BIOSIS
RESEARCH

West Cliff Colliery- Surface Gas Drainage Archaeological Assessment

Report for Olsen Environmental Consulting Pty Ltd

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- Dave Olsen (Olsen Environmental Consulting)
- Tania Stellini (DECC)
- Glenda Chalker (Cubbitch Barta Native Title Claimants Aboriginal Corporation)
- Leanne Hestelow and Donna Whillock (Tharawal Local Aboriginal Land Council)
- Robert Suansri (Biosis Research)

ABBREVIATIONS

AHC	Australian Heritage Council
AHIMS	Aboriginal Heritage Information Management System
ATSIC	Aboriginal and Torres Strait Islander Commission
CHL	Commonwealth Heritage List
DECC	Department of Environment and Climate Change (formally DEC)
DEH	Department of Environment and Heritage
EP&A	Environmental Protection and Assessment
EPBC	Environment Protection and Biodiversity Conservation
GSV	Ground surface visibility
ICOMOS	International Council on Monuments and Sites
LALC	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 DEC)
REP	Regional Environment Plan
RNE	Register of the National Estate
SHI	State Heritage Inventory
SHR	State Heritage Register

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EXECUTIVE SUMMARY

Biosis Research Pty Ltd was commissioned by Olsen Environmental Consulting Pty Ltd for BHP Billiton Illawarra Coal to undertake an archaeological assessment of the proposed West Cliff Mine Surface Gas Drainage Project.

The principal aims of this cultural heritage investigation were to identify, record and assess any Aboriginal or historical archaeological evidence within the study area, assess the potential impacts, and provide mitigation measures for the proposed borehole and related infrastructure locations.

Environmental and archaeological background research was undertaken prior to field work to understand site processes and patterning within the study area. A targeted archaeological assessment was undertaken over two days in June 2007 by Sarah Burke (Biosis Research Pty Ltd), Glenda Chalker (Cubbitch Barta Native Title Claimants Aboriginal Corporation), and Leanne Hestelow (Tharawal Local Aboriginal Land Council).

One known open artefact scatter (Leafs Gully 1 52-2-2265) was relocated on an existing dirt track during the survey and will be potentially impacted upon during use of the track to access borehole sites PA01 and PA04. No new Aboriginal sites were located during the survey. Areas of moderate Aboriginal archaeological sensitivity were identified in association with boreholes CP02, CP04, PA02 and PA03. The remainder of the borehole locations were assessed as having low Aboriginal archaeological sensitivity.

No historical archaeological heritage was identified that will be impacted upon by the proposed borehole locations.

RECOMMENDATIONS

Recommendation 1 – Leafs Gully 1 (52-2-2265) open artefact scatter

Artefact scatter site 52-2-2265 (Leafs Gully 1) was located on a track that will be used to access borehole sites PA04 and PA01 and will potentially be impacted by vehicle use during the construction and maintenance of the boreholes.

To avoid impacting this site further, access of all heavy machinery to borehole site PA04 should be via the existing track network within the paddock to the east, rather than along the track on which the artefact site is located (Figure 3). The portion of track required to access PA01 may continue to be used during the borehole works as this section was determined to contain less archaeological sensitivity.

To avoid impacting the site and the area of moderate Aboriginal archaeological sensitivity identified on either side of the track, disturbances outside the track should be avoided. This includes vehicle parking and equipment storage in any paddocks to the west of the track.

All contractors should be notified on the importance of avoiding areas of archaeological sensitivity and remaining within existing tracks when accessing borehole sites PA01 and PA04.

Recommendation 2 – Moderate Aboriginal archaeological sensitivity

All efforts should be made to minimise the impact upon possible archaeological deposits within 20 metres of the Mallaty and Leafs Gully Creek corridors, as these areas were identified as having moderate potential for Aboriginal archaeological sites to exist (Figure 3).

The following borehole locations were identified within or near to areas of moderate Aboriginal archaeological sensitivity:

CP02, CP04, PA02 and PA03

Where possible these borehole locations should be moved to areas of existing disturbance where archaeological potential is considered low, or a preferred location identified in section 8.2.

Recommendation 3 – Low Aboriginal archaeological sensitivity

The following borehole locations were identified as having low potential for Aboriginal archaeological sites to exist (Figure 3). There are no further heritage constraints to the proposed borehole locations:

CP01, CP03, CP05 – 17, PA01 and PA04

Recommendation 4 – Historical cultural heritage assessment

In relation to the historical cultural heritage requirements for the proposed borehole locations, no further work or permits are required under the *NSW Heritage Act 1977*.

Recommendation 5 – Avoiding unnecessary impacts

To avoid impacting upon unidentified sites, all vehicles and work movements should stay in previously cleared and disturbed areas where safe and practicable.

The construction methods of infrastructure installation should be kept to a minimum and where possible above ground alternatives should be considered.

Recommendation 6 – Stop work order

Should any unanticipated Aboriginal or historic heritage material be identified during any phase of the proposed works, all work must cease in the vicinity of the find while the appropriate statutory consent authority is contacted.

1.0 INTRODUCTION

Cultural heritage legislation protecting Aboriginal and historic heritage places applies in New South Wales. These places are an important part of our heritage. They are evidence of more than 50,000 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 2 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 development project (the study area). A second stage often involves a field inspection 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.

The subject matter of this report involves the use of a number of technical words and terms with which the reader may be unfamiliar. An extensive glossary has been included at the end of the report and reference to this may be of assistance.

1.1 Project background

BHP Billiton – Illawarra Coal (BHPIC) is preparing an Environmental Assessment under Part 3A of the Environmental Planning and Assessment Act, 1979 for a surface gas drainage project at West Cliff.

The Project Application and Preliminary Environmental Assessment will soon be submitted to the Department of Planning and in due course, the Director General's Requirements (DGRs) will be issued.

As part of the ongoing operations of the West Cliff Mine, BHPBIC plans to implement a programme to extract gas from the goaf area remaining after longwall extraction has occurred. If this gas is not drained from the goaf area it has the potential to flow in significant quantities into the current working areas and cause a safety hazard.

The goaf gas extraction will remove gas from the goaf areas immediately after coal removal and will transfer that gas to the surface via a cased borehole installed prior to mining. The gas will be either flared on the surface, or vented into the atmosphere.

The proposal involves the installation and use of approximately 20 Boreholes in Longwall Panels 32 to 34 of the West Cliff Mine. Figure 2 shows the proposed location of the boreholes.

This report has been commissioned in order to identify and assess the Aboriginal and historical archaeological significance of the area containing the proposed borehole locations. Results of this investigation will be used to identify predicted impacts to heritage items and places associated with the proposed development area. Recommendations will be designed to minimise impacts to cultural heritage places in accordance with legislative constraints and 'best practice' heritage management.

This work has the potential to impact upon Aboriginal archaeological sites and overall cultural values associated with the study area. This report assesses the likely impacts associated with the proposed works.

1.2 Study area

The study area is located in the Wollondilly Shire Council and Campbelltown Local Government Authority boundaries, approximately 1.5 km north of Appin, between Appin Road in the east and the Sydney Water Supply canal in the west, NSW (Figure 1). The study area includes a 30 x 30 m search of the 20 proposed borehole locations, as well as areas of associated infrastructure beyond this zone of impact, including access tracks and remote vent stack locations. The proposed boreholes follow the alignment of Longwalls Panels 32 to 34 of the West Cliff Mine in a north west to south east direction. The land within the study area is currently owned by a number of private land holders. The extent of the full study area is shown in Figure 2.

The study area is dissected east to west by Mallaty Creek and a number of smaller tributaries and drainage lines. Leafs Gully Creek transects the northern extent of the study area and Lilly Ponds Gully runs through the south western extent.

In recent years, the study area has been subject to ongoing pastoral and agricultural activities (including the construction of dams, buildings and other infrastructure), impacts from underground longwall mining activities, the installation of the Eastern Gas (Moomba Sydney)

Pipeline, a 330kV and 66kV transmission line easement and a race track. Appin Road and a number of smaller roads and tracks also extend across the study area. Such activities have resulted in moderate to high levels of disturbance in some areas.

1.3 Proposal

The proposed West Cliff Mine Surface Goaf Gas Drainage Project will comprise:

- Borehole installation with appropriate drilling equipment and fit out to enable gas extraction,
- Gas extraction and ventilation facility, and,
- Gas flaring equipment located at a safe distance from the ventilation points

Where possible existing access tracks will be utilised and it may be necessary to construct further access tracks utilising a crushed sandstone base.

Borehole Installation

The boreholes will be installed using a specialised drilling rig that will be similar in appearance to those used by BHPIC in their exploration activities in the local region.

Plate 1 shows the generic layout of the drilling rig. The drilling rig will utilise 4 air compressors and the drilling will be achieved by down hole hammer drilling using air recirculation. A pond will be constructed to function as a drilling sump. The drilling mast will be 9m high and will be raised into position as required.

The holes will be located on the tailgate side of the Longwall panel and will generally be within 50 m of the side of the panel. This location minimises the consolidation effect on the borehole as mining subsidence progresses. The holes will be drilled to a depth of approximately 500 m, nominally 10 m above the Bulli Seam.

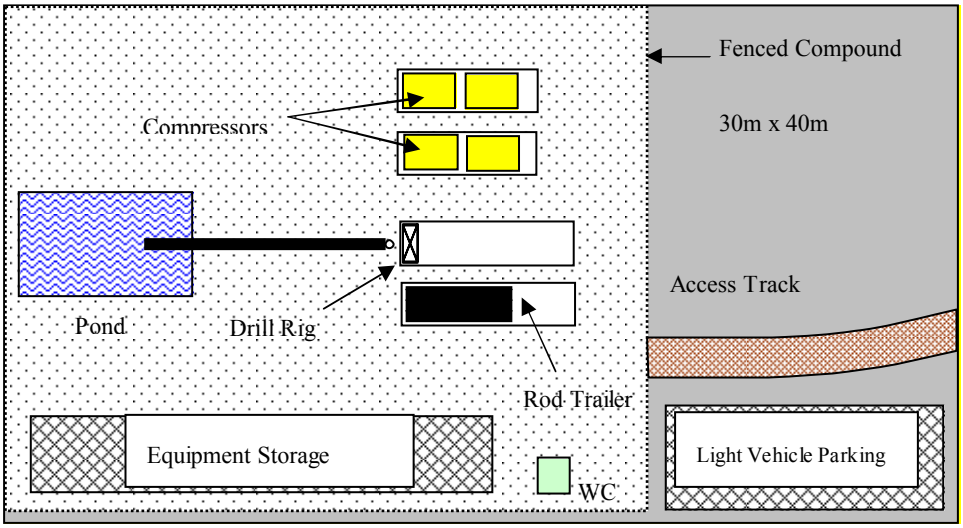

Plate 1: Generic Layout of drill rig

Gas Extraction and Ventilation

Gas will be extracted via the pre - drilled boreholes by a purpose-built mobile gas extraction plant. The plant consists of a PLC controlled liquid ring vacuum pump and associated pipework, valves, monitoring, control gear and genset all mounted on a 18 wheel semi-trailer. The vehicle has on-board water storage to service the liquid ring vacuum pump. This will minimise the number of times that water has to be delivered to the mobile plant.

The mobile plant will have an on-board generator to generate the power necessary to operate the equipment. The possibility of a gas-fired generator is under investigation. This diesel will be stored in a bunded tank adjacent to the mobile plant and will be connected by pipeline directly to the generator. Approximately 1 fuel delivery per week will be required.

The mobile vehicle will have an erectable vent stack approximately 9 m high. This stack will only be utilised when flaring is not occurring, or when the flares are located remote to the mobile plant. An on-board separator will reclaim the recycled sealing water, which will be redirected to an open recirculation tank.

There is a safety requirement to separate the flare units from the vent by at least 100 m to minimise the risk of plume ignition. The vehicle will remain in position extracting gas until it is required to move to the next borehole in the longwall panel. It is expected that the mobile equipment will be located for approximately 6 weeks at each borehole before it is required to move to the next location to re-commence gas extraction.

Each borehole will be plugged and abandoned in accordance with requirements of the Department of Primary Industries (Mineral Resources).

Gas Flaring

When appropriate and possible, gas will be flared utilising two existing flaring units. The flares will be situated adjacent to the mobile goaf plant. Excess gas will be sent to a remote vent stack, situated at least 100 m away. This will achieve the minimum required separation between the flare units and the gas vent, whilst avoiding the need for a second pad to be constructed. Gas will be transported from the mobile plant to both the flares and the remote vent stack through surface laid 200 mm poly pipe. There will be power and control signal connection between the mobile plant and the gas flares. Plate 2 shows a typical plan view layout of the gas extraction borehole with all equipment in place.

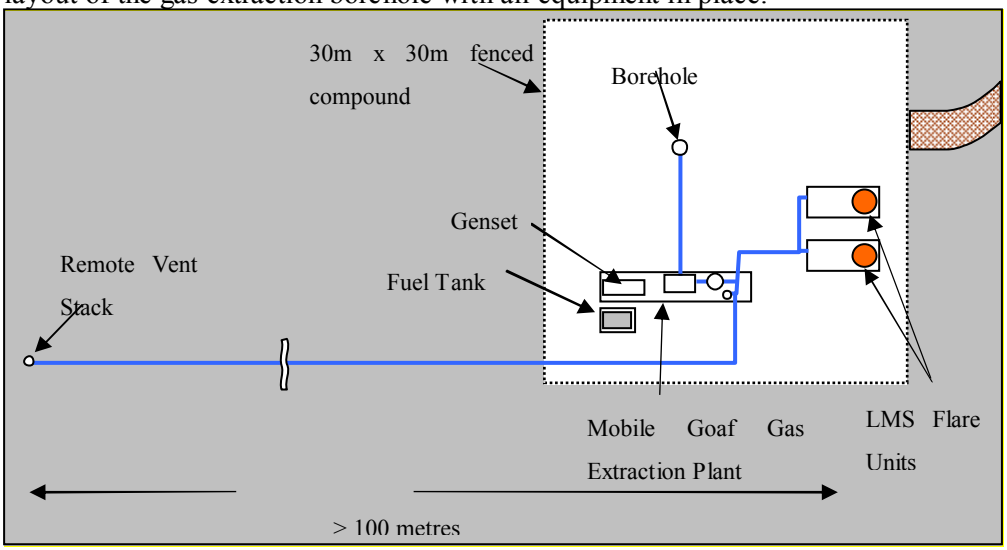

Plate 2: schematic view of gas extraction borehole and equipment layout.

1.4 Planning approvals

The project is a Major project under Part 3A of the Environmental Planning and Assessment Act 1979 and State Environmental Planning Policy (Major Projects) 2005.

Under Part 3A applications there are specific procedures that are required to be undertaken in regards to Aboriginal archaeological assessments as outlined within the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (Draft July 2005) that were prepared by the Department of Environment and Conservation. These procedures are being followed for this project.

1.5 Aims

The following is a summary of the major objectives.

- Conduct heritage register searches to identify any previously recorded cultural heritage sites within the survey 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.
- Consult with identified statutory stakeholders in the area.
- Undertake a targeted survey of the study area where existing information is limited, Survey coverage should target landforms with high potential for heritage places within the study area, as identified through background research.
- Record and assess sites relocated from previous surveys and those identified during the survey in compliance with the guidelines issues by the NSW Department of Environment and Conservation (DEC) and the NSW Heritage Office.
- Identify impacts to all identified Aboriginal and historic cultural heritage sites and places based on potential changes as a result of the proposed development.
- Make recommendations to minimise or mitigate impacts to cultural heritage values within the study area.

1.6 Consultation

1.6.1 Aboriginal

The Tharawal LALC (TLALC) and the Cubbitch Barta Native Title Claimants (CBNTC) have been identified as the relevant Aboriginal community organisations for the Study Area. Leanne Hestelow of the Tharawal LALC and Glenda Chalker of Cubbitch Barta were contacted at the outset of the project. Information was supplied to both organisations and representatives accompanied the archaeologists in the field. Both organisations were kept fully informed of any changes to the project or as new information was received.

Representatives from both Aboriginal groups were invited and participated on the survey, providing input of any queries or concerns that they may have had out in the field.

Glenda Chalker (CBNTC) provided written comment on the draft report 21/07/2007 (Appendix 1). The response noted two previously recorded sites in close proximity to borehole sites CP02 and PA04 and expressed concern that site 52-2-2265 must be protected during the borehole works and attempts made to avoid impacting the site, and that site 52-2-0021 has since been disturbed by recent development at the Mallaty creek stockpile area. These comments and general discussions with Mrs Chalker have been taken into account and the recommendations in this report reflect this accordingly.

Donna Whillock (TLALC) provided written comment on the draft report 09/10/2007 (Appendix 1). In this response Ms Whillock supports the findings and recommendations of the report.

2.0 HERITAGE STATUS AND PLANNING DOCUMENTS

2.1 Commonwealth Registers

2.1.1 National Heritage Registers

The *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act) establishes two mechanisms for protection of heritage places of National or Commonwealth significance. 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), who 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 RNE unless the listed place is owned by a commonwealth agency.

APPLICATION TO THE STUDY AREA – NATIONAL HERITAGE REGISTERS

The study area contains no items listed on the National Heritage Registers.

2.1.2 National Native Title Register

The Commonwealth *Native Title Act* 1993 establishes the principles and mechanisms for the preservation of Native Title for Aboriginal people.

Registered native title claimants only have the right to negotiate over certain types of future acts. 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 purpose of searching the register is to identify any Traditional Owner groups will 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 was completed for the study area and no claims are listed. The search did identify those Traditional Owner groups with current registered claims close to the study area that may identify themselves as relevant stakeholders with traditional knowledge or experience and these groups were contacted as part of the assessment.

2.2 State Registers

2.2.1 National Parks and Wildlife Act Registers

The Department of Environment and Climate Change (DECC) maintains two registers of heritage sites under the auspices of the NSW *National Parks and Wildlife Act 1974*. All Aboriginal sites in NSW are required to be registered on the Aboriginal Heritage Information Management System (AHIMS) register. Historic heritage places within lands managed by DECC (lands such as National Parks) are listed on the Historic Heritage Information Management System (HHIMS).

AHIMS: A search of the AHIMS register was undertaken at the commencement of the project. The AHIMS database is maintained by the Department of Environment and Climate Change and contains a list of all Aboriginal objects, Aboriginal places and other Aboriginal heritage values in NSW that have been registered as required under the NSW *National Parks and Wildlife Act 1974*.

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 DECC AHIMS Database was undertaken in May 2007 covering a 6 x 4km area centred on the study area. 40 previously recorded Aboriginal sites. Three sites are located within the current study area (section 4.5).

- 52-2-0021 – Douglas North
- 52-2-2265 – Leafs Gully 1
- 52-2-2237 – Ousedale Creek 3

Heritage Act Registers

The NSW Heritage Office, part of the Department of Planning, maintains registers of heritage and archaeological items that are of State or local significance to New South Wales.

State Heritage Register: 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 study area contains no items that are listed on the State Heritage Register and no items listed on the State Heritage Inventory. One site is located 400 m west of the study area and is unlikely to be affected by the current project.

- "Upper Canal" Water Supply System

S.170 provisions: 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.

APPLICATION TO THE STUDY AREA – GOVERNMENT AUTHORITY S.170 REGISTER

The study area contains no sites that are listed on any government authority s170 Heritage and Conservation Registers as there are no state agency assets located within the study area. One site is located 400 m west of the study area and is unlikely to be affected by the current project.

- "Upper Canal" Water Supply System

2.2.2 Environmental Planning and Assessment Act 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 Area (LGA) 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 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 YEAR SCHEDULE 1991 SCHEDULE 1

The study area contains no items listed in the heritage schedule of the Wollondilly LEP 1991. Though there is one located 400 m west of the study area. This item is unlikely to be affected by the current project

- "Upper Canal" Water Supply System

Under the *EP&A Act*, broad scale regional plans have also been developed that address cultural heritage resources that may extend beyond the geographic limit of one Local Government Area. The *Illawarra Regional Environmental Plan (1986) No 1* applies to the

Wollongong, Shellharbour, Kiama, Shoalhaven and Wingecarribee local government areas and provides a planning and decision making framework for how to best use land resources, improve quality of life and protect regional interests and investment. The *Illawarra REP* identifies the Illawarra region as possessing unique characteristics worth preserving and distinguishes items of cultural heritage associated with the escarpment and its environment.

APPLICATION TO THE STUDY AREA – Illawarra REP 1986 No 1

The study area contains no items that are identified in the Illawarra Regional Environmental Plan No 1.

2.3 Non-Statutory Registers

2.3.1 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 study area contains no heritage items classified (listed) by the National Trust of Australia.

2.4 Summary of heritage listings in the study area

No historical heritage sites or places are listed on the above registers within the present study area.

Three Aboriginal archaeological sites are listed on the AHIMS register and are discussed further in section 4.5.

3.0 ENVIRONMENTAL CONTEXT

3.1 Geology, Soils and Landforms

The Appin study area is at the south-western area of the geological feature known as the Sydney Basin. The area is located on the north-eastern edge of the Woronora Plateau (Hazelton and Tille 1990). The Sydney Basin is a geological province that consists of Permian and Triassic aged sedimentary rocks. The present study area is situated on Wianamatta Shale, which dates to the mid-Triassic period (Branagan & Packham 2000:58).

Hazelton and Tille (1990) have defined two soil landscapes within the study area, they are the Blacktown (ba) and Luddenham (lu). Each soil landscape has distinct morphological and topological characteristics. This results in each 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.

The Blacktown soil landscape is the predominant soil group in the study area, it is a residual landscape characterised by gentle undulating rises located on the Wianamatta Groups Shale. The local landscape also consists of broad rounded crests and ridges, and is almost completely cleared of the native eucalypt woodlands from agricultural activities in the area. (Hazelton & Tille 1990). Soil deposits in this area vary in depth and type. Only limited soil types in this region are considered fertile, such as the greyish brown loam that occurs in pockets near the top slopes and at the bottom of gullies, otherwise the topsoil is a hard setting brown clay that has become exposed from the clearing of the land and subsequent erosion. Depth of soil ranges from a maximum 150 mm of soil on crests and upper slopes, to 500 mm depth on lower side slopes and up to 2 m deep in drainage depressions and poor drainage areas (Hazelton & Tille 1990).

The Luddenham soil landscape is an erosional landscape located in the south eastern extent of the study area. It is characterised by undulating to rolling hills on Wianamatta Group Shales. Narrow ridges, hillcrests and valleys are the typical landform in this landscape. Native vegetation has been almost extensively cleared for agricultural activities. Soils vary from the shallow (<100 cm) shallow dark brown loam and clay deposits on the crests, to moderately deep brown clay loam overlaying clays on the slopes (70-150 cm). Lower slopes and drainage lines contain moderately deep soil deposits of greyish brown loam overlaying yellow sandy clay (<150 cm) (Hazelton & Tille 1990).

Both soil landscapes have reasonable potential to contain archaeological deposits, including stone artefact scatter sites. Archaeological materials may also occur on the surface where shallower soils exist. Impacts from vegetation clearance for pastures will have contributed to site disturbance and poor preservation.

3.2 Climate

The climate at Picton (15 kilometres west of the Appin) generally consists of mild summers with an average maximum of 28.6 degrees and minimum of 15.4 degrees in February, and cold, wet winters with an average minimum of 1.7 degrees and a maximum of 16.8 degrees in July (Bureau of Meteorology 2004). Recorded rainfall readings taken in 2004 indicate an average annual rainfall of 803.6 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 habitation throughout the region.

3.3 Flora and Fauna

The study area has consists mostly of cleared paddocks, with pockets of native vegetation remaining along the Mallaty Creek and Leafs Gully corridors. The flora typical of the area is mostly cleared eucalypt woodland. This has been a direct result from settlement and land clearing that has occurred in the area since Appin was settled in c1811. Prior to this the area would have been summarised as mostly uncleared eucalypt woodlands, open (dry sclerophyll) forest and tall open (wet sclerophyll) forests. In some areas dense scrub dominates the mid- and understorey.

Two remnant vegetation communities were identified within the study area, the Cumberland Plain Woodland and the Shale Sandstone Transition Forest. These communities are indicative of what once thrived across these areas prior to exploration and settlement in New South Wales (Biosis Research 2007c).

Within the Cumberland Plain Woodland, Grey Box *Eucalyptus moluccana* and Forest Red Gum *E. tereticornis* are the dominant canopy trees, 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*
(http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10191).

The Shale Sandstone Transition Forest occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with soils from sandstone, or where shale caps overlay sandstone. The main tree species include Forest Red Gum *Eucalyptus tereticornis*, Grey Gum *E. punctata*, stringybarks (*E. globoidea*, *E. eugenioides*) and ironbarks (*E. fibrosa* and *E. crebra*). Areas of low sandstone influence have an understorey that is simlar to that found in the Cumberland Plain Woodland
(http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10755).

The Woronora Plateau would have provided a wide diversity of resource zones, 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.

These ecological zones supported a range of faunal resources that would have been utilised by Aboriginal peoples.

3.4 Resource Statement

Based on the background information provided above, it is possible to speculate what resources would have been available for both Aboriginal and European exploitation.

Quartz is the main stone raw-material type suitable for Aboriginal tool manufacture that would be likely to occur in the vicinity of the study area in any abundance. This would be in the form of pebbles derived from the Hawkesbury sandstone. Elsewhere on the Woronora Plateau and Cumberland Lowlands the potential raw materials for stone artefact making include silcrete, chert, tuff, mudstone, quartz, quartzite and basalt (Smith 1989). Deposits of clays and ochres suitable for art, particularly stencil art, are locally available in the vicinity of the study area's adjacent land systems.

The year round water supply from Mallaty Creek and Leafs Gully Creek would have provided a reliable source of water, while the diverse natural environment would have provided vast and plentiful flora and faunal resources. Many of the plants found within the area were important to both Aboriginal people and early Europeans inhabiting the area and could be used for numerous purposes. These include using the wood to make implements; berries leaves and tubers for food and medicines as well as bark for shelters. Some of the plants exploited may have been the Eucalypt, whose leaves can be crushed and used for medicinal purposes, while the sap can be used as a sweet sugary food source and the bark could be used to make bowls and shelters (Botanic Gardens Trust 2005).

The various Fauna species present within the study area would have provided a range of resources for the Aboriginal people. Terrestrial and avian resources were not only used for food, but also provided a significant contribution to the social and ceremonial aspects of Aboriginal life. Mammals such as kangaroos and wallabies and arboreal mammals such as possums can be used as a food source and also for tool making. For example, tail sinews are known to have been used as a fastening cord, whilst 'bone points' which would have functioned as awls or piercers are an often abundant part of the archaeological record. Ethnographic observations of early European settlers coming in contact with Aboriginal people noted the use of a variety of animal parts; claws, talons, bone, skin, teeth, shell, fur and feathers were all used for a variety of tools and non-utilitarian functions. Aquatic species such as freshwater crayfish would have been easily accessible in larger waterways such as the Georges and Nepean Rivers which are located nearby (Rosen 1995). Aquatic vertebrates such as fish and eels may have been present in the larger creeks and waterways such as those within the study area.

4.0 ABORIGINAL HISTORY

4.1 Ethnohistory

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 timing for the human occupation of the Sydney Basin is still uncertain. Whilst there is some possible evidence for occupation of the region around 40,000 years ago, the earliest undisputed radiocarbon date from the region comes from a rock shelter site north of Penrith on the Nepean, known as Shaws Creek K2, which has been dated to 14,700 +/- 250 BP (Attenbrow 2002: 20). This site is over 50 km north from the study area along the Nepean River. To the south, along the coast just north of Shellharbour the site of Bass Point has been dated at 17,101 +/- 750 BP (Flood 1999). Closer to the study area on the Woronora Plateau the oldest date for Aboriginal occupation so far recorded is 2,200 +/- 70 BP at Mill Creek 11 (Sefton 1998). Such a 'young' date is probably more a reflection of conditions of archaeological site preservation and sporadic archaeological excavation, rather than actual evidence of the presence or absence of an Aboriginal hunter-gatherer population prior to this time.

Our knowledge of Aboriginal people and their land-use patterns and lifestyles prior to European contact is mainly reliant on documents written by non-Aboriginal people. The inherent bias of the class and cultures of these authors necessarily affect such documents. They were also often describing a culture that they did not fully understand – a culture that was in a heightened state of disruption given the arrival of settlers and disease. Early written records can, however, be used in conjunction with archaeological information and surviving oral histories from members of the Aboriginal community in order to gain a picture of Aboriginal life in the region.

A variety of studies of the language groupings that made up the greater Sydney region have been summarised by Attenbrow (2002). She suggests four main language groupings for the region. In the vicinity of the study area there were two (a coastal and a hinterland) Darug dialects: Dharawal and Gundungurra. It is suggested the hinterland Darug dialect covered the Cumberland Plain from Appin to the Hawkesbury River to the west of the Georges River, Parramatta, the Lane Cove River and Berowra Creek. The Gundungurra covered the area west of the Georges River on the southern rim of the Cumberland Plain, as well as the southern Blue Mountains (Attenbrow 2002: 34). These areas are considered to be indicative only, and would have changed through time, and possibly also changed depending on circumstances.

At the time of European settlement the Georges River and its tributaries were occupied by the Tharawal (Tindale 1974). The Gandangarra were known to have inhabited much of the Wollondilly area in the 18th and 19th century according to early non-indigenous records (ERM 2002). The interface of these two groups seems to have been around Appin. Ethnographic evidence considered by Sefton (1988: 22-29) indicates population mobility on the Woronora

Plateau with frequent contact with the neighbouring Gandangarra, Cobrakall (Liverpool and Cabramatta) and Wodi Wodi (Illawarra). 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 many resource 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 1992).

The arrival if settlers in the region around Appin and new competition for resources began to restrict the freedom of movement of Aboriginal hunter-gatherer inhabitants from around 1813 (McGill 1994). European expansion was such that by 1814 there had been considerable loss of Tharawal land to agriculture. A severe drought in the same year as well as the displacement of other tribes through European expansion forced Aboriginal people to congregate in the Appin area in search of food and other resources. Hostilities between Aboriginal people and Europeans began in the district of Appin when a large group of Aborigines were fired upon. In May 1814 the local militia killed an Aboriginal boy. This resulted in a revenge attack on three militia members before they had time to reload, killing one of them (McGill 1994). By 1816 the increasing hostilities resulted in Governor Macquarie sending a punitive military expedition to the area to apprehend the Aborigines involved. Aborigines met by the detachment were to be taken prisoner and sent to Parramatta or Windsor Gaol. Resistors were to be shot and the bodies of men hung from trees as an example, and the women and children buried. On 16 April 1816 news came to the detachment that a group of outlawed Aborigines were at Broughton's farm in Appin. Wallis arrived at the camp at 2am, but found it deserted. When a child's cry was heard in the bush the soldiers formed into a line and pushed through the push towards a deep rocky gorge (Cataract River). As the soldiers pursued the group panic ensued of which fourteen Aboriginal men, women and children were shot or driven over the cliff to their deaths (Liston 1988: 52-54). The exact site of the massacre is not known, but Broughton's original 1810 land grant was at Brooks Point.

4.2 The Archaeological Record – Regional Overview

4.3 Regional Overview

Previous archaeological work in the region began in the early 1960s, with the identification of a large shelter containing Aboriginal art and deposit (McCarthy 1961). This shelter site became known as 'Whale Cave' and has been discussed as part of academic investigations into regional variations of rock art and the prehistory of the Illawarra (Officer 1984; Sefton 1988; and McDonald 1994). Very little archaeological excavation work has been undertaken in this region of the Sydney Basin. The majority of this work has focussed on coastal and estuarine regions. Those shelters that have been excavated within the inland plateau environment have yielded dates of 2220 $\pm$ 70 BP, evidence of the earliest occupation is at Mill Creek 11 (Koettig 1985).

The Appin area has been subject to reasonably continuous archaeological study during the last 20 years in response to development and mining activities and intensive volunteer survey by the Illawarra Prehistory Group. The majority of this work has been surveys for impact assessments - many associated with mining leases - or exploratory surveys by the Illawarra Prehistory Group. Archaeological excavations have been sporadic, and account for only a small volume of the work previously conducted in the region.

The previous work has revealed a range of site types to be present in the region, with the most abundant sites being sandstone rockshelters and overhang sites containing art and/or archaeological deposits. The abundance of these sites is a reflection of the dominant landscape features formed by the Hawkesbury Sandstone geology. The majority of sandstone rockshelter sites are present along major drainage features such as the Georges River and larger tributary drainage features that are incised to a depth that results in outcropping sandstone (Biosis Research 2007 b; Sefton 2002). Other site types that have been recorded regionally include open artefact sites, grinding sites and scarred trees. Grinding groove sites are a common feature of exposed sandstone-dominated landscapes (Sefton 1998; Sefton 2002).

Surface stone artefact sites are common, but they are not a dominant component of the region's formally recorded archaeology (Sefton 1998:10). This may simply reflect the relatively small amount of survey in suitable areas for surface stone artefact sites to occur, especially when compared to the intensively focused and numerically abundant surveys that have searched for sandstone overhang sites. The abundance and distribution of the different site types is affected by variables such as exposure (the chance of finding the sites) and preservation (the chance of the site surviving). For example, sandstone shelter sites are more readily found than open artefact sites, which may be buried. Shelter sites in the region are also located in narrow valleys and gullies that have seen little land disturbance, whilst open artefact sites are usually present on the undulating land above the gullies, which almost without exception have been extensively impacted by pastoral development, meaning many sites may have been destroyed.

There is little doubt that in the region the areas with the highest site density and sensitivity are the sandstone gullies and valleys associated with well incised drainage lines. The site types that are encountered in these environments are sandstone overhangs with art, artefacts and archaeological deposits. Grinding grooves, scarred trees, and stone artefacts can also be expected to occur particularly in association with permanent water sources such as the Georges River.

These studies have combined to provide a regional site distribution pattern where sites are most likely to occur within particular geomorphic contexts and topographic units. For instance, there is a high probability of sites being located in areas where sandstone has weathered to form overhangs and potential shelters and where fine grained horizontal sandstone outcrops close to water source suitable for grinding purposes. Level ground on

ridgeline crests may contain artefact scatters, as ridgelines where used as access travel routes across the landscape. Sources of water may also influence the location of sites (Sefton 1988).

4.4 The Archaeological Record – Appin Study Area

A number of assessments have occurred within the study area boundaries and the immediate Appin region. Archaeological investigations in the Appin area date back to the mid 1970's when Haglund surveyed sections of the Eastern Gas Pipeline (Moomba-Sydney) which transects the study area **(Navin Officer 2002)**. The Illawarra Prehistory Group have also recorded a number of sites near the Georges River, immediately east of the study area. These sites included shelters with art and/or deposit, axe grinding grooves and an artefact scatter. Various survey assessments for seismic lines, subsidence lines, boreholes have also been conducted in the general area around Appin (Sefton 1995, 1996, 1998; Navin Officer 1996, 2002c)

Biosis Research (2006) completed an Aboriginal archaeological assessment of the East Appin 66kV switching station and related infrastructure. The study area is located to the south of the current study area, east of Appin Road. The survey assessment focused primarily on the impact footprint and no new Aboriginal archaeological sites or potential archaeological deposits were identified within the proposed development area.

Biosis Research (2007a) undertook an assessment of the proposed Mallaty Creek Stockpile area for Agility Gas, north of Appin. The assessment for this report is located north of Mallaty Creek within the present study area. The report assessed Aboriginal cultural heritage values associated with the proposed location of the stockpile area, in particular the registered Aboriginal site 52-2-0021 Douglas Park. An area of moderate archaeological potential was identified along the undisturbed section of the gentle lower slope leading to Mallaty creek. The report provides management recommendations to ensure the site and area of potential are protected from the risks associated with the operation of the stockpile area. Both the site and area of archaeological potential are located within the present study area, close to borehole CP02. No additional sites were located during the survey.

Biosis Research (2007c) undertook an assessment order to identify and assess Aboriginal and historic cultural heritage values of five proposed longwalls within the West Cliff Area 5, north of Appin. This assessment study area overlaps with the north eastern portion of the current borehole assessment. The assessment included the relocation of known sites including Leafs Gully 1, Ousedale Creek No. 3 and Douglas North within the present study area. No new sites within the current study area were identified. The assessment was being completed at the time this report was written, with the results of this investigation to be used to assess the impacts of subsidence on Aboriginal archaeological and cultural heritage sites and historical archaeological and heritage sites associated with Longwalls 34-38.

Navin Officer (2006) completed a cultural heritage assessment of a proposed Gas Turbine Power Station in Leafs Gully for AGL. This assessment is located immediately north west of the current study area and Leafs Gully. A survey of the proposed impact footprint was

undertaken during which no Aboriginal sites were located. A large area of moderate – low moderate archaeological potential was identified, situated on the low gradient upper slopes and crests of the spur line directly north of the current study area.

Navin Officer (2002a) completed a survey of a proposed route for an underground communications cable for the West Cliff Colliery. The assessment included an area between Mallaty Creek in the north and Brian Road in the south. Two silcrete flake isolated finds (Georges River 1 and Georges River 2) and an open artefact scatter (Leafs Gully 1) were located during the survey. Georges River 2 and Leafs Gully 1 area located within the current study area and are discussed below (Section 4.6). It was recommended that BHP Billiton apply for a Consent to Destroy for these two sites as they were located within the proposed impact route, however no evidence of these permits could be determined during the background research. All sites were identified as typical of the commonly occurring 'background scatter' in the region and were therefore of low significance. Artefacts were of a common material and located in a disturbed context. As no additional artefacts were located, despite high surface visibility at the time of the survey, it was considered unlikely that subsurface material existed within the survey boundary. The report also notes a reported burial site (#52-2-1933) situated in a treed paddock to the south of the current study area.

Heffernan and Klaver (1992) surveyed two alternative routes for a proposed water pipeline easements connected to the proposed Macarthur Water Quality Project, which is located approximately 3 km from the study area. Six potential archaeological deposits (PADs) and three isolated finds of Aboriginal stone artefacts were located along the Eastern Gas Pipeline (Moomba-Sydney) easement which runs north-south through the current study area. The survey also located one rock shelter with archaeological deposit (Ousedale Creek 3), one scarred tree (Ousedale Creek 4) and an open artefact scatter (Ousedale Creek 2) along Ousedale creek.

Navin Officer (2002b) undertook an archaeological survey of a proposed communications (optic fibre) cable route for Appin Colliery south of the current study area betweens Brooks Point Road and Wilton Road. Two isolated finds were recorded, including a red silcrete flake at Rocky Ponds Creek (AAC1) and a grey basalt ground hatchet on a ridge top in the vicinity of Brooks Point (ACC2).

Sefton (2002) completed an Aboriginal archaeological survey of the West Cliff Colliery 5 Area for BHP Billiton to identify areas of archaeological potential (within sandstone shelters and overhangs) which may be impacted by longwall mining of Area 5. Sefton's primary focus was on locating sandstone overhangs suitable for Aboriginal usage, with the survey route specifically targeting creek and ridgelines. Part of the current study area, along Mallaty Creek and Leafs Gully, is situated within the area assessed by Sefton. Seven open sites were recorded, though none were located within the current study area. Artefact scatters were located at plateau level associated with creek lines. Grinding sites were located in minor creek lines in the creek bed on Hawkesbury sandstone. Twenty four shelter sites and 18 PADs were located during the survey. Ousedale Creek 3 (shelter with arts and archaeological deposit) was

identified on the southern side of Mallaty Creek within the current study area. Eighteen stone artefacts (4 silcrete, 7 quartz, 1 quartzite and 5 chert) were located on the dripline of the shelter. Art within the shelter consisted of charcoal outline and infill drawings.

4.5 Previously Recorded Aboriginal Sites

A search of the NSW Department of Environment and Climate Change (DECC) Aboriginal Heritage Information Management System (AHIMS) database was conducted in May 2007. The search was conducted and identified **40** previously recorded those sites within a 6 x 4 km search area, centred on the study area (refer to Figure 5).

Table 1 (following) provides details of the 3 sites located within the study area. Details of specific site locations are considered sensitive and have not been included in this report.

AHIMS SITE NO.	SITE NAME	SITE TYPE	LANDFORM
52-2-2265	Leafs Gully 1	Open campsite; 1 quartz flake, 1 brown silcrete	Located on unsealed road, directly south of Leafs Gully
52-2-0021	Douglas Park	Open campsite – 1 artefact not described, 1 silcrete broken flake	East of gas pipeline on spur above Mallaty Creek
52-2-2237	Ousedale Creek No. 3	Shelter with art and deposit; charcoal outline and infill drawings	Located in overhang on south side of Mallaty Creek.

Table 1: Registered Aboriginal archaeological sites located within 500 metres of proposed boreholes.

Sites within the study area include 1 open camp site, 1 isolated find and 1 shelter with art and deposit. Of the 40 sites in the wider area, there are 8 open camp sites, 6 shelter with art sites, 6 shelters with art and deposit, 4 shelters with art and grinding grooves, 4 shelters with art, grinding groove and deposit, 2 shelters with art and potential archaeological deposits, 3 grinding grooves sites, 6 shelters with potential archaeological deposits and 1 scarred tree. These sites provide an indication of site types that are likely to occur within the immediate area.

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.

4.6 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.

Based on this information, the following predictive model for the study area has been developed, indicating the site types most likely to occur within the present study area.

Open campsites, artefact scatters and isolated finds

Open campsites and artefact scatter sites can comprise high-density concentrations or sparse low-density 'background' scatters. These represent campsites of everyday activities, hunting and gathering, 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 riparian vegetation occur within the study area and it is likely to obscure stone artefact scatters or isolated occurrences. The infrequent occurrence of these sites throughout the region can be attributed to this lack of ground surface visibility rather than the absence of such sites.

There is a moderate likelihood of identifying such sites within the presents study area, particularly in areas where open ground surface is visible. This site type is likely to be the most commonly occurring within the study area. Stone artefact sites that have been previously recorded in the region have been located along ridgelines, on the plateau associated with drainage lines and raised flats landforms within close proximity to water sources.

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 bordering the escarpment along the Nepean and George's Rivers as well as their tributaries and creek lines, such as Mallaty Creek within the study area. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves. The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist i.e. Hawkesbury Sandstone geological formations. Such topographical features occur within the present study area along the Mallaty Creek drainage line.

Sandstone shelters with art and/or deposit are the most common site to occur in the Woronora Plateau region and a number of shelter sites exists were recorded with the wider search of the study area. The AHIMS database search revealed one known rock shelters with art and deposit is located within the study area. The Mallaty Creek drainage line was recently surveyed by Biosis Research and no further shelter sites were recorded (2007c). Given the comprehensive level of survey already completed along this landform it is unlikely that further rock shelters with art and/or deposit exist within the study area (Sefton 2002, Biosis Research 2007c).

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.

No axe grinding grooves have been previously recorded within the study area though they are second to sandstone shelter sites for being the most common site type found within the Woronora Plateau region. These sites have not been maintained since European settlement; they will be difficult to locate beneath vegetation and debris. No additional sites were located during the Biosis Research survey (2007c). There is low potential for grinding grooves to occur within the study area. If sites occur they may be found on horizontal sandstone outcropping occurring along Mallaty and Leafs Gully Creeks.

Scarred Trees

Scarred trees exhibit scars caused by the removal of bark used in the manufacture of shields, canoes, containers or shelters. These generally occur on older trees or trees of size from which a suitably sized piece of bark can be removed. Early timber cutting within the region will have removed most large trees, as will periodic bush fires. These factors and the now abandoned practice of scarification reduce the likelihood of these sites being present in the study area to almost zero.

Burials

Aboriginal burial sites are generally situated within deep, soft sediments. In the wider region, burials have been limited to these deposits that occur along the coastline, to the east of the present study area. Within the study area, there is low potential for burials to occur or be preserved.

5.0 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, areas of disturbance, as well, as land owner histories. This research will lead to understanding historical archaeological potential for the site.

5.1 Regional Background

The history of Appin has been compiled and documented in several published and web-based sources. Primary research was also undertaken regarding the land use history in the area and is presented in the following section.

5.1.1 Establishment of Appin

Establishment of a reliable food supply for the settlers of Sydney was one of the driving factors behind expansion of the infant settlement of Appin. Chronic food shortages in the Colony were to be addressed by the creation of farming centres on the Hawkesbury, Airds and Appin plains. Governor Macquarie established the five Macquarie towns in the Hawkesbury, while he designed Liverpool to be the capital of the southwest, with the townships of Campbelltown and Appin in the Airds and Appin parishes respectively (Jack and Jeans 1996:24).

Governor Macquarie named Appin in 1811 after a small coastal village in Argyleshire (Scotland) where his wife was born. Deputy Commissary General William Broughton received the first local land grant that year. He called his 1000 acres Lachlan Vale after the Governor (www.stonequarry.com.au/towns/appin.html).

The following year Macquarie gave 100 acres to Andrew Hume who had journeyed to NSW in 1789 as an instructor in agriculture. His sons were John and Hamilton, the latter becoming a noted explorer. With an Aboriginal guide the two Hume boys made their first exploratory trip south in 1814, crossing the Razorback range and examining the areas now occupied by Picton, Mittagong, Bowral, Berrima and Bong Bong. Two years later they travelled to the Goulburn Plains (www.stonequarry.com.au/towns/appin.html).

Hamilton Hume was granted 300 acres at Appin. The 1824 Hume and Hovell expedition to Port Phillip left from the Appin Road, at a point indicated by a monument erected in 1924 to mark the centenary of the expedition. The monument is made of stone taken from the Hume house (www.stonequarry.com.au/towns/appin.html).

Urban growth was slow, with most of the area held in large pastoral or agricultural holdings, settlers tending to establish cattle and wheat properties. The Appin town site was formally surveyed in 1834 by Mitchell.

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.

5.1.2 Contact, massacre and continuation

By July 1813 Europeans had begun to encroach on traditional Aboriginal land, having established farms in the area. Traditional Aboriginal custodians were experiencing severe economic and social disruptions as a result of lack of access to traditional lands, the introduction of diseases and the settlement of displaced Aborigines from other areas. All these factors placed pressure on food supplies and increased tensions between Aboriginal and settler communities. Section 4.1 outlines the 'Appin massacre' which resulted from escalating hostilities between Aborigines and settlers.

Despite the massacre of 1816 there remained a continued Aboriginal presence within the area. Aboriginal people became increasingly involved with European settlement, working as stockmen and labourers on farms and as domestic help (JRC 1993:20). The establishment of two Aboriginal reserves in Burragorang (one at Pocket Creek, the other at Tonalli), reflects an Aboriginal population in the Wollondilly region. These reserves, however, were not the sole focus for Aboriginal activity in the area. Aboriginal people contributed, and continue to contribute, to the economic and social fabric of the whole area.

5.1.3 Pastoral Expansion

Agricultural pursuits in the area commenced with grazing. Initially unplanned, following the escape of cattle which prospered in the area (ever after known as Cow Pastures), more formal grazing pursuits commenced with establishment of the permanent settlement. Government stockyards were established and the landholders ran cattle. Later diversification saw dairying assume increasing importance to the community, although this was after the introduction of the railway and refrigeration (JRC Planning 1993:21). There are several examples of early dairy farms with byres and bails in the Appin area.

Wheat was another important early industry, with the area around Appin particularly suited for growing wheat. In response to this, several mills were established, where the grain was ground prior to dispatch. Severe outbreaks of rust in the 1870s largely destroyed the wheat industry in the area (JRC Planning 1993:22).

With the collapse of the wheat industry, diversification of agriculture occurred. Dairying and its related services remained an important regional industry until well into the twentieth century, declining in the 1960s. Orcharding was taken up in the areas surrounding Appin, reaching its peak in the 1950s. Grape growing for wine production enjoyed success in a few limited locations, while there was also a (commercially unsuccessful) brewery in operation at Blaxland's Crossing. Smaller, boutique industries such as Tang nuts and mushrooms have also contributed to the local economy. Within the past 50 years an intensive chicken farm has also been established in the Appin area by Inghams Enterprises Pty Ltd.

The advent of the railway opened the produce of the Appin area to larger markets. The railway did not pass through Appin, going instead to Picton. As a result, the increase in development such as was seen at settlements graced with a railway station or sidings, was not experienced at Appin.

5.1.4 Coal Mining Leases

Coal deposits in the Illawarra were first officially documented by George Bass in 1797 near Coalcliff (http://www.illawarracoal.com). A number of coal seams were subsequently discovered throughout the Illawarra over the next century, becoming a major industry in the region. However, the first mining leases were not established in the Appin region until the early 20th century, following the proclamation of the State Coal Mine Reserve in November 1926 (Wedderburn Parish Map 1972). This Reserve encompasses the present study area. A series of longwalls (34 - 36) for the West Cliff Colliery are to be excavated under the current study area.

5.2 Previous Archaeological Work and Heritage Listings

No previously listed heritage sites have been recorded within the study area.

Navin Officer undertook a cultural heritage assessment in relation to a proposed Gas Turbine Power Station immediately north of Leafs Gully (2006). The report concluded that based upon the agricultural context of the study area, unrecorded historic sites and features of heritage significance which may occur within this study area are likely to be:

- Structures of historic interest and heritage significance (buried, standing, ruined, abandoned or still in use).
- Nineteenth century structures and their associated infrastructure, such as fence lines, farm dwellings, outbuildings which may still be standing or as ruins, or archaeological deposits on less developed rural properties and in or near established farm complexes.
- Archaeological sites, such as occupation remains of former dwellings including homesteads, house and huts, distributed in close association with land settlement patterns, and favourable agricultural land and transport corridors.

One European historic site was located during this assessment, part of the *Sydney Water Supply Upper Canal System.* This site is located beyond the current study area and will not be impacted by the proposed boreholes.

The undulating rural slopes around Appin have been recorded within the Wollondilly Local Government Authority (LGA) Heritage Study as cultural heritage landscape feature (JRC 1993). The identification of cultural landscape units within the LGA was used to identify specific visual catchments of a homogenous nature, particularly crucial in the development of the historic landscape setting of Wollondilly. A number of heritage items were recorded within this landscape, including the village of Appin, the sandstone water supply canal and a

series of well defined '…evocative clusters of farm buildings, mostly of sandstone within a distinctive architectural character associated with early settlement on the smaller grants in the Appin area' (JRC 1993). The landscape features also includes an undulating pastoral terrain, vegetated gullies and valleys draining towards the Nepean and scattered dams. Though the current study area is within this landscape feature, no heritage items were listed in this document within the present study area.

5.3 Discussion – study area

The study area is located 2 km to the north of the township of Appin and is situated between the parishes of Menangle and Appin, the boundaries of which are situated north and south of Mallaty Creek respectively.

Plate 3: Early Menangle parish map (A025795).

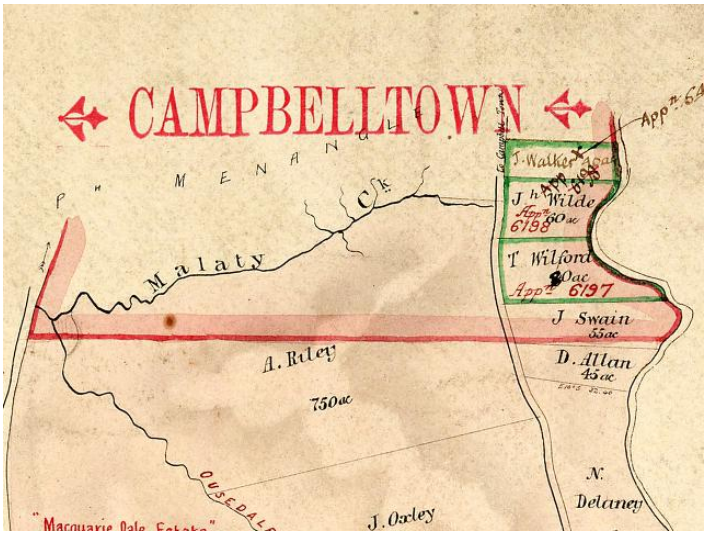

Plate 4: Early Appin parish map (http://www.lands.nsw.gov.au/survey_mapping/parish_maps 140611).

The main historical use of the study area has been as pastoral land. Early parish maps show initial land grants were awarded to the following individuals:

Grant	Acres	Parish	Granted
Nicholas Divine	400	Menangle	Noted on Menangle parish map c.1870
J. O'Neale	50	Menangle	Noted on Menangle parish map c.1870
Malachi Ryan	50	Menangle	Noted on Menangle parish map c.1870
Robert Miles	40	Menangle	10 June 1815
Joseph Marcus	30	Menangle	10 June 1815
George Grossley	240	Menangle	Noted on Menangle parish map c.1870
Alexander Riley	750	Appin	c.1820s

Table 2: Original land grant owners within the study area.

George Crossley owned land associated with the north western section of the study area bordering Leafs Gully. Crossley was an English lawyer charged with forging a will in 1796. He was transported to Australia for seven years and arrived at Port Jackson in 1799. By 1803 he was again practicing law in Sydney as those with legal training were in short supply. He was again convicted of perjury in 1821 and died in 1823. The adjourning 400 acres was granted to Nichols Divine by 1818. Divine was the Principal Superintendant of Convicts (Navin Officer 2006). His primary residence was located at Bulanaming, near Newtown which he was granted in 1799. As a tenant at will he also cultivated for some years land on either side of the stream which ran into Farm Cove (http://www.adb.online.anu.edu.au/biogs/A010293b.htm?hilite=divine). Lands and Titles information records Thomas Devine as the owner occupier for an area of land including Divine and Crossley's original grants by 1914 (DP 70208). Thomas Divine is also listed as a farmer of the Appin District in the NSW Post Office Directory for 1904.

Today the area encompassing Leafs Gully, Leafs Gully Road, north of Mallaty Creek operates as a trotting horse breeding and training facility. The majority of the land has been cleared for pasture and pockets of riparian vegetation remain along Leafs Gully. A private horse race track has been constructed, as well as three houses and associated sheds, infrastructure and horse yards. No items of historical significance have been recorded within this section of the study area. Navin Officer identified no items of historical archaeological significance within this area during a recent heritage assessment (2006).

The smaller land grants located east of Divine's property have been used as pastoral holdings with much of the original vegetation cleared and the area planted with pasture grasses. 'Blossom Lodge' occurs on the land originally granted to Robert Miles and is identified in DP 70208 from the Department of Lands and Titles dated 1914. This building infrastructure is

outside the impact footprint of the proposed borehole locations (Figure 4). Malachi Ryan, owner of one of these grants was appointed constable of Appin in 1822 and Chief Constable in 1884 (Whitaker 2005:114). Sheraton Homes are the current owners/tenants of the land within the study area north of Mallaty Creek, which continues to be operated for farming, grazing and waste disposal purposes.

The southern potion of the study area consists of land granted to Alexander Riley. Riley was originally granted 1250 acres of land on the 35 August 1812 which was later named 'Elladale'. The 750 acres within the study area appears to have been an additional grant. Alexander Riley came to NSW in 1804 and after serving as storekeeper and magistrate in Tasmania and Secretary to the colony in Sydney he resigned. He went on to become a prosperous farmer and trader. His principal place of residence was at Burwood (http://www.heritage.nsw.gov.au).

A subdivision sale plan for the 'Ousedale and Malton Estate' dated c.1850 shows the area south of Mallaty Creek. A number of buildings or structures are already evident, though only one is itemised ('old stockyard') (http:///www.nla.gov.au/cdview/nla.map-f445) (Figure 5). Information from the Department of Lands and Titles dated 1914, records the subsequent owners of the land south of Mallaty Creek as S. Byrne (tenanted by W. Harvey) and George Kershler (tenanted by Patrick Bourke) (DP 70208). The Byrne family regularly appear in the early history of Appin (Percival 1992). Within the past 50 years an intensive chicken farm has also been established by Inghams Enterprises Pty Ltd within and south of the current study area. Sebastion Holdings (Lots 10, 11 and 12 DP744101) and J. Malfitana (Lot Pt3 DP752012) are the current owners/tenants between Inghams and Mallaty Creek, which continues to be operated for farming and grazing purposes.

Previous assessments and observations during the survey noted that the current owner or tenants of a large portion of land within the study area have been using the paddocks to dispose of food-grade oils by ploughing them into the ground surface at a depth where they do not leach out, presumably more than 40 cm below the current ground surface (Biosis Research 2007a). Some paddocks are being used for horse and cattle grazing though most were left contaminated from the oil refuse disposal.

The Eastern Gas Pipeline (also referred to as the Moomba Sydney Gas Pipeline) transects the western section of the study area in a north south direction. More recently AGL have constructed a stockpile area used to service works on the gas pipeline which is located immediately to the east (Biosis Research 2007 a). An easement containing a 330 kV and 66 kV electricity line also transects the study area to the west of the gas pipeline in a north south direction. A number of dams have also been constructed along both the Leafs Gully and Mallaty Creek drainage areas. Several sealed roads and graded dirt tracks also exist within the study area (Figure 3).

5.4 Discussion

It appears the land within the study area was cleared at an early stage of European settlement in the area. From the initial historic occupation of the land until present, the primary use of the study area has been for grazing and agricultural purposes. Buildings, most likely farm houses, out buildings, and agricultural infrastructure are known to exist within the study area by the 1850's, however early maps suggest that the location of the proposed boreholes will not impact upon these structures or remains.

The southern section of the study area, below Mallaty Creek has been identified within the Appin historical landscape in the Wollondilly Heritage Study (JRC 1993). The historic landscape reflects the historic settlement processes played out across the Colony of NSW, in this case the formation of rural community established along a key road corridor (Appin Road). As the borehole structures will not be permanent fixtures and the infrastructure will be removed following the completion of the longwall mining process, the visual curtilage associated with this Appin area heritage vista is unlikely to be impacted by the proposed works.

It is anticipated that no historical archaeological remains or permanent landscapes will be impacted by the proposed borehole locations. The archaeological survey will help to determine this desktop assessment.

6.0 SURVEY

6.1 Survey Methods

An archaeological field assessment of the study area was undertaken on 12 and 13 June 2007. Representatives of the Tharawal Local Aboriginal Land Council (Leanne Hestelow) and the Cubbitch Barta Native Title Claimant Group (Glenda Chalker) participated in both days of survey. A targeted field method was employed for the survey of the site. The survey targeted areas within the impact footprint of each of the proposed borehole locations. All borehole locations were navigated to using a handheld GPS. An area of 30 x 30 m was then examined in detail around the proposed location. At each of these locations, landform, visibility, ground surface exposure, level of disturbance and archaeological sensitivity were noted. The general area was also assessed for areas of archaeological potential.

If the area appeared to be unsuitable for a borehole, a new site was examined, preferably located on a previously disturbed area to reduce the amount of additional disturbance required.

6.1.1 Constraints to the survey

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

Visibility

In most 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 primary factor that affects visibility is vegetation cover; however other things such as introduced fill will also significantly hamper visibility and surface site detection. Grassed paddocks obscure most of the ground surface within the current study area and were the major contributing factor that restricted visibility during this assessment. Riparian woodland vegetation occurs along Mallaty Creek and Leafs Gully and obscures much of the ground surface in these areas, providing very poor surface visibility.

Navin Officer (2000: 49-50) provide a good discussion on considerations of visibility and site obtrusiveness on the Woronora Plateau and Illawarra Escarpment. 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. (Navin Officer 2000: 49).

Exposure:

Exposure refers to the geomorphic conditions of the local landform being surveyed, and attempts to describe the relationship between those conditions and the likelihood the prevailing conditions that allow for the exposure of (buried) archaeological materials. Whilst 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. The majority of the study area is a a residual landscape. Such 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.

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 scalding. 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, creation of dams, vehicle tracks, buildings and farming infrastructure. The Eastern Gas Pipeline and its associated works such as the Mallaty Creek Stockpile and an electricity easement also contribute to the disturbance of the study area. Overall, the study area displays moderate evidence of disturbance.

6.1.2 Measures of survey effectiveness

For those survey transects where estimates of ground surface exposure and visibility are appropriate—transects located on vehicle tracks or seismic lines—then the standard definitions of exposure and visibility were recorded and are provided, along with the standard assessment of survey effectiveness (Burke and Smith 2004: 80, NSW NPWS 1997: Appendix 4):

- Visibility – a percentage estimate of the total visible ground surface of a survey area.
- Exposure – a percentage estimate of the transect area that has been exposed through natural or human agency to potentially reveal (buried) archaeological material.

6.2 Survey Results

6.2.1 Existing Condition of the Study Area

Borehole CP01 Position (56Z) E 293721 N 6218155						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Gentle foot slope; Undulating plain	**Blacktown (bt)**	**Cleared paddock**	**Moderate**	**0**	**0**	**none**

Survey Description	Photo of Site
Borehole CP01 is located on a gently sloping to level footslope slope, within a cleared paddock. Leafs Gully Creek is approximately 300 m to the north. The Eastern Gas Pipeline is located approximately 100 m west of the site. The tenant/property owner has used the area to recycle oil-based food waste by ploughing it into the ground at reasonable depth. This practice was observed within the paddock at the time of the assessment. There is a pervasive smell of old frying oil within the area and this activity will have disturbed the top soil profiles. 5 m to the south a track runs parallel to the borehole location in an east west direction. Soil units within this area are considered to be moderately disturbed. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. No Aboriginal or historical archaeological remains were located.	 Plate 5: Proposed borehole CP01 location facing west.

Alternative Borehole Locations, Issues and Recommendations
The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP01

Borehole CP02 Position (56Z) E 294415 N 6217657						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
midslope slope above creek line	**Blacktown (bt)**	**Cleared paddock**	**Moderate - high**	**0**	**0**	**open camp site 52-2-0021 Douglas Park**

Survey Description	Photo of Site

Borehole CP02 is located on a mid – lower slope above the steep slope to Mallaty Creek bed. The area has been cleared of most tree cover with a fringe of remnant trees within the riparian zone along the creek margins. The area consists of pasture with low grasses and weeds. Two large dams have been excavated into the banks. Outcrops of sandstone bedrock are exposed along the slope. These were carefully inspected but none had grinding grooves or wells. At the time of the survey exposure and visibility was 0% as paddock grasses obscured the ground surface.

The area is located between approximately 100 m to 170 m north of Mallaty Creek.

40 m to the north of the site location, a dirt road is used by vehicles accessing western pastures and the stockpile area. The track follows a relatively even contour across the mid-slope and appears to have been recently graded in the past for access to the stockpile located immediately north of the assessment area.

The Agility Gas stockpile has recently been created and this area is extensively disturbed. Soil units associated with the upper slope are considered to be extremely disturbed with no integrity. The soil units around the location of the borehole have been moderately disturbed through general farming practices.

No Aboriginal or historical sites were located.

Though there are localised areas of high disturbance, there is reasonable potential for intact stratigraphic soil profiles, and potentially archaeological deposits, in areas of lower disturbance. Given the character of the other artefact sites in the area, and the moderately graded slope, it is likely any sites located within this landform represent a background scatter of artefacts rather than a high density artefact site.

Plate 6 :newly graded track and location of disturbed site 52-2-0021

Plate 7: Proposed borehole CP02 location facing east. Small dam situated 10 m to east.

Cultural Heritage

52-2-0021 Douglas North

An **open camp site (52-2-0021)** is registered within the dirt road above the proposed borehole location. There is no information contained within the original site card as to the composition and variety of stone tools identified at the site. Biosis Research (2007) located a broken artefact (red silcrete 16 x 11 x 4 mm) embedded into the road surface, 20 m west of the registered site location. Despite careful survey of surrounding areas no other archaeological material was identified. The artefact was been considered as a component of the previously registered site given its close proximity to the registered location.

This site was not relocated during the current survey. Due to considerable disturbance having taken place since the previous survey was undertaken, as a result of the construction and use of the Mallaty Creek stockpile area. A new track has been graded across the location of the site and it is likely that the site has been removed or covered from introduced soils used to surface the track.

Alternative Borehole Locations, Issues and Recommendations

- The borehole site CP02 should be situated within areas of low aboriginal archaeological sensitivity associated with existing areas of disturbance on the general area.
- Impacts associated with the construction, use and maintenance of the borehole should avoid the 10 m riparian corridor along Mallaty Creek as this area is identified as having moderate archaeological sensitivity.
- No historical archaeological constraints are associated with borehole site CP02 .

Borehole CP03 Position (56Z) E 294270 N 6218229						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Steep midslope: undulating plain	**Blacktown (bt)**	**Cleared paddock**	**Moderate**	**0**	**0**	**none**

Survey Description

Borehole CP03 is located on a gentle midslope, within a cleared paddock. Mallaty Creek is approximately 300 m to the south. A small dam and road are also areas of disturbance located approximately 100 m to the south of the proposed borehole location. Steep slopes were not favoured as occupation sites by Aboriginal people and the site has low potential for Aboriginal archaeological sites. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface.

No Aboriginal or historical sites were located.

Photo of Site

Plate 8: Proposed borehole CP03 location facing south west towards Mallaty Creek.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP03.

Borehole CP04 Position (56Z) E 294771 N 6217405						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
gentle midslope towards Mallaty Creek	**Blacktown (bt)**	**Cleared paddock with pockets of native vegetation regrowth**	**Low - moderate**	**10**	**80**	**none**

Survey Description

Borehole CP04 is located on a moderate midslope about 40 m above Mallaty Creek to the north. The area is predominantly cleared of vegetation and grasses and paddock cover most of the ground surface. Grey Box, Red Gum and a sparse shrub layer were also recorded at this proposed borehole site. At the time of the survey paddock grasses obscured most of the ground surface, though some exposures with higher surface visibility associated with rock outcropping and shallow soils were recorded. These areas were closely inspected.

The site 52-2-2237 (Ousedale Creek 3) is located approximately 400 m west of the borehole within Mallaty Creek and will not be impacted by the proposed works Mallaty Creek is approximately 300 m to the south.

The borehole location has low Aboriginal archaeological potential. The riparian corridor (approx. 10 m) along Mallaty Creek (north of the borehole) was identified as

Photo of Site

Plate 9: Proposed borehole CP04 location facing west,

retaining moderate Aboriginal archaeological potential. No Aboriginal or historical sites were located.	Mallaty Creek is located to the right of the picture.

Alternative Borehole Locations, Issues and Recommendations

- Low Aboriginal and historical archaeological potential within existing areas of disturbance.
- No impacts to Aboriginal or historical archaeological heritage.
- Impacts associated with the construction, use and maintenance of the borehole should avoid the 10 m riparian corridor along Mallaty Creek as this area is identified as having moderate archaeological sensitivity.
- It is recommended that the borehole location be moved to an area of lower archaeological sensitivity (E294810 N6217375).

Borehole CP05 Position (56Z) E 295725 N 6217579

Landform	Soil Landscape	Context	Disturbance	Exposure %	Visibility %	Archaeology
gentle midslope towards Mallaty Creek	**Blacktown (bt)**	**Cleared paddock with pockets of native vegetation regrowth**	**Low - moderate**	**0**	**0**	**none**

Survey Description

Borehole CP05 is located on a moderately steep midslope about 50 m above Mallaty Creek to the north. The area is predominantly cleared of vegetation and grasses and paddock cover most of the ground surface. At the time of the survey, paddock grasses obscured the ground surface and visibility was 0%. A small dam was located immediately north of the proposed borehole location and the soil profile in association with this area has been heavily disturbed. The spoil exposure associated with the dam was closely inspected and no artefacts were located.

Borehole CP05 is identified as retaining low Aboriginal archaeological potential. The riparian corridor (approx. 10 m) along Mallaty Creek (north of the borehole) was identified as retaining moderate Aboriginal archaeological potential.

No Aboriginal or historical sites were located.

Photo of Site

Plate 10: Proposed borehole CP05 location facing south west towards Mallaty Creek.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP05.
- Impacts associated with the construction, use and maintenance of the borehole should avoid the 10 m riparian corridor along Mallaty Creek as this area is identified as having moderate archaeological sensitivity.

Borehole CP06 Position (56Z) E 295405 N 6217381						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Moderately steep midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description	Photo of Site
Survey Description	Photo of Site
Borehole CP06 is located on a moderately steep midslope. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. A fence line marking a paddock boundary runs adjacent to the borehole location in a north south direction. Disturbance to the locality will have been caused from vegetation clearance during the creation of the paddock and the installation of the fence. Mallaty Creek is located approximately 300 m to the north. Steep slopes were not favoured as occupation sites by Aboriginal people and the site has low potential for Aboriginal archaeological sites. No Aboriginal or historical sites were located.	 Plate 11: Proposed borehole CP06 location facing west.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP06

Borehole CP07 Position (56Z) E 295725 N 6217579						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
gentle midslope	**Blacktown (bt)**	**Cleared paddock**	**Low**	**0**	**0**	**none**

Survey Description	Photo of Site
Borehole CP07 is located on a gentle midslope about 600 m south of Mallaty Creek. The area is cleared of native and paddock grasses cover most of the ground surface. At the time of the survey, paddock grasses obscured the ground surface and visibility was 0%. Two dams were located east of the proposed borehole location. No Aboriginal or historical sites were located.	 Plate 12: Proposed borehole CP07 location facing west.

Alternative Borehole Locations, Issues and Recommendations
• The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the proposed location for borehole CP07.

Borehole CP08 Position (56Z) E 295693 N 6217177						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Moderately sloping midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description	Photo of Site
Borehole CP08 is located on a moderately steep midslope about 15 m west of a dam marking the head of Mallaty Creek. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. The tenant/property owner has used the area to recycle oil-based food waste by ploughing it into the ground at reasonable depth. This practice was observed within a nearby paddock at the time of the assessment. There is a pervasive smell of old frying oil within the area and this activity will have disturbed the top soil profiles. Soil units within this area are considered to be moderately disturbed. Steep slopes were not favoured as occupation sites by Aboriginal people and the site has low potential for Aboriginal archaeological sites. No Aboriginal or historical sites were located.	 Plate 13: Proposed borehole CP08 location facing south east towards a dam.

Alternative Borehole Locations, Issues and Recommendations
• The study has low potential for Aboriginal or historical archaeological remains.There are no archaeological constraints to the location of borehole CP08.

Borehole CP09 Position (56Z) E 295368 N 6216978						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Steep top slope/ drainage line gully	**Luddenham (lu)**	**Cleared paddock**	**moderate**	**20**	**90**	**none**

Survey Description	Photo of Site

Borehole CP09 is located on a steep top slope of a gully, about 900 m south of Mallaty Creek. At the time of the survey, paddock grasses obscured much of the ground surface and visibility was 0% in these areas. An area of eroding soil exposure was located near to the proposed borehole location and was closely inspected for archaeological remains. Soils within the exposure were red brown and clayey with some small rock and shale fragments. Disturbance to the locality will have been caused from vegetation clearance during the creation of the paddock and the natural erosion processes.

No Aboriginal or historical sites were located.

Plate 14: Proposed borehole CP09 location facing south west towards Mallaty Creek.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP09.

Borehole CP10 Position (56Z) E 294771 N 6217405

Landform	Soil Landscape	Context	Disturbance	Exposure %	Visibility %	Archaeology
Gentle midslope	Blacktown (bt)	Cleared paddock	moderate	30	10	none

Survey Description

Borehole CP10 is located on a gentle midslope within a paddock about 30 m east of a dam marking the head of Mallaty Creek. The tenant/property owner has used the area to recycle oil-based food waste by ploughing it into the ground at reasonable depth. This practice was observed within a nearby paddock at the time of the assessment. There is a pervasive smell of old frying oil within the area and this activity will have disturbed the top soil profiles. The ploughing had exposed much of the top soil layer and visibility was high, however the soil profile has been moderately disturbed from this process. The soil was very muddy at the time of the assessment and the paddock could not be accessed. The borehole location was visible from a dirt track located approximately 20 m west of the site.

No Aboriginal or historical sites were located.

Photo of Site

Plate 15: Proposed borehole CP10 location facing north east.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP10.

Borehole CP11 Position (56Z) E 295662 N 6216767						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Moderately sloping midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description

Borehole CP11 is located on a gentle midslope within a paddock about 100 m west of a small dam. The tenant/property owner has used the area to recycle oil-based food waste by ploughing it into the ground at reasonable depth. This practice was observed within a nearby paddock at the time of the assessment. There is a pervasive smell of old frying oil within the area and this activity will have disturbed the top soil profiles. Paddock grasses and exotic weeds obscured the ground surface which was very uneven underfoot. Ground surface exposure and visibility were 0% during the survey. The soil profile has been moderately disturbed from this process.

No Aboriginal or historical sites were located.

Photo of Site

Plate 16: Proposed borehole CP11 location facing north east towards a dam.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP11.

Borehole CP12 Position (56Z) E 295950 N 6216562						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Gentle midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description

Borehole CP12 is located on a moderately steep midslope about 100 m north of a dam and 20 m south of a paddock fence line. The borehole site is located approximately 10 m east of a group of Inghams chicken sheds. The dam is located at the head of the drainage line for Lily Ponds Gully. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. Steeper slopes were not favoured as occupation sites by Aboriginal people and the site has low potential for Aboriginal archaeological sites.

No Aboriginal or historical sites were located.

Photo of Site

Plate 17: Proposed borehole CP12 location facing east.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP12.

Borehole CP13 Position (56Z) E 0296228 N 6216363						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Moderately sloping midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description	Photo of Site
Borehole CP13 is located on a moderately steep midslope about 100 m north of a dam. The dam is located at the head of the drainage line for Lily Ponds Gully. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. Disturbance to the locality will have been caused from vegetation clearance during the creation of the paddock. No Aboriginal or historical sites were located.	 Plate 18: Proposed borehole CP13 location facing south towards a dam.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP13.

Borehole CP14 Position (56Z) E 295249 N 6216641						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Moderately sloping lower slope	**Luddenham (lu)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description	Photo of Site
Borehole CP14 is located on the lower undulating slope of a gully. Mallaty Creek is located 750 m to the north. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. Pockets of blackberry bushes were also growing on the slope. Steep slopes were not favoured as occupation sites by Aboriginal people and the site has low potential for Aboriginal archaeological sites. No Aboriginal or historical sites were located.	 Plate 19: Proposed borehole CP14 location facing south east towards a dam.

Alternative Borehole Locations, Issues and Recommendations
• The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP14.

Borehole CP15 Position (56Z) E295546 N 6216443						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
gentle sloping midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description	Photo of Site
Borehole CP15 is located on a gentle slope about 10 m south of a track and a cluster of Inghams chicken sheds. A series of dams associated with the drainage line of Lily Ponds Gully are located approximately 30 m away. No major creeks are located within 500 m of the borehole site. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. Disturbance to the locality will have been caused from vegetation clearance during the creation of the paddock. No Aboriginal or historical sites were located.	 Plate 20: Proposed borehole CP15 location facing south towards a dam.

Alternative Borehole Locations, Issues and Recommendations
• The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP15.

Borehole CP16 Position (56Z) E 0296228 N 6216363						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
gentle midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description

Borehole CP16 is located on a gentle midslope adjacent to the Inghams Enterprises driveway, 10 m south of a dam The dam is located at the head of the drainage line for Lily Ponds Gully. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. Disturbance to the locality will have been caused from vegetation clearance during the creation of the paddock. No major creeks or rivers are located within 500 m of the borehole site.

No Aboriginal or historical sites were located.

Photo of Site

Plate 21: Proposed borehole CP16 location facing south.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no archaeological constraints to the location of borehole CP16.

Borehole CP17 Position (56Z) E 296222 N 6215947						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Moderately sloping midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description

Borehole CP17 is located on a moderately steep midslope about 20 m north of a dam. The dam is located at the head of the drainage line for Lily Ponds Gully. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. Disturbance to the locality will have been caused from vegetation clearance during the creation of the paddock.

No Aboriginal or historical sites were located.

Photo of Site

Plate 22: Proposed borehole CP17 location facing south towards dam.

Alternative Borehole Locations, Issues and Recommendations

- The study has low potential for Aboriginal or historical archaeological remains. There are no

archaeological constraints to the location of borehole CP17.

Borehole PA01 Position (56Z) E 293721 N 6218155						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Moderately sloping midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description

Borehole PA01 is located on a gentle midslope within a paddock approximately 10 m south of a dirt track, and 20 m east of a private horse racing track. Leafs Gully Creek is located 20 m to the north of the proposed site. At the time of the survey exposure and visibility were 0% as paddock grasses obscured the ground surface. Disturbance to the locality will have been caused from vegetation clearance during the creation of the paddock.

No Aboriginal or historical sites were located.

Artefact scatter site **52-2-2265 (Leafs Gully 1)** is located on an existing dirt track that will be used to access borehole PA01 and PA04 (further discussed in PA04). The track is in regular use by the owner/tenant of this property as a link between the horse trotting race track and the other paddocks.

Photo of Site

Plate 23: Proposed borehole PA01 location facing north east towards a dam.

Alternative Borehole Locations, Issues and Recommendations

Borehole

- Borehole site PA01 has low potential for Aboriginal or historical archaeological remains.
- There are no archaeological constraints to the location of borehole PA01.

Access Track

- Artefact scatter site **52-2-2265 (Leafs Gully 1)** was located on both sides of a track used to access borehole sites PA04 and PA01. The site has been disturbed and is no longer in its original context.
- The track may continue to be used during the borehole works and no further action is required.
- To avoid impacting the site and the area of moderate Aboriginal archaeological sensitivity on either side of the track, disturbances outside the track should be avoided. This includes vehicle parking and equipment storage in any paddocks to the west of the track.
- All contractors should be notified on the importance of remaining within the track when accessing borehole sites PA01 and PA04.

Borehole PA02 Position (56Z) E 293925 N 6218435						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Leafs Gully	**Blacktown (bt)**	**Cleared vegetation with pockets of native vegetation regrowth**	**moderate -high**	**15**	**20**	**none**

Survey Description

Borehole PA02 is located on a flat area 10 m east of Leafs Gully Creek. The area is predominantly cleared of vegetation and grasses cover most of the ground surface. The soil profile shows signs of previous disturbances from vegetation clearance and the creation of a dirt access track, Grey Box, Red Gum and a sparse shrub layer were also recorded within the riparian vegetation zone of Leafs Gully. At the time of the survey paddock grasses obscured most of the ground surface, though some exposures with higher surface visibility (associated with rock outcropping and shallow soils) was recorded. The soil was rocky brown and sandy in character. These areas were closely inspected for sites.

No Aboriginal or historical sites were located.

The borehole location is situated close to a permanent water source, however given the previous disturbances associated with the site there is low potential for Aboriginal archaeological remains. Towards Leafs Gully and within areas of minimal disturbance the area has moderate potential for Aboriginal archaeological material to exist.

The site is accessed from a dirt track located off Leafs Gully Road.

Photo of Site

Plate 24: Proposed borehole PA02 location facing west towards Leafs Gully.

Alternative Borehole Locations, Issues and Recommendations

- Borehole PA02 has low potential for Aboriginal archaeological remains. There are no historical heritage constraints.
- The borehole should be located within the existing disturbances (track and clearing). A preferred borehole location is E294033 N6218373.

Borehole PA03 Position (56Z) E 294360 N 6218248						
Landform	**Soil Landscape**	**Context**	**Disturbance**	**Exposure %**	**Visibility %**	**Archaeology**
Leafs Gully	**Blacktown (bt)**	**Cleared paddock with pockets of native vegetation regrowth**	**Low - moderate**	**10**	**80**	**none**

Survey Description

Photo of Site

Borehole PA03 is located on a flat area 10 m north of Leafs Gully Creek. The area has previously been cleared of vegetation and regrowth covers most of the ground surface. Grey Box, Red Gum and a sparse shrub layer were also recorded within the riparian vegetation zone of Leafs Gully. The soil profile shows signs of previous disturbances from vegetation clearance. At the time of the survey grasses and low bushes obscured most of the ground surface, though some exposure with higher surface visibility (associated with rock outcropping and shallow soils) was recorded. The soil was rocky brown and sandy in character. These areas were closely inspected for sites.

No Aboriginal or historical sites were located.

The borehole location is situated close to a permanent water source, however given the previous disturbances associated with the site and the shallow soil profile, there is low potential for Aboriginal archaeological remains. Towards Leafs Gully and within areas of minimal disturbance the area has moderate potential for Aboriginal archaeological material to exist.

The site **52-2-2265 (Leafs Gully 1)** is located approximately 20 m to the west of the borehole along an existing dirt track (discussed further in PA04). Impacts to the site should be avoided during the construction of the borehole by accessing the site through a paddock, off Leafs Gully Road.

Plate 25: Proposed borehole PA03 location facing west.

Alternative Borehole Locations, Issues and Recommendations

- The study has moderate potential for Aboriginal archaeological remains.
- It is recommended that the borehole location be moved to an area of lower archaeological sensitivity. A preferred borehole location is E294449 N6218083.
- To avoid impacting site 52-2-2265 and areas of moderate archaeological potential along Leafs Gully Creek, access to the site should be via an existing paddock gate off Leafs Gully Road.
- There are no historical heritage constraints.

Borehole PA04 Position (56Z) E 295662 N 6216767

Landform	Soil Landscape	Context	Disturbance	Exposure %	Visibility %	Archaeology
Moderately sloping midslope	**Blacktown (bt)**	**Cleared paddock**	**moderate**	**0**	**0**	**none**

Survey Description

Borehole PA04 is located on a gentle midslope within a paddock about 30 south of Leafs Gully. The tenant/property owner has used the area to recycle oil-based food waste by ploughing it into the ground at reasonable depth. This practice was observed within a nearby paddock at the time of the assessment. There is a pervasive smell of old frying oil within the area and this activity will have disturbed the top soil profiles. Paddock grasses and exotic weeds obscured the ground surface which was very uneven underfoot. Ground surface exposure and visibility were 0% during the survey. The soil profile has been moderately disturbed from this process.

No Aboriginal or historical sites were located at the borehole site.

The site **52-2-2265 (Leafs Gully 1)** is located approximately 10 m to the west of the borehole along an existing dirt track. Use of this track to access the borehole location during its construction and maintenance will impact upon this artefact scatter site.	Plate 26: Proposed borehole PA04 location facing east.

Cultural Heritage

52-2-2265 (Leafs Gully 1)

Several artefacts made from a range of raw materials, including silcrete, mudstone and quartz were located along the surface of an unsealed track accessed from the western end of Leafs Gully Road. Leafs Gully Creek transects the site in a general east west direction. The site was previously recorded by Navin Officer (2002). Ground surface visibility along the exposed track was good (90%).

The site was relocated and an additional number of flakes were identified, extending the extent of the site along the full length of the track. The current survey confirms the Navin Officer findings, that 'artefact density and landscape setting suggest the site is potentially part of a very low density of 'background scatter' '(2002).

Artefacts located along the length of the track included:

1 x yellow mudstone flake
2 x silcrete flakes
2 x quartz flakes

The track is in regular use by the owner/tenant of this property as a link between the horse trotting race track, the homestead and the other paddocks. Other disturbances to the site include initial vegetation clearance, road grading and farming practices associated with the adjacent paddocks.

Plate 27: Examples of artefacts located at site 52-2-2265

Plate 28: Silcrete flake located at site 52-2-2265 .

Alternative Borehole Locations, Issues and Recommendations

Borehole

- Borehole site PA04 has low potential for Aboriginal or historical archaeological remains.
- There are no archaeological constraints to the location of borehole PA04.

Access Track

- Artefact scatter site 52-2-2265 (Leafs Gully 1) was located on both sides of a track used to access borehole sites PA04 and PA01. The site has been disturbed and is no longer in its original context.
- Use of heavy machinery on the track should be avoided. Access to the borehole should be via alternative tracks through the adjacent paddock.
- To avoid impacting the site and the area of moderate Aboriginal archaeological sensitivity on either side of the track, disturbances outside the track should be avoided. This includes vehicle parking and equipment storage in any paddocks to the west of the track.
- All contractors should be notified on the importance of remaining within the track when accessing borehole sites PA01 and PA04.

6.3 Discussion

6.3.1 Aboriginal

The study area would have provided an abundance of natural resources for the local Aboriginal inhabitants to exploit. Ethnographic information regarding the study area indicates that these inhabitants belonged to the *Tharawal* speaking people. Within this group a number of sub-groups, or clans, would have existed, and inhabited various areas within the language group. The division of these 'clans' within the region is said to have followed natural boundaries, such as the Illawarra escarpment, dividing those that inhabited the coast from those that inhabited the hinterland.

Several Aboriginal archaeological assessments have previously been undertaken within the study area. These studies have been development driven and as such they tend to focus primarily on the specific impact footprints of each particular project. When assessed together they provide a general overview of Aboriginal archaeological site modelling and predictive behaviour within the current study area.

The current study area is located on the north-eastern edge of the Woronora Plateau, on a dominant geology of Wianamatta Shale. The local landscape is characterised by undulating hills and broad rounded crests, and has been mostly cleared of the native vegetation from European agricultural activities in the area. Mallaty Creek and Leafs Gully are the primary water sources within the immediate locality and would have been utilised by Aboriginal and European people alike. The predictive modelling identified that raised areas of land adjacent to water confluences are favoured places of repeat occupation for Aboriginal people within similar landscapes. Dry elevated and level ground near creek lines often contains the remains of campsites, in the form of hearths and artefact scatters as the creek systems are thought to have been used as corridors for movement between the landscapes. These areas have been identified as areas of moderate areas of archaeological potential.

Previous archaeological work within the region suggested that the Blacktown Landscape is highly likely to contain what archaeologists often refer to as a 'background scatter' of stone artefacts – that is a generally low density, discontinuous scatter of artefacts. Such a distribution of stone artefacts has been noted elsewhere in the region, in a similar environment. The results of the survey concur with this predicative statement, with two low density stone artefact scatter sites (52-2-2265 and 52-2-2237) recorded within this landscape.

The artefact scatter site 52-2-2265 (Leafs Gully 1) was relocated during the current survey and will potentially be impacted upon by the proposed works associated with the construction, use and maintenance of Borehole sites PA04 and PA01. The site has been disturbed during the construction and use of the graded dirt track and it is unlikely to be in its original context.

The artefact scatter site 52-2-0021 (Douglas North) could not be relocated during the survey and it is assumed that the site has been disturbed during the construction of the AGL Mallaty

Creek stockpile area. Leanne Hestelow (TLALC) was present during the initial relocation with Biosis Research (2007c) and identified that the archaeological site and surrounding area have been disturbed since this assessment was undertaken (*pers. comm.* 13 June 2007).

The downstream component of Mallaty Creek is characterised by Hawkesbury sandstone ridges and overhangs. These features of the Hawkesbury Sandstone often exhibit evidence of habitation, art, and functional use by the Aboriginal groups that once inhabited the area. Mallaty Creek has previously been surveyed on two occasions and one art site with archaeological deposit was located (Ousedale Creek 3). These surveys were comprehensive and it is unlikely that further shelters with archaeological sites exist along the creek. Ousedale Creek 3 was assessed to be outside the impact zone of the proposed borehole locations and will not be disturbed by the proposed works. No grinding sites were located during the survey As the previous surveys also did not identify any sites of this type it is considered unlikely that grinding groove sites will be impacted by the proposed borehole works.

The abundance and distribution of the different site types can also be attributed to variables such as exposure (the chance of finding the sites) and preservation (the chance of the site surviving). For example, sandstone shelter sites are more readily found than open artefact sites, which may be buried. Stone artefact scatter sites are also very likely to have been extensively impacted by pastoral development, meaning many sites are exposed and their context may have been destroyed.

No new sites were located during the survey. Ground surface visibility and exposure were a major limitation to identifying archaeological sites during the survey. For example, visibility was generally poor, as grassed paddocks obscured much of the ground surface. Based upon previous studies in similar landscapes and the predictive statement above, it is considered possible that low densities of artefacts remain undetected in the study area. There have been considerable levels of ground disturbance to the study area since historic occupation from land clearing, farming practices, and the construction of utility infrastructure, such as roads, gas pipelines and electricity easements. As a result, the two recorded sites have been disturbed to varying degrees and are not likely to be in their original context.

6.3.2 Historical

No historical archaeological remains or heritage items were located during the survey, in relation to the proposed borehole locations. There are no historical archaeological constraints to the proposed borehole works.

It appears the land within the study area was cleared at an early stage of settlement in the Appin area. From the initial historic occupation of the land until present, the primary use of the study area has been for grazing and agricultural purposes. Buildings, most likely farm houses, out buildings and agricultural infrastructure are known to exist within the study area by the 1850's, however early maps suggest that the location of the proposed boreholes will

not impact upon these structures or remains. The results of the survey have confirmed this preliminary assessment.

The southern section of the study area, below Mallaty Creek has been identified within the Appin historical landscape in the Wollondilly Heritage Study (JRC 1993). As the borehole structures will not be permanent fixtures and will be capped following the completion of the longwall mining process, the visual curtilage associated with this Appin area heritage vista will not be impacted by the proposed works.

7.0 SIGNIFICANCE ASSESSMENT

7.1 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** 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 NSW Department of Environment and Conservation (DEC), the NSW Heritage Office and the Commonwealth Department of Environment and Heritage (DEH). The relevant sections of these guidelines are presented below.

7.2 Aboriginal Sites – Assessment of Significance

The following Aboriginal significance assessment is based on Part 1 of the *DEC Guidelines for Aboriginal Heritage Impact Assessment* (2006). 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.

7.2.1 Aboriginal community or cultural values

The NSW DEC 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 (Social) 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 this Aboriginal community (Appendix 1). 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.

7.2.2 Archaeological (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.'

7.2.2.1 Statement of Archaeological Significance

Leafs Gully 1 (52-2-2265)

The study area possesses low scientific value based on its potential to contribute to an understanding of Aboriginal occupation and use of the local context within and the Cumberland plain/lower Blue Mountains region. Although the study area has been subjected to disturbance through European occupation and land-use practices in previous years, the artefact scatter has some potential to contribute important data regarding the overall nature and pattern of Aboriginal occupation in this region, and specific information concerning stone tool technologies.

This site is considered to be of low scientific significance as a) the site contains a small number of stone artefacts - approximately 6 were recorded, of a range of locally sourced raw materials; b) the exposed site is located within a highly disturbed context on a graded dirt track that is currently in use; c) low density stone artefact scatters, also known as 'background scatter' are considered to be a common occurrence within the greater landscape of the Woonona Plateau.

The scientific research potential of this area can be compared to the current models of Aboriginal occupation, land use patterns and technology in the region, and may serve to augment and validate these models.

Significance: **LOW**

7.2.3 Aboriginal Sites – Significance Summary

The determination of Aboriginal significance relies on a comprehensive approach to cultural heritage assessments and to the values that are attached to heritage places. Aboriginal 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 following summary of significance has been based on the results of the archaeological survey, an understanding of regional Aboriginal sites patterning, and from comment and input from the relevant Aboriginal groups.

Site name and number	*Community or cultural SIGNIFICANCE*	*archaeological or scientific SIGNIFICANCE*
LEAFS GULLY 1 (52-2-2265)	HIGH	Low

8.0 IMPACT ASSESSMENT

8.1 Proposed Development

The proposed West Cliff Mine Surface Goaf Gas Drainage Project will comprise:

- Borehole installation with appropriate drilling equipment and fit out to enable gas extraction;
- Gas extraction and ventilation facility; and
- Gas flaring equipment located at a safe distance from the ventilation points.

Where possible existing access tracks will be utilised and it may be necessary to construct further access tracks utilising a crushed sandstone base.

8.2 Potential Impacts

As discussed above, the proposed development requires a certain level of disturbance within the study area. Higher levels of disturbance will be localised to the borehole and compound footprint (Section 1.3). The use and creation of additional access tracks to help facilitate this work and the installation of remote gas flaring equipment approximately 100 m from the borehole location will also have a secondary impact on ground surface within the study area.

Impacts associated with the proposed borefield works will be minimal as the bore holes are small and the pipeline is above ground. The proposed works that will involve ground disturbance includes the construction of the temporary fence compounds, creation of the pond, the installation of the concrete footings where necessary and the test/production bores.

Where possible, the construction methods of these components should be kept to a minimum and where possible above ground alternatives will be considered.

The infrastructure used to construct the boreholes and extract gas are temporary features that will be removed once the longwall mining process has been completed.

This disturbance may impact the physical remains and significance of archaeological sites in the following ways:

Borehole site	Impacts to archaeological sites
CP01	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP02	1. Douglas North (52-2-0021) artefact site no longer exists and will not be impacted. 2. No impact to areas of moderate Aboriginal archaeological sensitivity if borehole site is located within existing areas of disturbance. 3. Impacts associated with the construction, use and maintenance of

Borehole site	Impacts to archaeological sites
	the borehole should avoid the 10 m riparian corridor along Mallaty Creek as this area is identified as having moderate archaeological sensitivity. 4. No impacts to historical archaeological heritage.
CP03	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP04	1. Low Aboriginal and historical archaeological potential within existing areas of disturbance. 2. No impacts to Aboriginal or historical archaeological heritage. 3. Impacts associated with the construction, use and maintenance of the borehole should avoid the 10 m riparian corridor along Mallaty Creek as this area is identified as having moderate archaeological sensitivity. 4. A preferred borehole location within an area of lower archaeological sensitivity is E294810 N6217375.
CP05	1. Low Aboriginal and historical archaeological potential within existing areas of disturbance. 2. No impacts to Aboriginal or historical archaeological heritage. 3. Impacts associated with the construction, use and maintenance of the borehole should avoid the 10 m riparian corridor along Mallaty Creek as this area is identified as having moderate archaeological sensitivity.
CP06	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP07	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP08	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP09	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP10	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP11	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP12	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP13	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP14	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP15	Low Aboriginal and historical archaeological potential.

Borehole site	Impacts to archaeological sites
	No impacts to Aboriginal or historical archaeological heritage.
CP16	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
CP17	Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage.
PA01	**Borehole** Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage. **Access track** Artefact scatter site 52-2-2265 (Leafs Gully 1) was located on a track used to access the borehole site PA04 and PA01 and will potentially be impacted by vehicle use during the construction and maintenance of the boreholes.
PA02	1. Low Aboriginal and historical archaeological potential within existing areas of disturbance. 2. No impacts to Aboriginal or historical archaeological heritage. 3. Impacts associated with the construction, use and maintenance of the borehole should avoid the 10 m riparian corridor along Leafs Gully Creek as this area is identified as having moderate archaeological sensitivity (preferred location is E294033 N6218373).
PA03	1. The study area has moderate potential for Aboriginal archaeological remains which may be impacted by the proposed works. 2. It is recommended that the borehole location be moved to an area of lower archaeological sensitivity (preferred location is E294449 N6218083). 3. To avoid impacting site 52-2-2265 and areas of moderate archaeological potential along Leafs Gully Creek, access to the site should be via an existing paddock gate off Leafs Gully Road. 4. No impacts to historical archaeological heritage.
PA04	**Borehole** Low Aboriginal and historical archaeological potential. No impacts to Aboriginal or historical archaeological heritage. **Access track** Artefact scatter site 52-2-2265 (Leafs Gully 1) was located on a track used to access the borehole site PA04 and PA01 and will potentially be impacted by vehicle use during the construction and maintenance of the boreholes.

9.0 RECOMMENDATIONS

Recommendation 1 – Leafs Gully 1 (52-2-2265) open artefact scatter

Artefact scatter site 52-2-2265 (Leafs Gully 1) was located on a track that will be used to access borehole sites PA04 and PA01 and will potentially be impacted by vehicle use during the construction and maintenance of the boreholes.

To avoid impacting this site further, access of all heavy machinery to borehole site PA04 should be via the existing track network within the paddock, rather than along the track on which the artefact site is located (Figure 3). The portion of track required to access PA01 may continue to be used during the borehole works as this section was determined to contain less archaeological sensitivity.

To avoid impacting the site and the area of moderate Aboriginal archaeological sensitivity identified on either side of the track, disturbances outside the track should be avoided. This includes vehicle parking and equipment storage in any paddocks to the west of the track.

All contractors should be notified on the importance of avoiding areas of archaeological sensitivity and remaining within existing tracks when accessing borehole sites PA01 and PA04.

Recommendation 2 – Moderate Aboriginal archaeological sensitivity

All efforts should be made to minimise the impact upon possible archaeological deposits within 20 metres of the Mallaty and Leafs Gully Creek corridors, as these areas were identified as having moderate potential for Aboriginal archaeological sites to exist (Figure 3).

The following borehole locations were identified within or near to areas of moderate Aboriginal archaeological sensitivity:

CP02, CP04, PA02 and PA03

Where possible these borehole locations should be moved to areas of existing disturbance where archaeological potential is considered low, or a preferred location identified in section 8.2.

Recommendation 3 – Low Aboriginal archaeological sensitivity

The following borehole locations were identified as having low potential for Aboriginal archaeological sites to exist (Figure 3). There are no further heritage constraints to the proposed borehole locations:

CP01, CP03, CP05 – 17, PA01 and PA04

Recommendation 4 – Historical cultural heritage assessment

In relation to the historical cultural heritage requirements for the proposed borehole locations, no further work or permits are required under the *NSW Heritage Act 1977*.

Recommendation 5 – Avoiding unnecessary impacts

To avoid impacting upon unidentified sites, all vehicles and work movements should stay in previously cleared and disturbed areas where safe and practicable.

The construction methods of infrastructure installation should be kept to a minimum and where possible above ground alternatives should be considered.

Recommendation 6 – Stop work order

Should any unanticipated Aboriginal or historic heritage material be identified during any phase of the proposed works, all work must cease in the vicinity of the find while the appropriate statutory consent authority is contacted.

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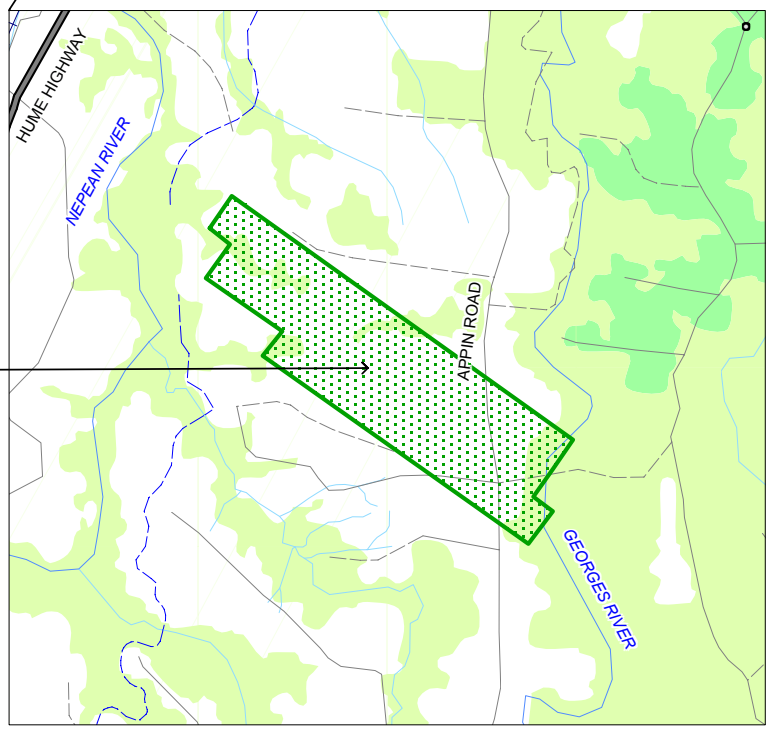
Department of Lands - http://www.lands.nsw.gov.au/survey_mapping/parish_maps

Appin History – http://www.stonequarry.com.au/towns/appin.html

FIGURES



Study area

BIOSIS RESEARCH Pty. Ltd.

15 - 17 Henrietta Street
Chippendale
NEW SOUTH WALES 2008

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

DATE: 21 June 2007

Checked by: SEB | File number: S4742

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Scale: 0 0.75 1.5 2.25 3 kilometres

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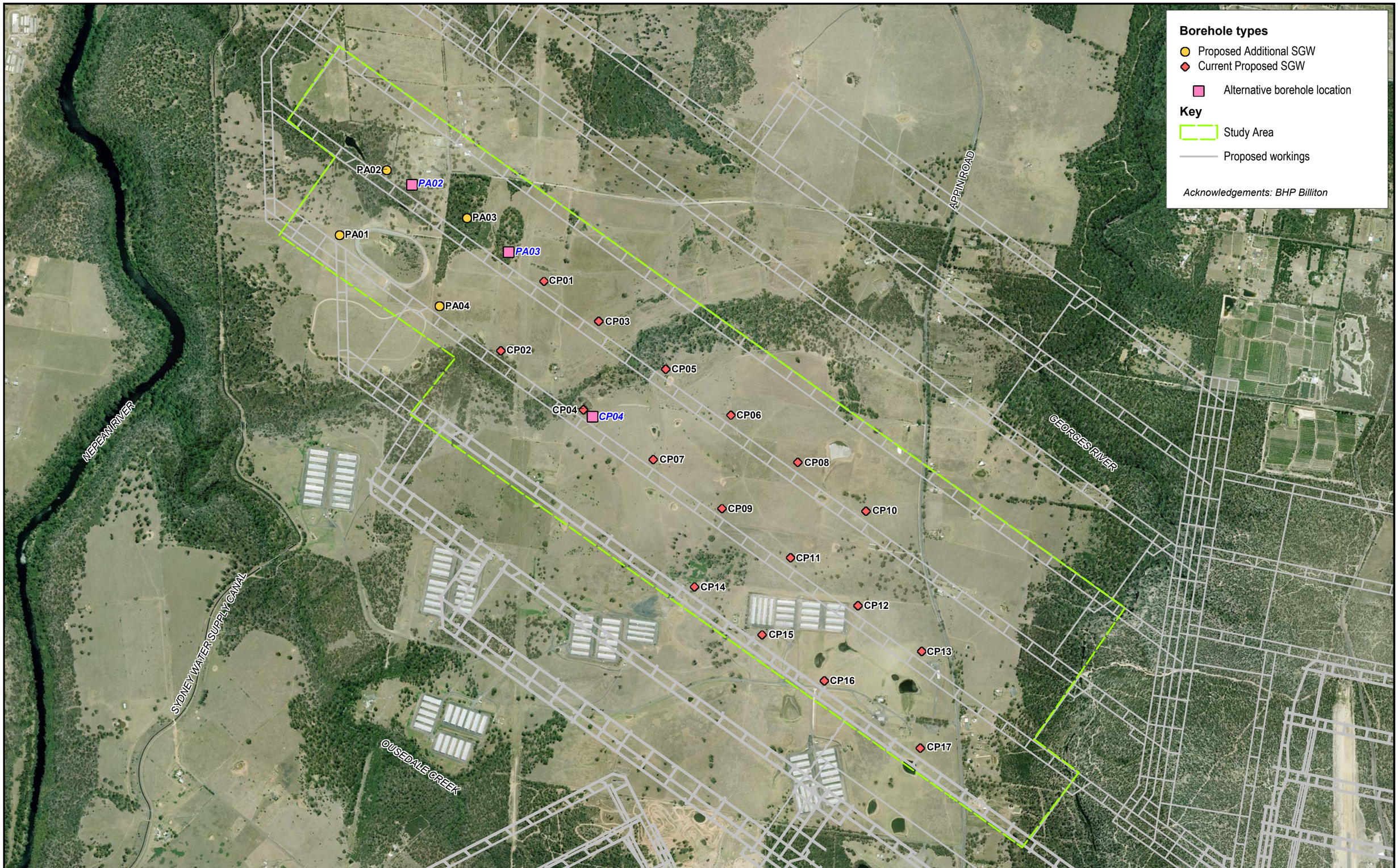

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Figure 2: The proposed developement.

DATE: 3 July 2007
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File number: S4732
Location:-..4000\4700s\4742\Mapping\S4742 F2_boreholes.WOR

Scale: 0 0.15 0.3 0.45 0.6 0.75 kilometres

Figure 2: The proposed developement.

Site Types

- Axe Grinding Groove
- Axe Grinding Groove; Engraved Groove Channels
- Midden
- None
- Open Camp Site
- Scarred Tree
- Shelter with Art
- Shelter with Art; Shelter with Deposit
- Shelter with Deposit
- Shelter with Midden
- Shelter with PAD

Extension of site 52-2-2265

Borehole types

- Proposed Additional SGW
- Current Proposed SGW
- Alternative borehole location

Key

Study Area

PA01 PA02 PA03 PA04 PA02 PA03 CP01 CP02 CP03 CP04 CP04 CP05 CP06 CP07 CP08 CP09 CP10 CP11 CP12 CP13 CP14 CP15 CP16 CP17 52-2-2265 52-2-0021 52-2-2237 52-2-2238 52-2-2096 52-2-1213 52-2-2095 52-2-2094 52-2-1214 52-2-2099 52-2-2098 52-2-2097 52-2-1213 52-2-1922 HB1 52-2-2240 52-2-2235 52-2-0270 52-2-2242 52-2-2250 52-2-0278 52-2-0419 52-2-2244 52-2-2243 52-2-2234 52-2-2241 52-2-1202 52-2-2266 52-2-0989 52-2-0417 52-2-2062 52-2-2066 52-2-2104 52-2-2113 SG11 52-2-2063 52-2-2036 52-2-2264 52-2-2064 52-2-2105 52-2-2041 52-2-2065 52-2-2034 52-2-2106 52-2-2102 52-2-2061 52-2-1681 52-2-1680 52-2-1682 52-2-2236 52-2-2059 52-2-2284 52-2-2101 52-2-1610 52-2-2283 52-2-2282

Acknowledgements: NSW Department of Lands 1:25000 topographic map series (1969-91)

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Figure 3: AHIMS

DATE: 3 July 2007
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Scale: 0 0.2 0.4 0.6 0.8 1.0 kilometres

Figure 3: AHIMS

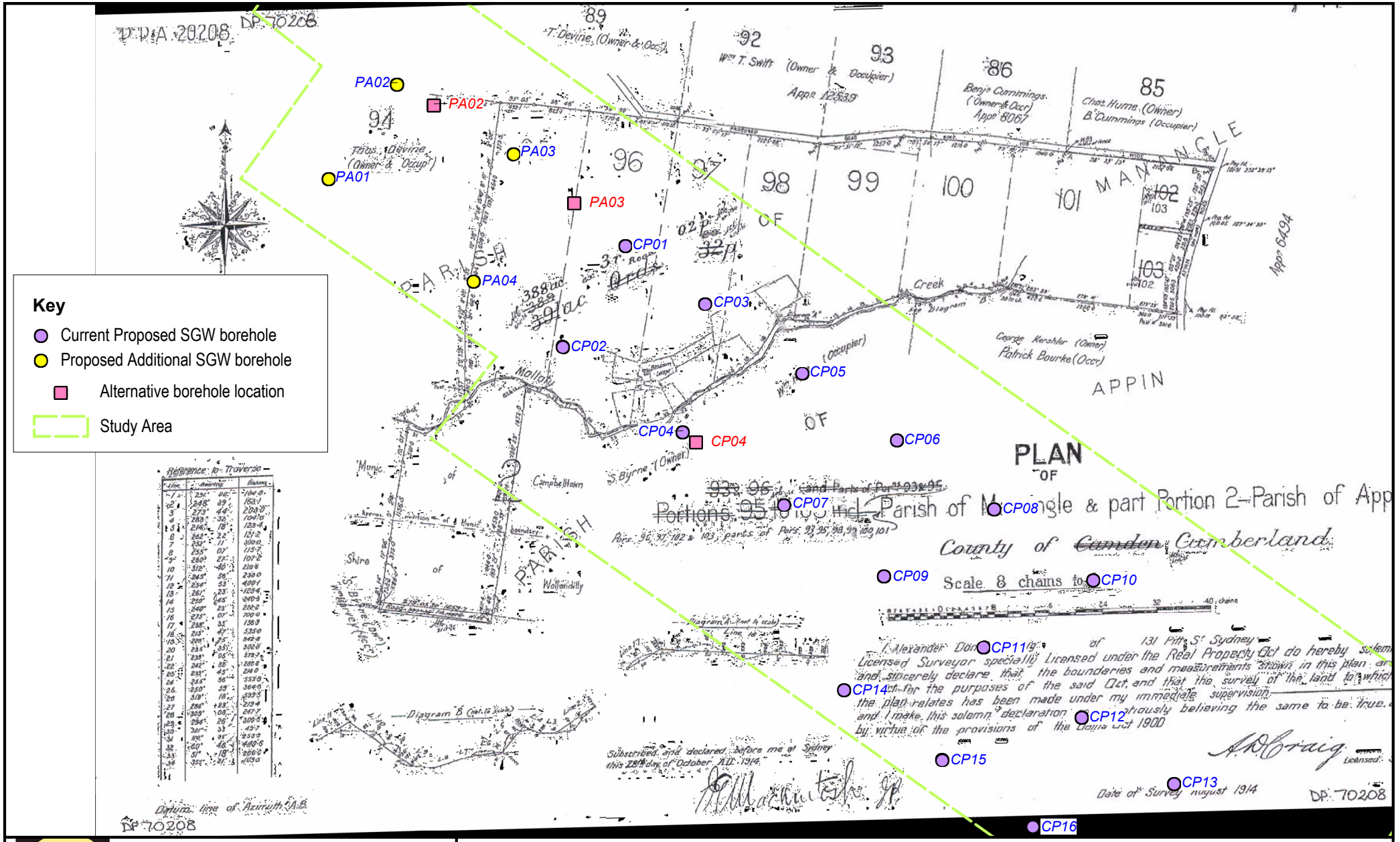

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Figure 4: Historic overlay - Lands and Titles Plan DP70208

DATE: 3 July 2007

Checked by: SEB | File number: S4742

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Scale: 0 0.15 0.3 0.45 0.6 0.75 kilometres

N W E S

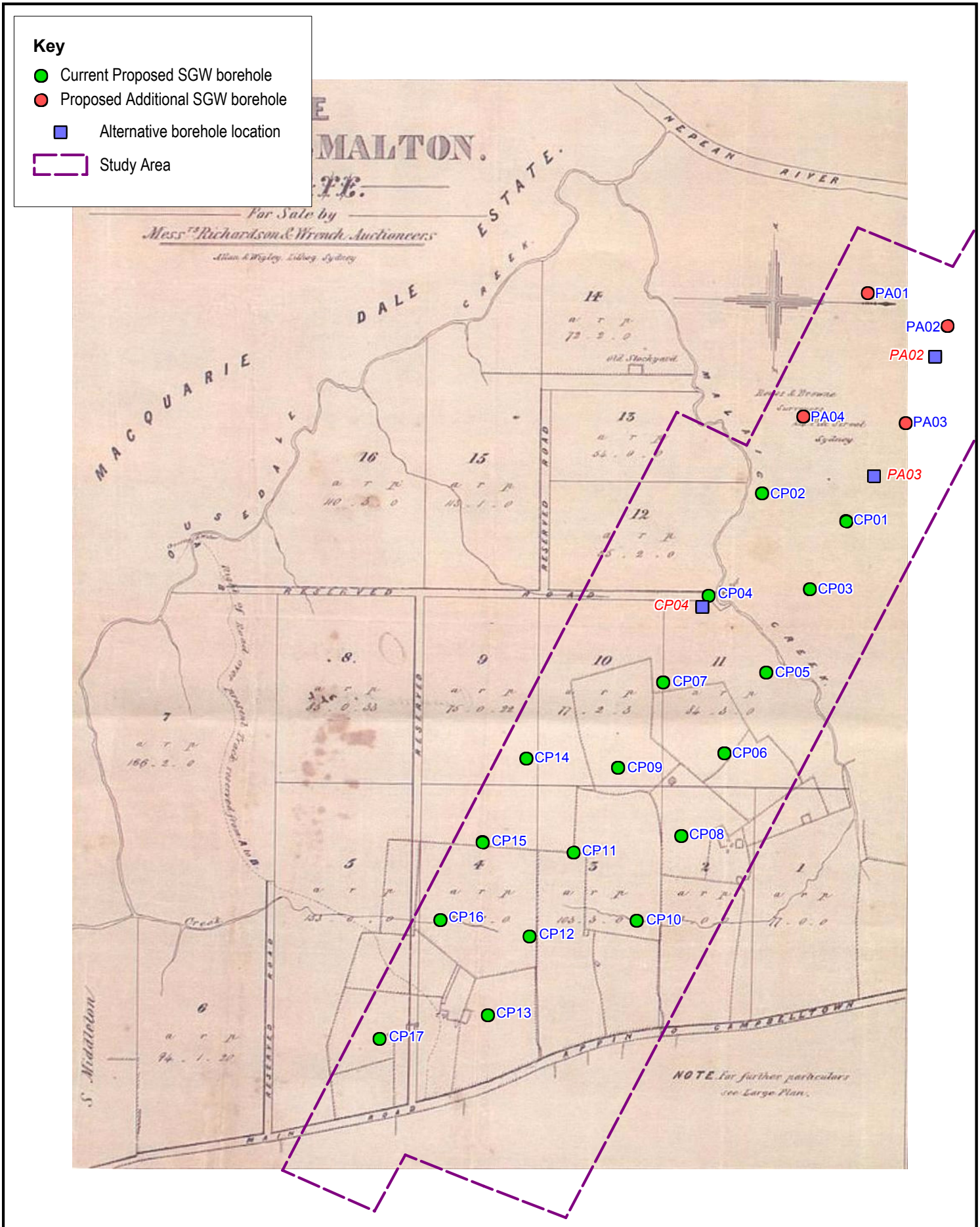

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Figure 5: Historic overlay - Ousedale & Malton Estate Map (c.1850)

DATE: 3 July 2007

Checked by: SEB | File number: S4742

Location:4000\4700s\4742\Mapping\S4742 F5_ousedale

Scale: 0 0.2 0.4 0.6 0.8 kilometres

APPENDICES

APPENDIX 1: ABORIGINAL COMMUNITY COMMENT

Cubbitch Barta Native Title Claimants
Aboriginal Corporation,
55 Nightingale Road,
PHEASANTS NEST. N.S.W. 2574.
21st July, 2007. 02 46841129 0427218425

Biosis Research Pty Ltd,
15-17 Henrietta Street,
CHIPPENDALE. N.S.W. 2008.

Dear Sarah,

WESTCLIFF BOREHOLE
DRAINAGE PROJECT

The survey for the above project took place on the 12th and 13th June, with another 1/2 day on the 26th June 2007. The boreholes were all physically examined for the possibility of Aboriginal sites.

Two previously recorded sites were in close proximity to CPO2 and PAO4.

Site 52-2-0021 was an isolated artefact near the Mallaty Creek stockpile that was supposed to be protected from the works taking place there, but during the survey, the site could not be relocated due to the crushed sandstone that had been put there. The recommendations that were made to protect the site had not been followed and had been covered in the crushed sandstone material, with none of the recommendations made clearly in place to avoid impact by the development. This is upsetting when the works were recommended to avoid the impacts, and had never been followed.

Site 52-2-2265 was relocated during the survey and there were actually more artefacts recorded at this time, then the original recording. The artefacts are located on what was to be an access track to PAO4.

My recommendations are that this access track not be used for PAO4, but access be gained possibly via the same access as CPO1. There are a couple of borehole locations that have been recommended to be relocated away from archaeological sensitive areas. These recommendations have been made in the report by Biosis Research Pty Ltd Further, I would like to make a comment that I would hope that these recommendations are adhered to by the developer and not ignored, as was the case with site no 52-2-0021, as previously discussed.

Yours faithfully,

G. Chalker

Glenda Chalker

THARAWAL
LOCAL ABORIGINAL LAND COUNCIL

West Cliff Colliery
Surface Gas Drainage
Archaeological Assessment
June 2007

To Sarah,

I have read your report in depth on the proposed boreholes (CP01 – CP17 and PA01 – PA04). As I was not in attendance myself, I am commenting on your report and discussions that I have had with yourself (Biosis Research) and Leeanne Hestelow Tharawal Local Aboriginal Land Council Representative. I fully support your recommended actions for the proposed boreholes. I trust that all of the work out on theses holes will abide by your recommendations. However any future work or boreholes that pneeds to be carried out will need further surveying both with Biosis Research, Cubbitch Barta Native Title Claimants and ourselves, Tharawal Local Aboriginal Land Council Cultural Heritage Representative.

Thank you for your invitation to attend and comment on this proposed work site.

Yours in Indigenous Unity,

DWhillock per: CD

Donna Whillock
Tharawal Local Aboriginal Land Council Cultural and Heritage Representative.

P.O. BOX 20, BUXTON NSW 2571
220 WEST PARADE COURIDJAH NSW 2571
TELEPHONE: (02) 4681 0059 • (02) 4681 0799 • FAX: (02) 4683 1375
tharawal@ideal.net.au

APPENDIX 2: 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.

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

GLOSSARY

GLOSSARY

Introduction & terminology

The following list provides definitions of various terms used in this report. Many of the terms have been referenced and the sources included in the reference list at the end of this report.

There is often a degree of confusion about the use of terms such as heritage place, historical site, archaeological site and so on. The definitions of these terms, as used in this report, have been included in the glossary and their relationship outlined in Figure 1 below. The term used most consistently is heritage place and this is defined as follows:

Heritage place: A place that has aesthetic, historic, scientific or social values for past, present or future generations – ' ... this definition encompasses all cultural places with any *potential* present or future value as defined above' (Pearson & Sullivan 1995: 7).

For the purpose of discussion in this document 'heritage place' can be sub-divided into **Aboriginal place** and **historic place** (i.e. a historic place refers more particularly to non-Aboriginal sites).

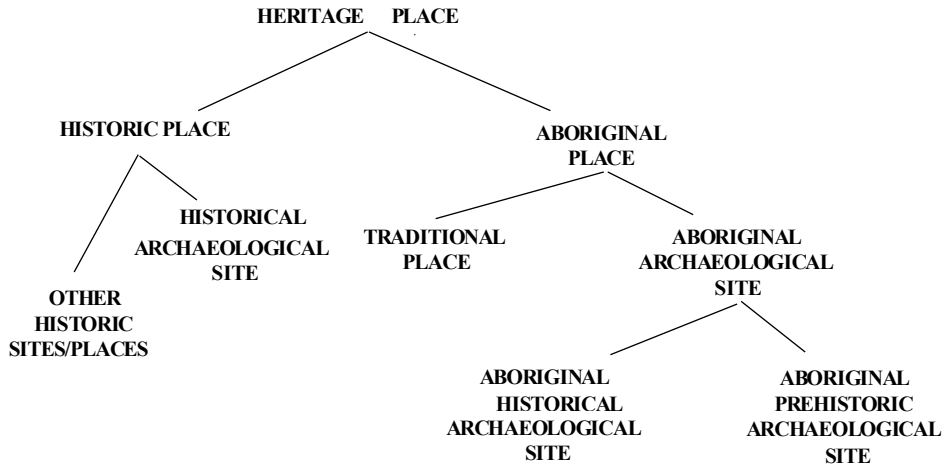

Figure G1: Terminology used for categories of heritage places.

Archaeological site types

The archaeological site types encountered in Australia can be divided into three main groups:

Historical archaeological site: an archaeological site formed since non-Aboriginal settlement that contains physical evidence of past human activity (for example a structure, landscape or artefact scatter).

Aboriginal historical archaeological site (or contact site): a site with a historical context such as an Aboriginal mission station or provisioning point; or a site that shows evidence of Aboriginal use of non-Aboriginal materials and ideas (for example: artefact scatter sites that have artefacts made from glass, metal or ceramics).

Aboriginal prehistoric archaeological site: a site that contains physical evidence of past Aboriginal activity, formed or used by Aboriginal people either before, or not long after, European settlement. These sites are commonly grouped as follows (further definition of each is contained in the glossary list):

- artefact scatter
- burial
- hearth
- isolated artefact
- mound
- quarry
- scarred tree
- shell midden
- structures
- rock art

- rock shelter
- rock well

One of the most common artefact types that provides evidence of Aboriginal people are those made from stone. Types and categories are outlined below in **Figure G2**, with further definition of each in the glossary list.

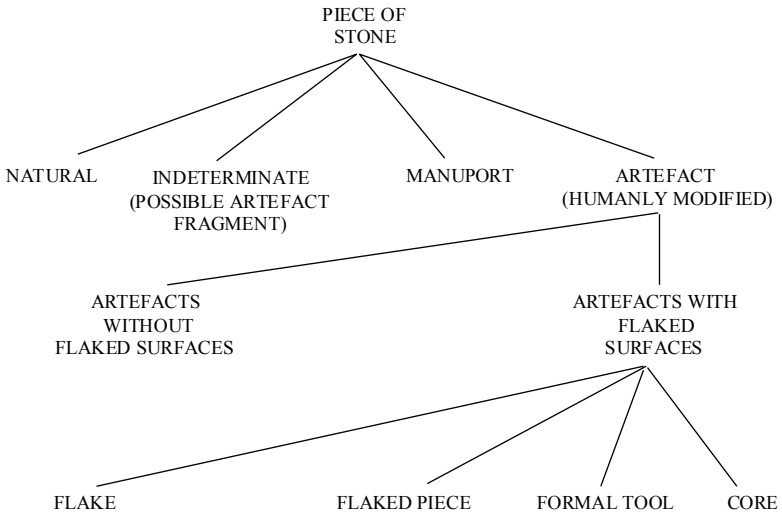

Figure G2: Stone artefact types/categories.

List of definitions

Aboriginal historical archaeological site (or contact site): either a site with an historic context such as an Aboriginal mission station or provisioning point; or a site that shows evidence of Aboriginal use of European/non-Aboriginal materials and ideas (e.g. artefact scatter sites that contain artefacts made from glass, metal or ceramics).

Aboriginal prehistoric archaeological site: a site that contains physical evidence of past Aboriginal use, formed or used by Aboriginal people either before, or not long after, European settlement.

Archaeology: the study of the remains of past human activity.

Artefact scatter: a surface scatter of cultural material. Artefact scatters are often the only physical remains of places where people have lived camped, prepared and eaten meals and worked.

Backed piece: a flake or blade that has been abruptly retouched along one or more margins opposite an acute (sharp) edge. Backed pieces include backed blades and geometric microliths. They are thought to have been hafted onto wooden handles to produce composite cutting tools. Backed pieces are a feature of the 'Australian small tool tradition', dating from between 5000 and 1000 years ago in southern Australia (Mulvaney 1975).

Bipolar working: technique used for the reduction of stone, in particular quartz, by placing a core on an anvil and 'smashing' with a hammerstone.

Blade: a flake at least twice as long as it is wide.

Burial site: usually a sub-surface pit containing human remains and sometimes associated artefacts.

Contact site: see 'Aboriginal historical archaeological site'.

Core: an artefact from which flakes have been detached using a hammerstone. Core types include single platform, multi-platform and bipolar forms.

Cortex: original or natural (unflaked) surface of a stone.

Flake: a stone piece removed from a core by percussion (striking it) or pressure. It is identified by the presence of a striking platform and bulb of percussion, not usually found on a naturally shattered stone.

Flaked piece: a piece of stone with definite flake surfaces, which cannot be classified as a flake or core.

Hammerstone: a piece of stone, often a creek/river pebble/cobble, which has been used to detach flakes from a core by percussion. During flaking, the edges of the hammerstone become 'bruised' or crushed by impact with the core.

Heritage Place: A place with aesthetic, historic, scientific or social values for past, present or future generations – '... this definition encompasses all cultural places with any *potential* present or future value as defined above' (Pearson & Sullivan 1995).

Historic place: a place that has some significance or noted association in history.

Historical archaeological site: an archaeological site formed since non-Aboriginal settlement that contains physical evidence of past human activity (for example a structure, landscape or artefact scatter).

Isolated artefact: the occurrence of one (or a small number as defined by the survey methodology) of artefacts within a given area. It/they can be evidence of a short-lived (or one-off) activity location, the result of an artefact being lost or discarded during travel, or evidence of an artefact scatter that is otherwise obscured by poor ground visibility.

Obtrusiveness: how visible a site is within a particular landscape. Some site types are more conspicuous than others. A surface stone artefact scatter is generally not obtrusive, but a scarred tree will be (Bird 1992).

Pebble/cobble: natural stone fragments of any shape. Pebbles are 2–60 mm in size and cobbles are 60–200 mm in size (McDonald et al. 1984: 78).

Pre-contact: before contact with non-Aboriginal people.

Post-contact: after contact with non-Aboriginal people.

Retouch: a flake, flaked piece or core with intentional secondary flaking along one or more edges.

Rock art: 'paintings, engravings and shallow relief work on natural rock surfaces' (Rosenfeld 1988: 1). Paintings were often produced by mineral pigments, such as ochre, combined with clay and usually mixed with water to form a paste or liquid that was applied to an unprepared rock surface. Rock engravings were made by incising, pounding, pecking or chiselling a design into a rock surface. Rare examples of carved trees occasionally survive.

Rock shelter: may contain the physical remains of camping places where people prepared meals, flaked stone, etc. They are often classed as a different type of site due to their fixed boundaries and greater likelihood of containing sub-surface deposits. Rock shelters may also contain rock art.

Rock-well: a natural or modified depression within a stone outcrop, which collects water. The most identifiable of these sites have been modified by Aboriginal people, either by deepening or enlarging.

Scarred tree: scars on trees may be the result of removal of strips of bark by Aboriginal People e.g. for the manufacture of utensils, canoes or for shelter; or resulting from small notches chopped into the bark to provide hand and toe holds for hunting possums and koalas. Some scars may be the result of non-Aboriginal activity, such as surveyors marks.

Significance: the importance of a heritage place or site for aesthetic, historic, scientific or social values for past, present or future generations.

Utilised artefact: a flake, flaked piece or core that has irregular small flake scarring along one or more margins that does not represent platform preparation.

Visibility: the degree to which the surface of the ground can be seen. This may be influenced by natural processes such as wind erosion or the character of the native vegetation, and by land-use practices, such as ploughing or grading. Visibility is generally expressed in terms of the percentage of the ground surface visible for an observer on foot (Bird 1992).