major source of information about Aboriginal prehistory'(1999: 149). Indeed, the often great time depth of Aboriginal archaeological sites gives them research value from a global perspective, as they are an important record of humanity's history. Research potential can also refer to specific local circumstances in space and time – a site may have particular characteristics (well preserved samples for absolute dating, or a series of refitting artefacts, for example) that mean it can provide information about certain aspects of Aboriginal life in the past that other less or alternatively valuable sites may not (Burke and Smith 2004: 247-8). When determining research potential value particular emphasis has been placed on the potential for absolute dating of sites.

In addition to the research potential related value factors, the NSW NPWS (1997: 32) also discuss *Educational Potential* and *Aesthetic Significance*, as items that may be included in scientific significance. The NPWS general advice is that archaeologists should give careful consideration prior to attempting to determine educational and aesthetic values (NPWS 1997: 32). We make no attempt to determine educational potential of sites under scientific assessment, but do consider educational value as a contributing factor that may be included in an assessment of social significance by the Aboriginal community.

Aesthetic values

There is a diverse yet accessible literature regarding identifying aesthetic values and determining aesthetic significance (Burke and Smith 2004: 248-9, Kerr 1996: 15-16, Pearson and Sullivan 1999: 134-8). It is generally agreed that aesthetic values are an important part of cultural heritage significance, however they are dependent on an individual's sensory response, which means determining aesthetic value is fraught with difficulty, and should be applied on a case-by-case basis as it is not always a value applicable to archaeological sites (Burke and Smith 2004: 248). However, when dealing with shelter and rock art sites aesthetic values and landscape context are an important consideration. The question 'does the place have a relationship between its parts and the setting which reinforces the quality of both', while originally proposed in an architectural context (Kerr 1996: 15), is relevant also for rock art and shelter sites in a bushland setting where there is often an important relationship between the cultural site and natural environment.

2.2 Historic Sites – Assessment of Significance

The State Heritage Register, which was established by the amendments to the NSW *Heritage Act* in 1999, has a separate set of significance assessment criteria broadly based on those of the Australia ICOMOS Burra Charter (1999).

To be assessed for listing on the State Heritage Register an item will need to meet one or more of the following criteria:

CRITERION	*DESCRIPTION*	*CATEGORY*
A	An item is important in the course, or pattern, of NSW's cultural or natural history;	Nature of
B	An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history;	Nature of
C	An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;	Nature of
D	An item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons;	Nature of
E	An item has the potential to yield information that will contribute to an understanding of NSW's cultural and natural history;	Nature of
F	An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history;	Comparative
G	An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural or natural environments.	Comparative

Table 9 : Criteria for the assessment of historic cultural heritage

Amendments to the *Heritage Act* clarify and strengthen responsibility for the management of heritage items at the Local and State level. Consequently, items can be assessed as having **Local** or **State** level significance. Items should also be assigned a grading, in order to better explain its place within a cultural landscape. Criteria for grading an item or place are discussed below.

An item cannot be excluded from listing on the State Heritage Register on the basis that items with similar characteristics have already been listed. These criteria can be applied to items of State and Local significance.

These assessment criteria are useful in considering a wide range of heritage items, and may be applied to sites with items of standing heritage as well as areas with the potential to contain archaeological deposits.

APPENDIX 3:

3.0 LEGISLATION

COMMONWEALTH LEGISLATION

ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

In January 2004 the Commonwealth *Australian Heritage Commission Act 1975* was repealed and in its place amendments to the EPBC Act were made. The amendments were contained in three new pieces of Commonwealth Heritage Legislation. The three new Acts are the:

1. Environment and Heritage Legislation Amendment Act (No. 1) 2003 which:

   (a) amends the Environment Protection and Biodiversity Conservation Act 1999 to include 'national heritage' as a new matter of National Environmental Significance and protects listed places to the fullest extent under the Constitution

   (b) establishes the National Heritage List

   (c) establishes the Commonwealth Heritage List

2. Australian Heritage Council Act 2003 which establishes a new heritage advisory body to the Minister for the Environment and Heritage, the Australian Heritage Council, and retains the Register of the National Estate.

3. Australian Heritage Council (Consequential and Transitional Provisions) Act 2003 which repeals the Australian Heritage Commission Act, amends various Acts as a consequence of this repeal and allows for the transition to the new heritage system.

Any place that has been nominated and assessed as having cultural heritage significance at a national level can be added to the National Heritage List.

Under the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) an action requires approval from the Federal Environment Minister if the action will, or is likely to, have a significant impact on a matter of national environmental significance. Matters of national environmental significance relating to cultural heritage are:

- World Heritage Places, and
- National Heritage Places.

An action includes a project, development, undertaking, activity, or series of activities.

Actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land), and actions taken by the Commonwealth that are likely to have a significant impact on the environment anywhere in the world, may also require approval under the EPBC Act.

NATIVE TITLE ACT 1993

The Commonwealth Native Title Act establishes the principles and mechanisms for the preservation of Native Title for Aboriginal people.

Under Subdivision P of the Act, *Right to negotiate*, native title claimants can negotiate about some proposed developments over land and waters (known as 'Future Acts') if they have the right to negotiate. Claimants gain the right to negotiate if their native title claimant application satisfies the registration test conditions.

The right to negotiate applies over some proposed developments or activities that may affect native title. These are known as future acts under the Native Title Act 1993. Native title claimants only have the right to negotiate over certain types of future acts, such as mining. Activities such as exploration and prospecting on the land do not usually attract the right to negotiate.

The right to negotiate is not a right to stop projects going ahead — it is a right to have a say about how the development takes place. In some situations, the right to negotiate does not apply. In these circumstances, claimants may have the right to be notified, to be consulted, to object and to be heard by an independent umpire.

The right to negotiate is triggered when a government issues a notice to say that it intends to allow certain things to happen on land, such as granting a mining lease. This notice is called a 'section 29 notice.

People who claim to hold native title in the area, but have not yet made a native title claimant application, have three months from the date given in the section 29 notice to file a claim if they want to have a say about the proposed development. To get the right to negotiate, the claim must be registered within a month after that.

If the right to negotiate applies, the government, the developer and the registered native title parties must negotiate 'in good faith' about the effect of the proposed development on the registered native title rights and interests of the claimants.

The parties can ask the National Native Title Tribunal to mediate during the negotiations.

If the negotiations do not result in an agreement the parties can ask the Tribunal (no sooner than six months after the notification date) to decide whether or not the future act should go ahead, or on what conditions it should go ahead.

The National Native Title Tribunal administers the future act processes under the Commonwealth legislation. The Tribunal's role includes mediating between parties, conducting inquiries and making decisions (called 'future act determinations') where parties can't reach agreements.

When the Tribunal receives a future act determination application, it must conduct an inquiry (an arbitration) in order to determine whether the future act can be done and if so whether any conditions should be imposed.

A member of the Tribunal (or a panel of three members) will be appointed to conduct the inquiry, and will initially hold a preliminary conference and set directions for the parties to provide submissions and evidence. Members who have mediated a particular matter are not usually appointed as inquiry members. Inquiry members conduct hearings, receive submissions and evidence from the parties and take into account matters set out in section 39 of the Native Title Act such as:

- the effect of the future act on the enjoyment by the native title party of their registered native title rights and interests; their way of life, culture and traditions; the development of their social, cultural and economic structures; their freedom of access to the land and freedom to conduct ceremonies and other cultural activities; and the effect of the future act on any area or site of particular (special) significance to the native title party;
- the interests, proposals, opinions or wishes of the native title party;
- the economic or other significance of the future act;
- the public interest; and
- the presence of any existing non-native title rights and interests and use of the land by other persons (for instance, pastoralists).

ABORIGINAL AND TORRES STRAIT ISLANDER HERITAGE PROTECTION ACT 1984

The Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act* 1984 provides protection for Aboriginal cultural property. Whereas the State Act provides legal protection for all the physical evidence of past Aboriginal occupation, the Commonwealth Act deals with Aboriginal cultural property in a wider sense. Such cultural property includes any places, objects and folklore that ‘are of particular significance to Aboriginals in accordance with Aboriginal tradition’. There is no cut-off date and the Act may apply to contemporary Aboriginal cultural property as well as ancient sites.

PROTECTION OF MOVABLE CULTURAL HERITAGE ACT 1986

Australia's movable cultural heritage is protected at both Commonwealth and State levels. This web site only provides information on the Commonwealth laws.

In 1970 the United Nations Educational, Scientific and Cultural Organisation (UNESCO) adopted the UNESCO Convention on the Means of Prohibiting the Illicit Import, Export and Transfer of Ownership of Cultural Property. Australia ratified the convention by passing the *Protection of Movable Cultural Heritage Act 1986* (the Act), giving the 1970 Convention force in Australian law.

The Act regulates the export of Australia's significant cultural heritage objects. It is not intended to restrict normal and legitimate trade in cultural property and does not affect an individual's right to own or sell within Australia.

It implements a system of export permits for certain heritage objects defined by the Act as 'Australian protected objects'. Australian protected objects are objects which form part of the movable cultural heritage of Australia and which meet the criteria established under the National Cultural Heritage Control List. The Control List is located in the Regulations to the Act, and divides Australian protected objects into two classes:

- Class A objects which may not be exported
- Class B objects which may be exported if granted a permit under the Act.

A person wishing to export a Class B object is required to apply for a permit in writing. Applications are processed in accordance with the legislative process established under section 10 of the Act.

Certificates of Exemption, granted under section 12 of the Act, allow Australian protected objects that are currently overseas to be imported into Australia and subsequently re-exported. This includes Class A objects.

The Act also includes provisions that allow Australia to respond to an official request by a foreign government to return movable cultural heritage objects that have been illegally exported from their country of origin.

The *Protection of Movable Cultural Heritage Act 1986* is administered by the Minister for the Environment and Heritage. This responsibility was transferred from the Minister for Communication, Information Technology and the Arts in November 2001.

The Movable Cultural Heritage Unit in the Department of the Environment and Heritage provides the Secretariat to the National Cultural Heritage Committee

STATE LEGISLATION

NATIONAL PARKS AND WILDLIFE ACT 1974

The *National Parks and Wildlife Act 1974* provides for the protection of Aboriginal objects (sites, relics and cultural material) and Aboriginal places. Under the Act (S. 5), an Aboriginal object is defined as:

> *any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.*

This includes individual artefacts, scatters of stone artefacts, rock art sites, ancient camp sites, human burials, scarred trees, and ruins and archaeological deposits associated with Aboriginal missions or reserves.

Aboriginal places (areas of cultural significance to the Aboriginal Community declared by the Minister) are protected under Section 84 of the Act.

Aboriginal objects (any material evidence of the Aboriginal occupation of NSW) are protected under Sections 86, 87 and 90 of the Act. Section 86 of the Act identifies that a person, other than the Director-General or a person authorised by the Director-General in that behalf, who:

> *(a) disturbs or excavates any land, or causes any land to be disturbed or excavated, for the purpose of discovering an Aboriginal object*

is guilty of an offence under the NPW Act.

The *National Parks and Wildlife Act* requires that a permit from the Director General be obtained before archaeological fieldwork involving disturbance to an Aboriginal site is carried out. Consent is granted under section 87 and 90 of the Act. Queries and applications to excavate or disturb an Aboriginal archaeological site for purposes of archaeological fieldwork, should directed to the relevant Planning and Aboriginal Section Manager at the appropriate Environment Protection and Regulation Branch office. For this study the relevant branch office is at Sydney.

Section 91 of the Act requires the mandatory reporting of the discovery of Aboriginal objects, and establishes a mechanism for interim protection orders that may be used to protect objects. Identified Aboriginal objects and sites are registered with the NSW Department of Environment and Conservation (DEC) on the Aboriginal Heritage Information Management System (AHIMS). DEC administers *the National Parks and Wildlife Act 1974*.

HERITAGE ACT 1977

The *Heritage Act 1977* details statutory responsibilities for historic buildings and gardens, historic places and objects, historical archaeological sites, and historic shipwrecks. The Act is administered by the Heritage Council of New South Wales, through the NSW Heritage Office.

The aim of the Act is to conserve the 'environmental heritage' of the state, which includes items such as buildings, works, relics, moveable objects or precincts significant for historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. A 'Place' is defined as an area of land, with or without improvements and a 'Relic' is defined as any:

> *deposit, object or material evidence:*
>
> *(a) which relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and*
>
> *(b) which is 50 or more years old.*

An excavation permit is required for any works, excavations or activities, associated with an archaeological site. Excavation permits are issued by the Heritage Council of New South Wales in accordance with sections 60 or 140 of the *Heritage Act*.

It is an offence to disturb or excavate land to discover, expose or move a relic without obtaining a permit from the NSW Heritage Council.

> *139 Excavation permit required in certain cases*
>
> *(1) A person must not disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed unless the disturbance or excavation is carried out in accordance with an excavation permit.*
>
> *(2) A person must not disturb or excavate any land on which the person has discovered or exposed a relic except in accordance with an excavation permit.*

Excavation permits are usually issued subject to a range of conditions that will relate to matters such as reporting requirements and artefact cataloguing, storage and curation. A permit may be required from the Heritage Council of NSW for works or activities associated with a registered place or object.

General queries about site issues and permit applications can be made to the archaeological officers at the Heritage Office. The contact details are:

NSW Heritage Office

3 Marist Place

PARRAMATTA NSW 2150

Ph: (02) 9873 8500

Fax: (02) 9873 8599

Consultation and discussion with the NSW Heritage Office should begin well before lodging an application for a permit to disturb or destroy a historical archaeological site.

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The *NSW Environmental Planning and Assessment Act* will have relevance for all development projects because it requires that environmental impacts are considered in land-use planning and decision making. The definition of 'environment impacts' includes impacts on the cultural heritage of the project area. The Act has three relevant parts: Part III, which governs the preparation of planning instruments; Part IV, which relates to development where consent is required under an environmental planning instrument (EPI); and Part V, which relates to activity where development consent is not required but some other government approval assessments are needed.

Under the Act, local government authorities and The Department of Infrastructure, Planning and Natural Resources (formerly Planning NSW) prepare local and regional environmental planning instruments (LEPs and REPs) to give statutory force to planning controls. These may incorporate specific provisions for conserving and managing archaeological sites.

Integrated Development Assessment (IDA) was introduced under the *Environmental Planning and Assessment Act* so that all matters affecting a development application would be considered by the consent authority in an integrated way.

Integrated Development is one which requires development consent as well as one or more approvals from different government agencies. Such agencies may include NSW DEC or the NSW Heritage Council. If a development is likely to impact a heritage item, the consent authority must refer it, to NSW DEC (for Indigenous objects) or the NSW Heritage Council (for sites listed on the State Heritage Register) prior to approval determination.

The Local Government Act 1993

Under the State Local Government Act, councils can prepare local approvals policies that set out specific matters for consideration in relation to applications to demolish, build or undertake works. Archaeological sites could be considerations under such policies.