EnergyAustralia

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Appendix G
Cultural Heritage Assessment

MARULAN GAS TURBINE FACILITIES

ENVIRONMENTAL ASSESSMENT

JOINT CONCEPT APPLICATION

VOLUME 2 | APPENDICES | August 2008

URS

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Cultural Heritage Assessment of the Proposed Marulan Gas Turbine Facilities, NSW

Report for URS Australia Pty Ltd

July 2008

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ACKNOWLEDGMENTS

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

- Nicole Brewer and Andrew Dudgeon (URS Australia Pty Ltd)
- Pat Little and Justin Boney (Pejar Local Aboriginal Land Council)
- David King and Sharon Halls (Gundangarra Tribal Council Aboriginal Corporation)
- Chris Lewczak, Robert Suansri and Rachel Blakey (Biosis Research)

ABBREVIATIONS

AHC	Australian Heritage Council
AHIMS	Aboriginal Heritage Information Management System
ATSIC	Aboriginal and Torres Strait Islander Commission
CHL	Commonwealth Heritage List
DEC	Department of Environment and Conservation (now DECC)
DECC	Department of Environment and Conservation
DEH	Department of Environment and Heritage
DoP	Department of Planning
EP&A	Environmental Protection and Assessment
EPBC	Environment Protection and Biodiversity Conservation
GSV	Ground surface visibility
ICOMOS	International Council on Monuments and Sites
PLALC	Pejar Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
MGA	Map Grid of Australia – unless otherwise specified all coordinates are in MGA
NHL	National Heritage List
NNTT	National Native Title Tribunal
NPWS	National Parks and Wildlife Service (now part of DECC)
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 was commissioned by URS Australia Pty Ltd (on behalf of Delta Electricity and EnergyAustralia) to conduct a cultural heritage assessment of a site proposed for the development of two separate gas turbine facilities and associated infrastructure, located near Marulan in NSW (see Figure 1). The study area had not been previously surveyed.

The field surveys were conducted on the 26, 27 and 28 September 2006, and included consultation with two separate Aboriginal communities. The assessment also involved a desktop component where site access was restricted. No Aboriginal or historical sites had been previously recorded within the study area.

During the field survey of the study area 10 Aboriginal archaeological sites were recorded. All of these sites are stone artefact scatter sites or isolated stone artefact occurrences. A number of landforms within the proposed development area were also identified as having potential to contain further Aboriginal archaeological sites.

The cultural heritage impact of the proposed development is considered to be low.

RECOMMENDATIONS

Aboriginal archaeological sites

Aboriginal cultural heritage values are present within the study area as 10 Aboriginal archaeological sites and a number of archaeologically sensitive landforms have been identified.

The following recommendations give specific details for the mitigation and management of cultural heritage values associated with the site of the proposed gas turbine facilities, and shared infrastructure including access roads, a gas pipeline and high voltage transmission grid connections, identified during the cultural heritage assessment of the study area.

All recommendations have been made based on findings from field and desktop archaeological assessment across the study area.

Marulan Site - Facilities Footprint

- A sub-surface investigation program be undertaken when the areas of ground disturbance for the Facilities within the Marulan Site and associated infrastructure are known following detailed design and prior to construction. This sub-surface investigation program would aim to determine the presence of buried Aboriginal archaeological sites and to identify the extent of the recorded sites. These investigations would involve:
    - the excavation of a number of shovel probe holes spaced evenly (grid pattern) across the sub-surface impact footprint.

  - a number of test pits would be excavated at 10 metre intervals within the areas of identified archaeological potential and at recorded sites BH8 and BH9 to determine the presence and extent of cultural material.

  - Aboriginal archaeological cultural material identified would be recorded in detail.

- All attempts by Delta Electricity and EnergyAustralia should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.

- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facilities, then all attempts to reduce and mitigate impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area. The CEMP would include a requirement for contractors to be briefed on the Aboriginal cultural heritage values of the area.

Marulan Site Generally

- All attempts by Delta Electricity and EnergyAustralia should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.

- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facility, then all attempts to reduce and mitigate impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area. The CEMP would include a requirement for contractors to be briefed on the Aboriginal cultural heritage values of the area.

Gas Pipeline Corridor

- The southern section of the proposed gas pipeline alignment between the TransGrid Switchyard and the Moomba to Sydney Gas Main should be surveyed in detail to identify cultural values. Known areas of Aboriginal archaeological potential along this proposed pipeline should be subject to a detailed sub-surface investigation program (Figure 4).

- All attempts by Delta Electricity and EnergyAustralia should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.

- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facilities and associated infrastructure, then all attempts to reduce and mitigate impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area. The CEMP would include a requirement for contractors to be briefed on the Aboriginal cultural heritage values of the area.

Proposed Electricity Transmission Line

A sub-surface investigation program should be undertaken within identified areas of archaeological potential to determine the presence of archaeological sites when the areas of ground disturbance for the infrastructure are known following detailed design and prior to construction. These investigations would involve:

- excavation of a number of shovel probe hole test pits excavated at 20 meter intervals within areas of Aboriginal archaeological potential along linear transects

- All attempts by Delta Electricity and EnergyAustralia should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.

- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facilities and associated infrastructure, then all attempts to reduce and mitigate impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area. The CEMP would include a requirement for contractors to be briefed on the Aboriginal cultural heritage values of the area.

Historical archaeological sites

- No historical sites are situated within the current development proposal area for the Marulan gas turbine facilities and associated infrastructure. Given this, no further archaeological work will be required with regard to historic sites or places within the study area.

OPTIONS Pipeline and electricity routes, Gas Turbine Facility Locations	Aboriginal sites and areas of archaeological potential	Significance rating/Level of potential	Potential Impact	Overall Cultural Values	Action required or recommended	Relevant Requirements	Timing of Action	Duration of Process
Marulan Site - Facilities Footprint	BH7	Moderate scientific significance	Site located within proposed gas turbine footprint envelope	**Moderate Cultural Values**	The site does not warrant further investigation, but should be identified in and managed through the CHMP, such as identifying on plans / fencing the artefact area.	Under Part 3A *Guidelines For Aboriginal Cultural Heritage Impact Assessment and Community Consultation*	All archaeological sub-surface investigation should be undertaken **prior** to finalisation of footprint and any ground disturbance works	All archaeological investigations will take between **6-8 weeks** to complete sub-surface investigations
	BH8 BH9 Area of Aboriginal archaeological potential	Moderate scientific significance Moderate scientific significance Moderate scientific significance	Site located within proposed gas turbine footprint envelope Site located within proposed gas turbine footprint envelope Impact footprint situated on area of archaeological potential	**Moderate Cultural Values**	Archaeological sub-surface investigations to determine the extent and significance of each site			
Marulan Site Generally	BH1 BH3	Low scientific significance High scientific significance	No impacts from current project design No impacts from current project design	**Moderate Cultural Values**	No further investigation as these sites will not be impacted by proposed construction works			

	BH4	Moderate scientific significance	No impacts from current project design					
	BH5	Moderate scientific significance	No impacts from current project design					
	BH6	High scientific significance	No impacts from current project design					
	BH10	Low scientific significance	No impacts from current project design					
	Area of Aboriginal archaeological potential	Moderate to high scientific significance	Impact corridor traverses area of archaeological potential					
Gas Pipeline Corridor	BH2	Low scientific significance	Gas pipeline impact corridor(s)	**Moderate Cultural Values**	The site does not warrant further investigation, but should be identified in and managed through the CHMP, such as identifying on plans / fencing the artefact area.			
	Area of Aboriginal archaeological potential	TBA	Gas pipeline impact corridor(s) traverses areas of archaeological potential	**TBA**	Archaeological sub-surface investigations to determine the extent and significance of areas of potential			
Proposed Electricity Transmission Line	Area of Aboriginal archaeological potential	TBA	Impact corridor traverses area of archaeological potential	**TBA**	Archaeological sub-surface investigations to determine the extent and significance of areas of potential			

Table 1: Summary of potential impact on heritage places and actions/recommendations.

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 40,000 years of occupation of New South Wales by Aboriginal people, and of the more recent period of post-contact settlement.

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

It is an offence under sections of legislation to damage or destroy heritage sites without a permit or consent from the appropriate body (see Appendix 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 survey of this area.

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

1.1 Project background

Biosis Research was commissioned by URS Australia Pty Ltd to conduct an archaeological assessment of two gas turbine facilities and associated infrastructure at a proposed site located near Marulan in NSW (Figure 1). This report has been commissioned in order to identify and assess Aboriginal and historical cultural heritage values within this study area.

The project has been included as a Major Project under Part 3A of the Environmental Planning and Assessment Act 1979 and State Environmental Planning Policy (Major Projects) 2005. The project also fits within the declaration of certain power generating facilities being critical infrastructure projects (Minister for Planning, 26 February 2008).

Subsequent to this, an application was made and accepted by the Director-General as delegate for the Minister of Planning that under Clause 6 of the State Environmental Planning Policy (SEPP) (Major Projects) 2005 the proposed development is ‘development of a kind’ described in Schedule 1. As such, a Concept Plan Application and two Project Applications under part 3A of the EP&A Act 1979 are to be submitted to the NSW Department of Planning (DoP).

Delta Electricity and EnergyAustralia are seeking Concept Plan Approval for the two separate gas turbine facilities and associated shared infrastructure, while the Applications for Project Approval seek Project Approval for EnergyAustralia's facility and Stage 1 of the Delta Electricity facility. Further project applications, including assessment under another part of the EP&A Act, would be sought for those elements only approved at Concept Approval level, such as the gas pipeline and Stage 2 of the Delta Electricity facility.

Under Part 3A applications there are specific procedures that are required to be undertaken in regards to Aboriginal cultural heritage 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 (now known as the Department of Environment and Climate Change). The procedures as they relate to this project are discussed in Section 1.5.

The results of this investigation will be used to identify predicted impacts to heritage items and places associated with the proposed development area. Recommendations designed to minimise impacts to cultural heritage places have been formulated according to legislative constraints and best practice heritage management.

1.2 Study area

The study area comprises two gas turbine facilities and associated infrastructure envelopes / corridors near the town of Marulan in the NSW Southern Highlands. The proposed development site is located approximately 12 kilometres northwest of Marulan. The site can be accessed by Canyonleigh Road. The western boundary of the study site is bordered by the Wollondilly River (Figure 1).

The study area is referred to as *the Marulan Site* throughout this report when making general observations about the area and project as a whole. As described in Section 1.3, the Marulan Site has been further divided into specific work areas for the purposes of managing the cultural heritage aspects of the project.

The *TransGrid Site* is referred to occasionally in this report, and this refers to the TransGrid 330 kV Marulan Substation / Switchyard site, which is to the south of, and immediately adjacent to the Marulan Site.

1.3 Proposal

Delta Electricity and EnergyAustralia propose to construct two separate gas turbine power generating facilities at the Marulan Site, in the southern highlands of NSW. A gas pipeline and other shared infrastructure servicing both facilities is proposed to be constructed along with high voltage transmission lines connecting each facility to the nearby TransGrid 330kV Marulan Substation. The proposed development was considered as four work areas for the purposes of this heritage assessment (See Figure 2):

- MARULAN SITE - FACILITIES FOOTPRINT - includes the EnergyAustralia facility consisting of two open cycle gas turbines; and the Delta Electricity facility which will be constructed in two stages (Stage 1: Open cycle peaking power plant; and Stage 2: Combined cycle base load plant). This assessment has addressed the footprint required for both turbine facilities. The location of the facilities is proposed to be within the footprint envelope. This also includes the portion of the gas pipeline within the footprint area.

- MARULAN SITE GENERALLY – the portion of the proposed Marulan site outside the envelope. No other infrastructure / development is proposed in this area at this stage.

- PROPOSED ELECTRICITY TRANSMISSION LINE – connecting the gas turbine facilities to the adjacent TransGrid Marulan Substation.

- PROPOSED GAS PIPELINE CORRIDOR- from the southern and eastern margins of the Marulan Site and the TransGrid Site to the Sydney Moomba pipeline

The proposed gas power stations and associated works have the potential to disturb areas of Aboriginal archaeological potential within the Marulan region. This report assesses the likely impacts associated with the proposed development.

1.4 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 Plans and National Trust heritage lists.
- Consult with identified stakeholders in the area.
- Undertake a comprehensive 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 identified during the survey in compliance with the guidelines issued by the NSW Department of Environment and Climate Change (DECC) and the NSW Heritage Office.
- Assess impacts to all identified Aboriginal and historical 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.

1.5 Consultation

1.5.1 Statutory

During the course of this project consultation with the Department of Environment and Climate Change (DECC) has been undertaken to obtain information concerning previously recorded Aboriginal archaeological sites and completed archaeological studies.

The NSW DECC provided suggested Environmental Assessment requirements for the proposal to the NSW Department of Planning (DoP) on 23 January 2008. These requirements were incorporated into the DoP's Director General's Requirements (DGRs) which were issued 3 March 2008. The DGRs identify consultation with the Aboriginal community to be an important aspect of the project's cultural heritage assessment, and advise that this consultation must be carried out as per the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (2005). This Guideline describes the methods and procedures for cultural heritage assessment and Aboriginal community consultation that should be carried out for projects being assessed under Part 3A of the *Environmental Planning and Assessment Act* 1979 (NSW).

1.5.2 Aboriginal

The consultation process was carried out in accordance with the NSW DECC's *Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation* (2005). EnergyAustralia and Delta Electricity actively sought the views and ideas of stakeholders on cultural heritage. EnergyAustralia and Delta Electricity did this through the following activities:

Advertisement inviting groups and individuals to register their interest in the Aboriginal cultural heritage assessment and management program placed in the Goulburn Post on 25 January 2008 with registrations closing 8 February 2008; and

Letters to the following stakeholders providing notification of the heritage consultation process being undertaken:

- NSW Department of Environment and Climate Change;
- Registrar of Aboriginal Owners;
- Goulburn Mulwaree Shire Council;
- NSW Native Title Services; and
- Pejar Local Aboriginal Land Council.

Two groups responded to the advertisement:

The Office of the Registrar of Aboriginal Owners advising there are no Aboriginal Owners of the subject land; and

Pejar Local Aboriginal Land Council stating they wished to continue to be consulted regarding the Project including further sub surface testing.

The Gundungurra Tribal Council Aboriginal Corporation, although they did not formally register were contacted and they wished to continue to be consulted regarding the Project, including proposed sub-surface testing.

Representatives from the Pejar Local Aboriginal Land Council and Gundungurra Tribal Council participated in the archaeological and cultural heritage survey with Biosis Research staff. Subsequently the Pejar Local Aboriginal Land Council have been consulted regarding the placement of preliminary site activities—such as geotechnical drilling and testing—to ensure these activities have been undertaken with no risk to archaeological or potential archaeological materials.

Consultation will continue with both the Pejar Local Aboriginal Land Council and Gundungurra Tribal Council Aboriginal Corporation.

2.0 HERITAGE STATUS AND PLANNING DOCUMENTS

2.1 Commonwealth Registers

2.1.1 National Heritage Registers

The Commonwealth Australian Heritage Commission Act was repealed and in its place amendments were made to the *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act) in 2003.

Under the EPBC Act Amendments (No 88, 2003) two mechanisms have been created 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 include 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 compile 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
No items within the study area are listed on the National Heritage List, the Commonwealth Heritage List or the Register of the National Estate.

2.1.2 National Native Title Register

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

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, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements was completed on 12 March 2007. The search identified a registered Native Title Claim lodged by the Gundangarra Tribal Council Aboriginal Corporation (reference NC97/7) that encompasses the current study area. Further discussion on this issue is provided in Chapter 5: Statutory Planning of the Environmental Assessment.

2.2 State Registers

2.2.1 National Parks and Wildlife Act Registers

The Department of Environment and Conservation (DEC), now 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 AHIMS Database completed on 19/09/06 identified 40 previously recorded Aboriginal sites within 6 kilometres of the proposed study area, one of which is situated adjacent to the gas turbine facility (52-4-0134 TME-OS2 with PAD) within the TransGrid Switchyard site.

2.2.2 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
No items in the study area are listed on the State Heritage Register.

APPLICATION TO THE STUDY AREA – NSW STATE HERITAGE INVENTORY LISTINGS
No items in the study area are listed on the State Heritage Inventory.

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
No sites are listed on the government authority s170 Heritage and Conservation Registers

Relics Provisions: Approval must be obtained from the NSW Heritage Council when making changes to a heritage place listed on the State Heritage Register (Section 60 Permit), or when excavating any land in NSW where there is a possibility that archaeological relics may be disturbed (Section 140 Permit).

The NSW Heritage Act 1977 currently affords automatic statutory protection to 'relics' that form part of archaeological deposits. Sections 139–145 of the Act prevent the excavation of a relic, except in accordance with a gazetted exception or an excavation permit issued by the Heritage Council of New South Wales. 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.

APPLICATION TO THE STUDY AREA – NSW HERITAGE ACT 1977 RELICS PROVISIONS
There are no identified archaeological sites within the study area, however, the relics provisions are applicable to all relics regardless of heritage listing. Any archaeological sites that may be identified in the study area during survey will be protected by the relics provisions of the NSW *Heritage Act 1977*.

2.2.3 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 Governments 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 – LOCAL ENVIRONMENTAL PLANS
No items within the study area are listed in the heritage schedules of the Goulburn Mulwaree Local Government Area (Mulwaree LEP 1995; Goulburn Mulwaree LEP 2007).

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)
No heritage items classified (listed) by the National Trust of Australia are located within the study area associated with this proposal.

2.4 Summary of heritage listings in the study area

There is one previously identified heritage item within close proximity to the proposed gas turbine facility (Table 1). The site comprises an Aboriginal stone artefact scatter (52-4-0134) located within the TransGrid Switchyard Site property.

ITEM	*RNE*	*CHL*	*NHL*	*AHIMS*	*SHR*	*SHI*	*S170*	*SLEP 1985*	*IREP 1986*	*NATIONAL TRUST*
52-4-0134 TME-OS2 with PAD				**X**						

Table 2: Summary of known heritage items within the study area and within close proximity of the site.

3.0 ENVIRONMENTAL CONTEXT

The environmental background to the study area is provided in order to give a context to the archaeological assessment. The environmental aspects of an area will influence the type of archaeological remains that are likely to be present.

Firstly, the environmental conditions of the study area may have influenced the land use by people in the past and, secondly, conditions will also affect the processes by which sites are preserved. Environmental values of an area can also contribute to the cultural significance and attachments people have to a place.

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

3.1 Geomorphology

3.1.1 Geology

The Southern Tablelands occur as part of the Lachlan Fold Belt which Hird (1991:9) considers "the most complex geological province in NSW." The province is characterised by Ordovician, Silurian and Devonian sedimentary units and Early Silurian volcanics that have been subsequently subject to periods of major orogenic activity and Devonian and Carboniferous granitic intrusions. More recently Tertiary volcanic activity and Quaternary sedimentary deposition has occurred in the Goulburn area of the Lachlan Fold Belt (Branagan & Packham 2000:6-20).

The study area is dominated by tertiary formations comprising clay, sand, claystone and sandstone. The Wollondilly River has a bed-load that is comprised of Quaternary sand, clay and gravel. The Wollondilly River and its tributaries are the most southerly portions of the large and complex Hawkesbury River system (Branagan and Packham 2000:275). The streams are 'underfit' streams, so called because they occupy valleys that are much larger than the streams themselves (Branagan and Packham 2000:275).

Just beyond the study area and very common in the region are the Ordovician/Silurian formations – comprising silty sandstone, quartz greywacke, siltstone quartzite, shale phyllite and minor amounts of porphyry. Volcanic basalt formations also outcrop close to the study area (Goulburn 1:250,000 Geology Mapsheet).

3.1.2 Soils

The soils within the study area reflect their underlying geology, described above. Soil landscapes refer to areas of land with unique landform features that contain characteristic sets of soils (SCA 2003). Within the study area 6 soil landscapes have been identified, and these are summarised below, based on the descriptions provided by the SCA (2003). Because each soil landscape contains a unique set of soil, topographic and landscape attributes they provide a useful way to summarise archaeological potential and exposure.

The Marulan Soil Landscape accounts for the majority of the study area's land surface. This soil landscape is erosional, being formed predominantly by water erosion. The soils are formed on the Marulan granite batholith. The terrain here consists of undulating rises to undulating low hills, with slopes having gradients up to 15%, and relief ranging between 10m to 50m. Rounded granite outcrop is a common feature of this soil landscape. Soils here are generally shallow and sandy. Where this soil landscape is adjacent to major terrain features, such as the Wollondilly River, it was likely to have been a favourable place for Aboriginal occupation, due to the moderate, well drained terrain and the diversity of resources that would have been locally present. The soils are formed over long periods, and sometimes the topsoil includes material washed from upslope, hence the landscape has good potential to accumulate and expose archaeological materials. This landscape has been extensively cleared for pasture.

The Gibraltor Rocks Soil Landscape forms a small percentage of the study area's ground surface, being traversed by the proposed easements. Situated on and formed from conglomerate and sandstone, there are a variety of soils, with depth dependent on topographic position. The terrain consists of rolling to steep hills, with slopes between 10 and 70% gradient and relief ranging between 40m to 100m. Sandstone rock outcrop is sometimes present. The area has not been much cleared of native vegetation. The steepness of this landscape, and the colluvial soils suggest that archaeological potential here is low.

The Jaqua Soil Landscape accounts for a small portion of the study area. This landscape is characterised by long foot-slopes and undulating low rises formed on meta-sedimentary rock (Slate, quartzite, phyllite). Terrain here consists of shallow, concave slopes with gradients no greater than 7% grade, and relief between 5m and 30m. The soils are generally deep, although the topsoil has been subject to high levels of erosion, probably due to extensive land clearing. The gentle slopes and deep locally formed soils suggest that this landscape has good archaeological potential. High levels of erosion mean that sites should be easy to detect here.

The Durran Durra Soil Landscape makes up a very small percentage of the study area. This landscape consists of rolling to steep hills, with shallow soils formed on and from meta-sedimentary rocks. The terrain is steep, with slopes grades between 10 and 40%, and relief between 30m and 120m. The soils are shallow and stony, with the ground surface often stony or rocky. This area has been slightly cleared of native vegetation. The crests and ridges in this area may have archaeological potential as such landforms may have been used as travel routes by Aboriginal people, with the in situ soils likely to accumulate artefacts.

The Paddy's River Soil Landscape is an alluvial landscape that accounts for a very small percentage of the study area. This soil landscape narrowly flanks the Paddy's River and its larger tributaries. The area is generally flat, with the stream having a shallow bank gradients, and being ephemeral dependant on rainfall, sometimes forming a series of disconnected ponds. The area has been extensively cleared. The deep, in situ accumulated soils, gentle terrain and availability of water suggest this area has good archaeological potential.

The Wollondilly River Soil Landscape similarly accounts for a very small percentage of the study area's ground surface, flanking the Wollondilly River. This landscape consists of alluvial flats and terraces, with low slopes having <6% grade and relief of around 5m. The soils are deep alluvium, with the landscape being almost entirely cleared of native vegetation. The combination of a favourable resource zone and a long period of alluvial deposition that is likely to preserve archaeological deposits mean this soil landscape has high archaeological potential, especially terrace areas.

3.1.3 Topography

The study area generally comprises moderate to steep rolling hills and extended ridgelines, dissected by minor and major water lines. A number of minor drainage lines and open low lying swampy flats also occur between ridgelines. The major hydrological feature within the present study area is the Wollondilly River. A number of minor creek lines and drainage lines are also present within the study area.

3.2 Climate

The climate within the study area is warm-temperate. The average maximum daytime temperatures at Goulburn range from 13ºC to 28ºC in summer and 11ºC to 17ºC in winter. The mean annual rainfall in the area is approximately 665mm. The average number of rain days at Goulburn is 22 days during summer and 30 days during winter (Bureau of Meteorology). Whilst there is a wide range of conditions and temperatures suggested by these data, the conditions in the study area can be summarised as being mild and very suitable for year-round hunter-gatherer habitation of all parts of the region

3.3 Flora and Fauna

Observations of early non-Indigenous explorers and settlers in the Goulburn area often included mention of its treeless grassy plains (Paton 1990). In general it is likely the area was an open woodland landscape containing a variety of plants used by the Indigenous inhabitants. During a visit to the Goulburn area in 1836 James Backhouse recorded a woman eating 'sow-thistle'. This is believed to be a variety of the *Asateraceae* family (also including the yam daisy) (Lance and Koettig 1986). Other plant resources local to the area included flowers, nectar and fruits from edible plants such as *Melaleuca*, *Grevillia*, *Hakea* and *Banksia*.

At higher elevations around the study area the sandy granite derived soils of the region are likely to have supported a savannah woodland community of Yellow Box and Blakleys Red Gum (Hird 1991). Remnant basalt and basalt derived soils would have supported 'a brown barrel-ribbon' gum community which is a type of intermediate sclerophyll forest vegetation. Red Strignybark Regrowth Forest is located in the Sydney University Farm property adjacent to the study area indicating a forest type that probably occurred within the study area. It is largely unknown to what extent the local inhabitants would have moved between resource zones, but it is likely that the combination of habitats around the region would have provided ample year-round resources for numbers of local groups.

The various environments found throughout the study area would have provided habitat for a range of mammal, bird, reptile and aquatic species. The open grassland areas would have been habitat for kangaroos, while the sheltered forest would have been home to koalas, rock wallabies, bandicoots as well as birds such as cockatoos, falcons and owls. Along the waterways there would have been frogs, platypus and within the waters there would have been numerous fish species, such as perch, eels and galaxias.

Bennett observed the roasting of echidnas, platypus hunting on the Wollondilly River as well as individuals eating *Banksia* species nectar (MacDonald and Garling 1998). Eels, freshwater mussels and insects would also have added to the large variety of food resources available to the inhabitants of the area (Paton 1990). Possum, kangaroo and wallaby as well as fish and birds have also been recorded in observations of the traditional Aboriginal diet in the study area region (Flood 1980).

In addition to being a food resource, plants and animals were also used for tool manufacture and also provided a significant contribution to the social and ceremonial aspects of Aboriginal life. For example *Xanthorrhoea* sp. (grass tree) is known to have been used for spear shafts and for resin. Along with Kurrajong trees, grass trees were also utilised for their bark fibres to manufacture items such as string bags and fishing lines. Tree bark would also have been used for coolamons (carrying containers) and to construct shelters. Animal sinews, teeth and bones were used to manufacture tools, decorations and ornaments, and fur was used for cloaks.

In the study area today nearly all the original vegetation has been cleared. It has been used for many years as grazing land. Small, isolated pockets of remnant woodland and others of regrowth occur at some locations in the study area.

3.4 Resource Statement

Overall, these diverse environments found within the study area would have provided a range of resources for exploitation by the Aboriginal people who inhabited the region.

The geological landscapes would have provided various sources of stone material for the Aboriginal people, from which a range of stone tools could be manufactured. Raw material types would have included quartz and quartzite, silcrete, chert, flint, diorite and basalt.

Granites and basalt would have been used to manufacture stone axes, used for cutting bark from trees in preparation for canoes, shields and shelters. Stone would have also been used in the grinding of seeds or ochres for paint. Finer grained materials such as chert and silcrete would have been used for the procurement and processing of wood, bark, fibre, hides, shell and bone. Other raw materials, such as quartz and quartzite would have been used for similar purposes.

For the local Aboriginal people, the region would have provided vast and plentiful plant and animal resources. Many of the plants found throughout the study area were important to the Aboriginal people inhabiting the area and could be used by Aboriginal people for numerous

purposes. These include using wood to make implements; berries, leaves and tubers for food and medicines, as well as bark for shelter construction. Some of the plants exploited may have been the banksia, whose flowers could be placed in a bowl of water in order to obtain the sweet nectar to drink (Botanic Gardens Trust 2005). The wood was also used to manufacture tools for weaving baskets. Blackwood trees were used for spear throwers and shields, and fibres from the inner bark were used to make string for fishing lines (Zola & Conran 1991: 50). The liquid of the young ferns stems was rubbed onto the skin to relieve insect bites (Zola and Gott 1992: 56) and the roots were roasted and then ground into a paste in order to make a damper (Zola and Gott 1992: 37). Handles for the stone axes were manufactured from Silver Wattle (Zola and Gott 1992: 36).

Various Fauna species present within the study area would have provided a range of resources for Aboriginal people, while the rivers themselves would have provided relatively easy access between the different resource zones. Food, tools, shelter and ceremonial items were derived from floral resources, with the locations of many campsites predicated on the seasonal availability of resources.

4.0 ABORIGINAL CONTEXT

It is now generally agreed that people were present within Australia at least 45,000 years ago, but many still argue for dates up to and beyond 65,000 years ago (Allen & O'Connell 2003:5). Dates of the earliest occupation of the continent by Aboriginal people are subject to continued revision as more research is undertaken.

4.1 Ethnohistory

Our knowledge of the social organisation of Aboriginal people prior to European contact is, to a large extent, reliant on documents written by early European arrivals recording their impressions. 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 in order to gain a picture of Aboriginal life in the region. Oral histories from members of the Aboriginal community also provide valuable information.

Few records exist for the greater Marulan area. By the time the first non-Indigenous explorers were moving through the district, the Indigenous population had already suffered considerable disruption and had been greatly reduced by the effects of disease. Smallpox, reported as an epidemic in Sydney in 1789, had likely already spread to the Goulburn area (Lance and Koettig 1986).

The records that do remain, however, give some insight into the lifestyle of the people of the region. Bennett recorded observations in the 1830s of bark huts being built on the Goulburn plains. These were made of tree branches with bark sheets. He also recorded people making and wearing possum skin cloaks (McDonald and Garling 1997).

Many early explorers and later settlers to the Goulburn district noted the absence of a visible Aboriginal population. This may have been due to a number of factors including active efforts on the part of the local population to remain undetected. An additional smallpox epidemic in 1846-1847 devastated much of the remaining population. Following the outbreak the Bench of Magistrates estimated that there were 25 Aboriginal people remaining in Goulburn (Steele 2003). However, this does not take into account the people who may have moved to other parts of the region.

According to Tindale (1974) the language group that once inhabited the current study area is near the border of three different groups, the Gundangarra, the Wadi Wadi, and the Wandandian peoples. The Gundangarra were noted as inhabiting the region around Goulburn and Berrima; down the Hawkesbury River (Wollondilly) to about Camden. The Wadi Wadi occupied the land to the east and included much of the Shoalhaven, while the Wandandian occupied the land to the west of the study area.

In general, language groups were not political or social units. Instead, land custodianship and ownership centred on the smaller named groups that comprised the broader language grouping. These groups are often called 'clans' or 'local descent groups', however as Wesson (2000: 8) points out, they are better described as 'named groups' as the membership structure and degree of division from other groups could vary. Groups were delineated by physical boundaries within the landscape, such as watercourses and particular varieties of vegetation. Group members were usually united by common dialect, descent, history, and a shared Dreaming ancestor, with each group led by influential individuals; primary allegiance was owed to this named group, although this could vary according to context and location.

These groups in turn are generally assumed to have been made up of small local extended family groups (often called *bands*). It is assumed that such bands were made up of one or two adult males and their 'wives' and dependants (McDonald 1992).

Historical material, including magistrates records and early non-Indigenous memoirs suggest that around six bands of Gandangara people lived around the Goulburn area (Navin Officer 2000). It is impossible to say, however, what population numbers would have been prior to non-Indigenous settlement.

As it was normal practice to disallow intermarriage in close family bands, a number of groups would travel together making up the larger units or 'named groups'. Gatherings of numbers of such groups occurred for ceremonial reasons or to share in seasonally abundant resources (Clark 1990).

The records of the local inhabitants that do remain refer to a wide variety of technology including spears, spear throwers, shields, clubs, boomerangs, digging sticks and coolamons (Flood 1980). As already mentioned a wide variety of food resources were available and would have included kangaroo, wallaby, possum, emu and other bird species, reptiles, fish, mussels, yabbies and plant foods including berries, tubers and seeds (Paton 1990). These records help to build a picture of elements of the lifestyle of the Indigenous inhabitants that are not preserved in the archaeological record. The study area site currently falls within the boundary of the Pejar Local Aboriginal Land Council.

4.2 The Archaeological Record

By far the most common site type in the southern tablelands region is the stone artefact scatter. Such scatters can range from isolated individual artefacts up to complex sites containing thousands of artefacts. Small sites of fewer than ten artefacts may indicate 'one off' occupation events, and are very common. Larger sites can be representative of a range of past activities, including campsites. The location of large, high density artefact occurrences, campsites in particular, have been found to be influenced by environmental factors. These include distance to water, aspect, raw material availability, the underlying geology or 'substrate' and environmental factors such as land fertility and resource diversity (Lance and Koettig 1986). The likelihood of sites being located in the area can be assessed by a consideration of these desirability criteria. In the region west of the study area, it is likely that

sites occur on hill slopes, and within 100 metres of water. Creek flats and hill top landforms have also contained significant numbers of recorded sites (Lance and Koettig 1986). Sites near the junctions of water sources seem to frequently contain higher densities of artefacts. Survey results and environmental modelling frequently suggest that well drained areas with soft soils are the most likely location for larger camp sites (Koettig 1983).

4.3 Regional Overview

Reports associated with recorded sites are also kept by DECC and will also be collected and used in this assessment. This information will be used to create an Archaeological Predictive Model. Each of these reports have been summarised below.

The majority of the study area has not been part of any previous archaeological investigation. The TransGrid Switchyard has been surveyed, but the consultants were unable to access this report. Many archaeological assessments have been undertaken for the Mount Piper – Marulan 500kv transmission line (Brayshaw and Dallas 1990; Haglund 1991; Brayshaw and Dallas 1993v.1, v.2). Other investigations close to the study area are of sub-divisions at Tallong (Koettig 1988) and Towrang (Dibden 2004a, 2004b) and of a quarry at Marulan (Umwelt Environmental Consultants 2005). Each of these reports are summarised below.

Koettig (1988) undertook an archaeological survey for Aboriginal sites in a proposed rural sub-division at Tallong, NSW. During the survey a total of 9 Aboriginal archaeological sites were recorded, two were shelters with archaeological deposits and the other 7 were open artefact scatters. All the artefact scatters were located in areas of less than 10% visibility and all of the exposure at 4 of the sites revealed artefacts. The scatters were located on creek banks and interfluves adjacent to the creeks. Most ridges had very good visibility but no artefacts were located. Despite this, on a northern ridge top with poor visibility obscured by cobbles two isolated artefacts were located, both artefacts were cores. Due to poor visibility along the banks of Barbers Creek no artefacts were recorded. Silcrete was the most common material used for manufacture of the artefacts recorded amounting to 72%.

Brayshaw and Dallas (1990) conducted an archaeological investigation of Stage 1 of the southern section of the Mount Piper – Marulan 500kV transmission line. The southern end of this study area is located to the west of the proposed site. The total distance of stage 1 of the transmission line was 36.5km, approximately 28km of the route was available to survey, 20km of which was surveyed on foot. The areas not surveyed by foot were considered unlikely to contain archaeological material. During the survey six Aboriginal archaeological sites were recorded. All the sites were open camp sites. The closest site to the current study area is 52-4-0085 Arthursleigh, which was located on an edge of a hilltop, 900 metres east of a tributary of the Wollondilly River. A total of 12 artefacts were recorded within the scatter comprising of 7 quartz, 3 quartizte, 1 silcrete and 1 chert. It was considered likely that site would contain further sub-surface cultural deposits. Brayshaw and Dallas found the Wollondilly river flats and flanks to have no archaeological sensitivity. Rather they suggest that the more likely site locations along the Wollondilly River would be found at swamps and

on low spurs adjacent to the river which would provide easier access to the timbered hills and to the river.

Laila Haglund (1991) undertook further work for the Mt Piper – Marulan 500 kV Transmission Line, part of which included the monitoring of a pylon at the archaeological site Arthursleigh (52-4-0085). Consent to Destroy the site was issued by National Parks and Wildlife for the site. Despite this it was concluded that site had not been disturbed by the clearing and drilling, and that the pylon should be constructed without damage to the site.

Brayshaw and Dallas (1993v.1) conducted a further archaeological investigation of the Mt Piper – Marulan 500 kV Transmission Line. This report consolidates all prior investigations for the transmission line. Twenty-six new Aboriginal archaeological sites were recorded during the survey, one of which was a shelter site (near Mount Piper) and the others were all Open Camp Sites. The consultants were informed of a possible burial site at Retreat River within a round mound of earth. The mound would not be impacted upon by the transmission line. During this summary they recommended that the Arthursleigh site be test excavated and a surface collection of the artefacts be undertaken. Sandstone scarps and prominent ridgelines were considered to have the highest sensitivity for archaeological sites; creek and river flats and adjacent high ridgetops, the Wollondilly River flats and adjacent hillslopes were identified as having high sensitivity; and gently undulating land, containing creeks and adjacent ridgelines that extend between Bannaby and Marulan were identified as having moderate sensitivity for archaeological sites.

Brayshaw and Dallas (1993v.2) undertook test excavations of seven archaeological sites that they identified for the Mt Piper – Marulan 500 kV Transmission Line. One of these archaeological sites was the Arthursleigh (52-4-0085). At this site 8 test trenches were excavated at the 4 locations where pylons were to be built. The northeast and southeast test trenches revealed no archaeological material. One flake fragment was located in the northwest pair of trenches. The southwest trenches revealed a further eight pieces of quartz, two silcrete. The artefacts were located at a depth between 5cm to 20cm in a gravely soil mix that appeared to be slopewash.

Dibden (2004a) conducted an archaeological assessment of Greenwich Park a subdivision at Towrang approximately 5 kilometres west of the current study area. During the survey 19 Aboriginal sites were recorded. This comprised a total of 86 stone artefacts, all of which were found on spur crests, spur side slopes or drainage depressions. Silcrete was the most common material type (65%), other material types included Quartz (15%), quartzite, chert and volcanics.

Dibden (2004b) undertook Stage 2 of the Greenwich Park subdivision during which 29 Aboriginal sites were identified. Similar to Stage 1 the most common artefact material was silcrete (49%), quartz (32%) and the remainder was made up with chert, quartzite and volcanics.

Umwelt Environmental Consultants (2005) conducted an archaeological assessment of a proposed quarry at Marulan. A total of 52 previously unrecorded sites were located during the survey, 29 of which were artefact scatters; 12 were isolated finds; seven were scarred trees and two were stone arrangements. The artefact scatters and isolated finds recorded during the survey were located on exposed creek lines and on slopes or crests. None of the sites were assessed as likely to have subsurface artefacts in an undisturbed context.

4.4 AHIMS Results

A search of the NSW Department of Environment and Climate Change (DECC) Aboriginal Heritage Information Management System (AHIMS) database was conducted to identify those sites within 6 kilometres of the study area. In total, 40 Aboriginal archaeological site have been registered (refer Figure 3). One of these sites (52-4-0134) is located within the existing TransGrid site, adjacent to the current study area (Table 2).

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. These registered sites reflect site-specific archaeological investigations that contribute to our knowledge of Aboriginal resource exploitation within close proximity to water resources and the likelihood of the location of Aboriginal sites associated with certain landforms.

Table 2 (following) provides details of the archaeological sites located within a 6 kilometre search area of the Marulan region.

AHIMS SITE NO.	*SITE NAME*	*SITE TYPE*	*LANDFORM*
52-4-0085	Arthursleigh 1	Open Camp Sites	
52-4-0134	TME-OS2 with PAD	Open Camp Sites	Red Strignybark Regrowth Forest on bank of creek. Located within the TransGrid Site.
52-4-0076	T6	Open Artefact Scatter	On rise along drainage channel.
52-4-0077	T5	Open Artefact Scatter	Low interfluve just above boggy area of open channel
52-4-0078	T4	Open Artefact Scatter	Situated on rises between two drainage channels that form a lagoon
52-4-0080	T2	Open Artefact Scatter	Low interfluve just above boggy area of open channel
52-4-0082	T8	Open Artefact Scatter	Low interfluve just above boggy area of open channel
52-5-0219	Boonerah Pt 1	Open Artefact Scatter	Bank near a lake
51-3-0234	Millendale Creek		
51-6-0150	Greenwich Park Stage 2 Site 8	Isolated Artefact	Spur Crest / side slope interface

AHIMS SITE NO.	SITE NAME	SITE TYPE	LANDFORM
51-6-0151	Greenwich Park Stage 2 Site 9	Isolated Artefact	Drainage depression
51-6-0152	Greenwich Park Stage 2 Site 10	Isolated Artefact	Saddle crest
51-6-0153	Greenwich Park Stage 2 Site 11	Isolated Artefact	Spur side slope
51-6-0154	Greenwich Park Stage 2 Site 12	Open Artefact Scatter	Grassed paddock
51-6-0155	Greenwich Park Stage 2 Site 13	Open Artefact Scatter	Toe section of a spur immediately above alluvial flats.
51-6-0156	Greenwich Park Stage 2 Site 14	Isolated Artefact	Basal spur slope just above alluvial flats.
51-6-0157	Greenwich Park Stage 2 Site 15	Open Artefact Scatter	Lower spur slope
51-6-0158	Greenwich Park Stage 2 Site 16	Isolated Artefact	Lower spur slope
51-6-0159	Greenwich Park Stage 2 Site 17	Open Artefact Scatter	Lower slope
51-6-0160	Greenwich Park Stage 2 Site 18	Isolated Artefact	Lower slope in a paddock
51-6-0161	Greenwich Park Stage 2 Site 19	Isolated Artefact	Spur side slope in a paddock
51-6-0162	Greenwich Park Stage 2 Site 20	Open Artefact Scatter	In a drainage depression on the bank of a creek
51-6-0163	Greenwich Park Stage 2 Site 21	Open Artefact Scatter	On a knoll crest
51-6-0164	Greenwich Park Stage 2 Site 22	Open Artefact Scatter	Upper slope
51-6-0165	Greenwich Park Stage 2 Site 23	Isolated Artefact	Spur side slope in a paddock
51-6-0166	Greenwich Park Stage 2 Site 24	Open Artefact Scatter	Basal slope above an incised drainage depression
51-6-0167	Greenwich Park Stage 2 Site 25	Isolated Artefact	Edge of bank of an incised drainage depression
51-6-0168	Greenwich Park Stage 2 Site 26	Open Artefact Scatter	Either side of an incised drainage depression
51-6-0169	Greenwich Park Stage 2 Site 27	Isolated Artefact	Edge of the bank of an incised drainage depression
51-6-0170	Greenwich Park Stage 2 Site 28	Isolated Artefact	Edge of the bank of an incised drainage depression
51-6-0171	Greenwich Park Stage 2 Site 29	Open Artefact Scatter	Flat bank of an incised drainage depression
to be assigned	BH 11	Open Artefact Scatter	River terrace on river channel
to be assigned	BH 12	Open Artefact Scatter	River terrace adjacent to river channel
to be assigned	BH 13	Open Artefact Scatter	Saddle on top of prominent ridge line
to be assigned	BH 14	Isolated Artefact	Upper slopes of prominent ridgeline
to be assigned	BH 15	Open Artefact Scatter	Upper slopes of prominent ridgeline
to be assigned	BH 16	Isolated Artefact	Gentle slope adjacent to minor drainage line
to be assigned	BH 17	Open Artefact Scatter	Gentle mid slope above drainage line
to be assigned	BH 18	Open Artefact Scatter	Top of open moderate hill between two minor drainage lines
to be assigned	BH 19	Open Artefact Scatter	Break of slope overlooking prominent drainage feature

Table 3: AHIMS sites and other sites known to exist but not yet registered on AHIMS within 6 kilometres of the study area.

Open artefact scatters are the most common site type close to the study area, and isolated artefacts are the next most common. There are no other site types recorded within six kilometres of the study area.

4.5 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 previous archaeological work and recorded Aboriginal archaeological sites, the following predictive model for the study area has been developed, indicating the most likely through to the least likely site types.

The following broad predictive model is suggested for the study area:

- Open campsites (artefact scatters) are likely to be the most common site types in the study area;

- Artefact scatters are most common site type and are likely to occur on level, well-drained ground adjacent to sources of freshwater and wetlands;

- Isolated finds are likely to occur anywhere in the landscape;

- Scarred trees are likely to occur in all topographies where old growth trees survive, either as isolated trees or as part of remnant or continuous forest;

- Burial sites may occur in landforms characterised by relatively deep profile of soft sediments such as sand and alluvium.

Specifically, the environmental context and regional patterning suggest that the study area will have been occupied by Aboriginal people, and this occupation will have left observable records/marks. Aboriginal site types are discussed in the following section, with particular regard to the potential for such sites within the study area.

- *Open campsites, artefact scatters and isolated finds*

These sites represent the site type most frequently identified within the region, especially on level, well-drained land features on rises within close proximity to water courses. They are highly likely to occur within the current study area, particularly in close proximity to the Wollondilly River. Isolated finds are likely to occur throughout the study area and will be found wherever exposure is sufficient to reveal them.

- *Scarred Trees*

Scarred trees can be expected to occur in all landscapes where stands of old growth timbers remain. Historically certain species were selectively harvested (i.e. *Toona australis* Red Cedar), however, other mature eucalypt species may be present within the area. The likelihood of mature scarred trees being present within the study area is consequently considered to be moderate – high where old growth timber survives.

- *Middens*

Middens are most likely Aboriginal site to be identified close to the Wollondilly River. It is likely that regular flooding along the river banks may have caused eroding midden complexes within the study area. The likely occurrence of middens is considered to be moderate; however, the level of archaeological integrity displayed by such sites is likely to be diminished. No middens have previously been recorded within the study area however there is some potential that they may occur along the upper reaches of the river.

- *Rock shelters with art and/ or deposit*

Rock shelters with art and/or deposit generally occur within specific geological and topographical landscapes comprising sandstone exposures, shelving and overhangs. Rock shelter sites are unlikely to occur within the study area given the lack of suitable geological features.

- *Grinding Grooves*

Grinding grooves are often found on large open and relatively flat areas of sandstone shelving and outcrops in close proximity to water. As the study area does not have large areas of open sandstone, grinding grooves are unlikely to be identified in the study area.

- *Burials*

Aboriginal burial sites are generally situated within deep, soft sediments such as aeolian (wind) sand or alluvial (river deposited) silts. Within the study area, there is some potential for burials to occur within the soft deposits that may be encountered on the banks of the Wollondilly River.

- *Aboriginal Ceremony and Dreaming Sites*

These types of highly significant sites tend to occur at places associated with traditional stories and cosmology, often the sites include landscape components such as hills or rivers. Generally they are located away from habitation sites, although this is likely to require further testing when more of such site types are recorded. There is low potential that unregistered Aboriginal *Ceremony and Dreaming Sites* will be found in association with the study area.

- *Post-Contact Sites*

These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area. Many of these sites can hold special significance for Aboriginal people and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with

post-contact Aboriginal use. This site type is usually known from historical records or knowledge preserved within the local community. It is considered unlikely that any additional, unregistered post-contact sites will be present within the study area.

- *Aboriginal Places*

Aboriginal *places* may not have any "archaeological" indicators of a site, but are nonetheless significant to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings. Often these places are significant in the living memory of a community. There is low to moderate potential that Aboriginal places of spiritual and cultural significance will be found in association with the study area.

- *Aboriginal Resource and Gathering sites.*

Aboriginal Resource and Gathering Sites are sites where there is ethnographic, oral, environmental or other, evidence that suggest that natural resources have been collected and utilised by Aboriginal people. These natural resources have a cultural significance and connection for the Aboriginal community, such as ochre outcrops that were used for art or ceremonial purposes. These sites are still considered important places today. Such places within the study area might be located along the Wollondilly River.

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.

The historic background is based on information held at the following repositories:

- *NSW Lands and Titles Office*

A chain of title for the study area's allotments has provided an understanding of land use history and ownership. This information also contains allotment-specific survey plans that include any buildings on the property.

- *Local History Societies*

Local history societies collate many primary source materials such as early journals and other local documents. As well as written sources, members of the local history society can often provide additional oral history information about an area, adding to the depth of historical background.

All of this information has been used locate known and potential historical archaeological sites.

5.1 Early exploration and settlement

The Goulburn area of the southern tablelands was probably first observed by a European in 1798, when an ex-convict, John (James?) Wilson reached Mount Towrang during a government-sponsored foray south from Sydney (Wyatt 1941: 24). Subsequent to this, between 1814 and 1820, several other expeditions reached and described the area around Goulburn. Charles Thorsby led an expedition in 1818 with Hume, Wild and Meehan during which Marulan was recorded. The expedition led to the discovery of Goulburn Plains and Lake Bathurst, and in turn led to land grants and settlement of the region during the early 1820s. The earliest settlements in the region can be found along rivers such as the Wollondilly. Later settlement patterns were influenced by the introduction of the Great Southern Road (Hume Highway) and the railway; however the arable land associated with the rivers and waterways continued to play an important role in the nature of settlement. Marulan is the closest town to the study area; it sits amidst a narrow neck of land between the ridges and steep gorges of the Shoalhaven and Wollondilly Rivers. This corridor is the main accessible route when traversing between Melbourne and Sydney.

The great Southern Road was a convict built Road; there was a major stockade for the chain-bound convicts at Towrang from 1836 to 1842. The stockade became the principal penal establishment in the southern district (Mulwaree Shire Community Heritage Study 2002-2004).

Where the south road forked to Bungonia and Goulburn a township (meant as a way station) was drawn up by Mitchell and surveyed by Hoddle in 1834. The township of Marulan was born, and officially gazetted on 11 March, 1835.

At the time of construction of the railway, the population in the neighbourhood of Marulan increased, however at the end of 1867, as work on the viaduct across Barber's Creek neared completion, many of the railway workers moved to the next section of the line. John Morrice, the owner of the property 'Glenrock' took advantage of the railway's construction by subdividing the land fronting the main road in the vicinity of the railway. He named this town Mooroowoolen, and an advertisement for the sale of lots appeared in 1867. It was about 2 miles from Marulan. Over the next ten years the town slowly moved to Mooroowoolen, which became known as Marulan. The old township was in a state of ruin and the new town contained all the relevant services to cater for the needs of travellers.

The study area itself is located close to the township of Marulan. The landownership history has been traced for Marulan and the surrounding region. The land history of the Marulan site comprised of a number of portions within the parish of Uringalla, most of which were owned by the one family.

- Portion 69 was 71 acres;
- Portion 70 was 47 acres;
- Portion 98 was 48 acres.

Thomas Holt received the original land grants that incorporated the Marulan site as well as the Arthursleigh sheep station located adjacent to the study area and other estates within the region. He wrote his will on the 6 March 1888 and died seven months later. In his will he specified that the land should be handed through the generations from the eldest son to the eldest son (Book 2117 No. 492). So when Thomas died he left his estate to his eldest son Alfred William Holt who then left the estate to his eldest son Claude Alfred Wallis Holt. By 1949 Eric Thomas Wallis Holt, who was a Grazier from Mount Pleasant owned the land within the study area. When Thomas died in 1971 Margret Williamson Holt and Perpetual Trustee Company became the probates of his will.

The plains in the region were used for stock-raising and wheat growing. The region also became a major exporter of wool. Arthursleigh Station next to the study area is still a working sheep farm.

A well-known historical feature of the region is the Macquarie Track. Part of this track is located several kilometres north of the study area. The track forms part of the early nineteenth century road network of the region, and is marked on late nineteenth century Parish maps as Sydney Road. Isolated sections of the track that were gazetted as roads are visible on current topographic maps. The track is demonstrative of the earliest exploration and development of

the region for agriculture, and the region's importance as a primary producer to Sydney and the wider colony.

5.2 The Archaeological Record

No sites were present in the study area.

A search of the NSW State Heritage Register showed twenty-seven registered sites for Goulburn Mulwaree Local Government Area. While none of the sites are within the study area an example of the sites recorded outside of the Goulburn township are:

- Catholic Church of Christ the King, Taralga
- Christ Church Anglican, Bungonia
- Glen-Dor – Welcome Reef Dam, Lower Boro
- Hillas Farm Homestead, Bannaby
- Marulan Railway Station Group, Marulan
- Mayfield – Welcome Reef Dam, Lower Boro
- Ooranook – Welcome Reef Dam, Stewarts Crossing
- Rossis Bridge over the Wollondilly River, Goulburn
- Tarago Railway Station Group, Tarago
- Marulan Township, Marulan

None of these items is in the vicinity of the study area. The closest is the Marulan Railway Station Group, in the township of Marulan, twelve kilometres away from the study area.

Mulwaree Local Environmental Plan 1995

Goulburn Mulwaree Local Environmental Plan 2007

No sites were present in the study area.

The heritage schedules of both these instruments were consulted as the project spanned the reallocation of Local Government boundaries and the public exhibition of the 2007 LEP. There were no sites listed as being present within the study area in either instrument.

State Agency Heritage Registers

No sites were present in the study area.

The NSW Heritage Office databases contain information on items listed under s170 of the Heritage Act by State Agencies. The Marulan railway station group, is the closest site to the study area.

The Register of the National Estate

No sites were present in the study area.

A search of the Register of the National Estate returned 71 items and sites of registered heritage significance in the Goulburn Mulwaree Local Government Area. None of these sites was identified as being within the study area. The closest sites to the study area were Glenrock Homestead, a Streetscape on George Street, an Anglican Church Cemetery and the Catholic Church Cemetery all located at Marulan.

The Register of the National Trust of Australia (NSW)

No sites were present in the study area.

A search of the items registered on the National Trust Register showed there were 96 items, sites and areas listed on this register in the Mulwaree Local Government Area. Included in the listed items are:

- Arthursleigh Homestead (c1820s)
- Arthursleigh Woolshed (c1820s)
- Arthursleigh Shearers Quarters
- Arthursleigh Group (includes all the above)
- Big Hill Uniting Church (c1878)

None of these sites are within the study area, however they provide a good example of the early pastoral and social development of the Marulan area. The Arthursleigh sites are all in the neighbouring property to the proposed development, but are separated from the proposal by some distance and topography.

5.3 Discussion

There are no formerly registered sites of historic or historic archaeological significance in the study area. The dominant land use of the study area has been for grazing, as evidenced by the nearby Arthursleigh property, within Sydney University Farm, which is a working Sheep Station with a long history. As such, the types of sites which may be expected to occur in the study area are those associated with rural properties – old infrastructure such as sheds, windmills and farm machinery and other ephemera such as refuse dumps may be present.

6.0 SURVEY

6.1 Survey Methods

The survey methods for Aboriginal sites have been designed to locate archaeological sites within the study area with reference to the following information:

- Previously recorded sites within the study area;
- Areas of potential as identified by the background research predictive model (regional site patterns as compared to the physical environment of the study area, or items identified in historic plans);
- The proposed development footprint, including pipelines, electricity easements and sub-station sites.

The survey was conducted exclusively within the Study Area as outlined in Section 1.2 and has used the following method:

Transect Survey –

The size of the study area and the type of development allowed for almost 100% survey coverage of the pipelines and the preferred gas turbine facility sites. The wider area within the boundaries of the Marulan site was not intensively surveyed. Although the majority of the site was sample surveyed, a number of determined transects were specifically surveyed and detailed notes recorded along each one. Each transect was determined in order to sample a range of landforms/landscape units along limited area of the pipeline alignments and turbine footprint. Information recorded during the survey included the geology of the area, exploitable resources, identifiable land-use impacts and any archaeological sites present in the study area. This information was also used to assist in the identification of areas of archaeological potential.

Desktop Survey –

Due to land access restrictions, a desktop assessment of the proposed gas pipeline corridor was undertaken. This involved background research of this part of the study area in order to determine the likelihood of the presence of heritage sites and values, and specifically identify sensitive landforms with the potential to contain Aboriginal and historic material.

Factors that influence the effectiveness of the survey include:

Ground Surface Visibility:

Ground Surface Visibility (GSV) is an average amount of the physical ground that could be viewed at the time of survey, and is expressed as a percentage. The primary effect on GSV is vegetation cover, however modern cultural material, such as concrete, rubble, rubbish or land fill can also hamper GSV. Within the study area, much of the landscape comprised open

pasture grasses that did not allow for good ground surface visibility. Features within the landscape that provided excellent ground surface visibility include wombat and rabbit burrows, cattle tracks, farm vehicle tracks, the base of trees, fence lines, exposed creek and drainage banks and soil slips and scalding from wind and water erosion.

Disturbance

Physical ground disturbance that occurs within the area has been noted and mapped. Ground disturbance includes events such as natural erosion and impacts from historical land-uses such as farming and vegetation clearance. Ground disturbance can often result in areas of better GSV, therefore making it easier to identify sites, however, such sites tend to have been impacted by the disturbance event. Throughout the study area, farming activities such as fence construction, vehicle tracks and cattle movement, provided suitable ground surface visibility. This type of disturbance was targeted and inspected within the study area.

Limitations

Other limitations to the survey were also noted. Such limitations might generally include restricted access to private lands, or areas that were considered unsafe to survey. In particular, access was not yet possible within the proposed gas pipeline corridor. This alignment occurs between the existing Moomba to Sydney Gas Main and the Marulan site. This area will be assessed on a desktop basis, using site prediction models from previous archaeological work in the wider Southern Tablelands region, and the results of this initial assessment.

6.1.1 Existing Condition of the Study Area

The study area comprises open grazed paddocks with small stands of remnant and planted trees. The region has been farmed for many years and much of the original vegetation has been cleared.

6.2 Aboriginal Participation

Aboriginal representatives from the Pejar Local Aboriginal Land Council and the Gundangarra Tribal Council Aboriginal Corporation participated in the survey. The representatives have contributed input into the survey methods used, and have been asked to provide comment on the cultural significance of the locality and any archaeological objects or areas that are recorded during this survey.

6.3 Survey Results

The archaeological field survey of the study area was conducted by Melanie Thomson and Chris Lewczak (Biosis Research) accompanied by Pat Little and Justin Boney (Pejar Local Aboriginal Land Council) and Sharon Halls (Gundangarra Tribal Council Aboriginal Corporation) on 26, 27 and 28 September 2006.

A total of 7 survey transects were completed during the survey of the study area (Figure 2). Transects sampled a wide variety of terrain within the identified landscapes. A major

limitation to archaeological survey noted during the fieldwork was a lack of visibility and exposure throughout much of the Marulan Soil landscape. Poor levels of ground surface visibility can be attributed to thick pasture grass cover that occurs across the majority of the study area.

Along the pipeline alignment, completed survey transects followed the proposed routes and the entirety of these were surveyed. Along each route, areas of good ground surface visibility were targeted (Plate 1 and 2). Completed surveyed transects focussed on archaeologically sensitive landforms and exposures that provided the opportunity for archaeological materials to be identified. Areas of exposure included wombat burrows, cattle tracks, vehicle tracks, erosion at the base of trees and fence lines.

Overall, the ground disturbance levels within the study area were relatively low, as the study area has only been used for stock grazing. No scarred trees were recorded as no large remnant trees were encountered. With relatively little ground disturbance, and deep alluvial soil deposits across many areas, it is highly likely that undisturbed archaeological sites will occur.

Plate 1: Survey Transect 3, within Marulan Site

Plate 2: Survey Transect 5, facing south east towards existing TransGrid Switchyard

Despite poor ground surface visibility across much of the study area, a number of Aboriginal archaeological sites were identified, where areas of good exposure were encountered.

The majority of sites were recorded on alluvial terraces and ridgelines adjacent to the Wollondilly River and associated smaller tributaries and drainage lines (Figure 3, Table 4). A number of sites were also recorded along ridgelines away from water sources, in particular, in ridge saddles on the sheltered side of the ridges. However, it should be noted that site location was dependant on some form of disturbance to expose these sites, such as vehicle access tracks, animal digging and erosion resulting from vegetation clearance.

Transect	Landscape	Land unit	Landform elements	Dimensions (L x W)	Coverage m^2	Visibility %	Exposure %	Effective coverage m^2	Effective coverage (%)	Archaeology
1 (Pipeline)	Wollondilly River	River	River floodplain and terraces	600 x 15	9,000	25	5	112.5	1.25%	-
2 (Pipeline)	Marulan Landscape	Steep Hills	Mid to upper hill slopes	484 x 15	7,260	15	2	21.78	0.3%	-
3 (Footprint)	Marulan Landscape	Hills	Moderate undulating hills dissected by drainage line	2360 x 15	35,400	40	10	1,416	4%	BH7, BH8, BH9
4 (Pipeline)	Marulan Landscape	Undulating	Moderate hills and drainage lines	1046 x 15	15,690	20	5	156.9	1%	-
5 (Pipeline)	Marulan Landscape	Undulating	Upper River Terrace and moderate hills	600 x 15	9,000	30	5	202.5	2.25%	BH2
6 (Pipeline)	Marulan Landscape	Undulating	Upper River Terrace and moderate hills	1385 x 15	20,775	45	10	934.86	4.5%	BH1, BH3, BH4, BH5, BH6
7 (Pipeline)	Wollondilly River	River	River floodplain and terraces	600 x 15	9,000	15	5	112.5	1.25%	-

Table 4: Survey Transects completed during the field survey

6.3.1 Desktop Results

Based on previous archaeological work and the results of initial field survey across sections of the study area, a number of areas of Aboriginal archaeological potential were identified (Figure 4). All of these areas are situated along major and minor water lines, on associated alluvial terraces and on significant ridge lines or hill tops.

6.4 Aboriginal Sites and areas of Aboriginal archaeological potential

As a result of the archaeological survey, 10 previously unidentified Aboriginal archaeological sites were recorded (Figure 3). A number of areas of Aboriginal archaeological potential have also been identified based on landforms and site locations within the wider region (Figure 4).

The following site descriptions have been separated by proposed pipeline, electricity easement and gas turbine facility locations.

6.4.1 Marulan Site - Facilities Footprint

Three Aboriginal archaeological sites were recorded within the proposed footprint envelope. Two areas of Aboriginal archaeological potential were also identified within this area. The details of these are outlined below.

BH7

Description: This site comprises a single quartz flake located on the spoil of a wombat hole at the base of a large tree (Plate 3). It is located in the centre of the proposed gas turbine facilities site and on the proposed electricity line (Figure 3). It is situated on a moderate rise that overlooks a small drainage line to the north west.

Site Condition: The immediate area at the base of the tree has been exposed and disturbed through the excavation of the wombat burrow. It is however likely that further archaeological deposits will be associated with this isolated find across the moderate rise in areas that have not been disturbed.

Feature Description: One broken quartz tool, as it exhibits retouch along the left lateral margin (Plate 4). It is unlikely that movement from the wombat burrowing has damaged the quartz tool. No other cultural material was identified in the immediate vicinity of the wombat hole.

Plate 3: Location of BH7 on eastern bank, facing north west

Plate 4: Stone artefacts recorded at BH7

BH8

Description: This site is located within the proposed gas turbine facilities footprint (Plate 5). The site was identified on the spoil from a number of wombat burrows amongst remnant vegetation. It is on top of a moderate rise on the eastern side of the Wollondilly River.

Site Condition: The area around this site has been heavily disturbed by the wombat burrows although it is likely that the site continues across the landform in areas that have not been impacted by the wombat burrows.

Feature Description: The site comprises two broken quartz flakes and one retouched quartz tool (Plate 6). These stone artefacts were associated with pale yellow brown sandy silt. The sand excavated from the wombat burrows was to a significant depth.

Plate 5: Location of BH8 on eastern bank, facing north west

Plate 6: Stone artefacts recorded at BH8

BH9

Description: This site is located within the proposed the proposed gas turbine facilities footprint (Plate 7). This site is located 60 metres west of BH8. It is possible that the cultural material from these sites is related. The site was identified on the spoil from a number of wombat burrows amongst remnant vegetation. It is on top of a moderate rise on the eastern side of the Wollondilly River.

Site Condition: The area around this site has been heavily disturbed by the wombat burrows although it is likely that the site is continues across the landform in areas that have not be impacted by the wombat burrows.

Feature Description: The site comprises one quartzite core and one quartzite broken flake (Plate 8). These stone artefacts were associated with pale yellow brown sandy silt. The sand excavated from the wombat burrows was to a significant depth.

Plate 7: Location of BH9 on eastern bank, facing north west

Plate 8: Stone artefacts recorded at BH9

Areas of Aboriginal archaeological potential

The top of the moderate hill and ridge line overlooking a small drainage line to the north west and the Wollondilly to the west are considered to have Aboriginal archaeological potential for sub-surface cultural deposits (Figure 4). This area covers a moderate section of the proposed gas turbine facilities envelope.

The hill is part of the Marulan soil landscape, suggesting slowly accumulated and actively eroded shallow soils, which are identified as being of archaeological potential. Also present within the envelope is a small sand deposit, with the relatively deep, soft sand readily identified by wombat burrows and bracken. Sandy deposits like this are a relatively common and often noted feature of the Southern Tablelands, often occurring as small isolated features on other landscapes (Jenkins 1996). It is not clear whether the small sand deposit in this part of the study area is an Aeolian feature, or whether it is a residual bar deposit from an old

course of the Wollondilly River. Without a doubt, however, such features are uniformly noted as having high Aboriginal archaeological potential on the Southern Tablelands (Packard 1986). The presence of artefacts identified at this locality confirms this potential.

6.4.2 Marulan Site Generally

Six Aboriginal archaeological sites were recorded within the proposed Marulan Site generally (Figure 3). Associated within these sites are areas of Aboriginal archaeological potential (Figure 4). The details of these are outlined below.

BH1

Description: This site consisted of an isolated artefact situated at the base of an existing overhead power line tower (Plate 9). The site has been exposed during the construction of the tower.

Site Condition: The site comprises only a single quartz artefact on the southern side of a small drainage line. The immediate area has been significantly disturbed however other sections of the drainage bank within close proximity are intact.

Feature Description: The site comprises a single quartz stone artefact (Plate 10). The quartz

Plate 9: Location of BH1 site, facing north east

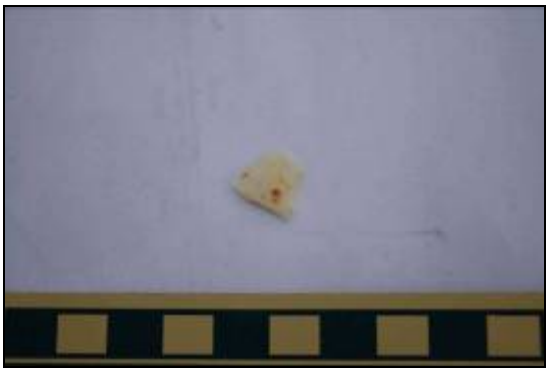

Plate 10: Recorded stone artefact at BH1

from which this was manufactured would have been locally available through the study area.

BH3

Description: This small scatter of stone artefacts is situated on the upper eastern bank of the Wollondilly River (Plate 11). These artefacts have been exposed along a farm vehicle track that runs along the top of the river bank. The underlying soil comprises alluvial sands and gravels, near which a number of medium sized granite boulders are outcropping.

Site Condition: The site is relatively undisturbed as the disturbance from the vehicle track is limited. The majority of the associated landform is undisturbed and likely to contain further stone artefact material sub-surface.

Feature Description: The stone artefacts comprised 3 quartz flakes and a quartzite core trimming flake (Plate 12). A number of other quartz fragments were also noted along the vehicle track. These materials would have been available locally.

Plate 11: Location of BH3 on upper river bank, facing south

Plate 12: Exposed stone artefacts recorded at BH3

BH4

Description: Further along this vehicle track, which runs parallel to the Wollondilly River, an isolated stone artefact was identified on an eroded section of the track (Plate 13). It was identified in close proximity to a major drainage line that runs into the nearby Wollondilly River. The deposit along the bank comprises sandy gravel soil.

Site Condition: This section of the farm vehicle track is moderately eroded into the underlying alluvial deposits. It is likely that there will be further archaeological material at greater depths.

Feature Description: The site comprises a primary flake which has been removed from the outside of a large smooth quartz pebble (Plate 14). This is a strong indicator that the material occurs in the local area.

Plate 13: Location of BH4 on eastern bank, facing north west

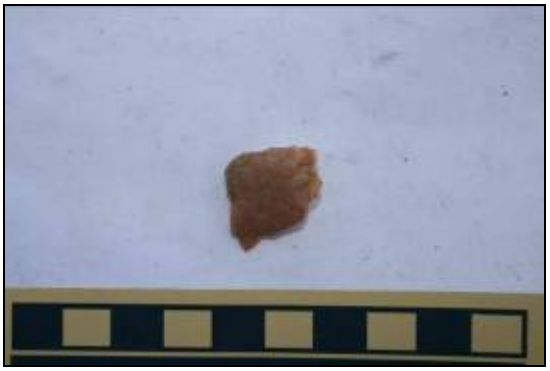

Plate 14: Single stone artefact recorded at BH4

BH5

Description: On the farm vehicle track, a further isolated stone artefact was identified on an eroded section (Plate 15). It is situated on the eastern side of the Wollondilly River. The deposit along the bank comprises sandy gravel soil.

Site Condition: This section of the farm vehicle track is eroded in small patches. However, it is likely that there will be further archaeological material at great depths.

Feature Description: The site comprises a silcrete core and core trimming flake. This raw material type would have been brought into the area as it is not locally available (Plate 16).

Plate 15: Location of BH5 on eastern bank, facing

Plate 16: Stone artefacts recorded at BH5

BH6

Description: This stone artefact scatter site is situated along a farm vehicle track and gateway on the upper slope of a moderate hill, 300 metres east of the Wollondilly River (Plate 17).

Site Condition: The site has been exposed and disturbed by the continuous use of the farm vehicle track along the hill and through the gateway. There is relatively little topsoil across this rise with the underlying bedrock being exposed in deeply eroded sections.

Feature Description: A total of eight Aboriginal stone artefacts were identified, comprising cores, formal tools and flakes (Plate 18). It is highly likely that further sub-surface cultural material will occur in undisturbed areas across this rise. It is likely that this material will occur close to the surface as little topsoil occurs across the hill crest.

Plate 17: Location of BH6 on farm vehicle track and in gateway

Plate 18: Stone artefacts recorded at BH6

BH10

Description: This site comprises one broken fragment of silcrete that may have been broken by farm vehicle movement through the nearby gate (Plate 19). The site is situated on the top of a moderate rise that overlooks the Wollondilly River to the east. A number of other possible fragments were also noted however these were heavily disturbed and broken from continuous use and erosion at the gateway.

Site Condition: The site is significantly disturbed by continuous farm vehicle use and trampling from cattle as a large water trough is located close by. The areas is heavily disturbed and eroded due to vehicular movement and the shallow topsoil associated with the top of the hill.

Feature Description: The single broken silcrete artefact was located in an eroded gateway. The soil in this area comprises shallow silty coarse grained gravel (Plate 20). The other identified stone fragments and material exposed in the gateway is raw material which was suitable for the manufacture of stone artefacts, however did not exhibit any diagnostic features.

Plate 19: Location of BH10 on exposure near gateway

Plate 20: Broken stone fragments and one silcrete stone artefact recorded at BH10

Areas of Aboriginal archaeological potential

There are a number of landforms within the Marulan site that are considered to have potential for Aboriginal archaeological sites (Figure 4). These included the continuous hills/ridgeline that runs parallel to the Wollondilly River, along its eastern margin. This area also includes a 250 metre buffer either side of the Wollondilly River that encompasses the alluvial floodplain and terraces.

6.4.3 Proposed Gas Pipeline Corridor

Only one Aboriginal archaeological site was recorded within the proposed gas pipeline. It should be noted however that the majority of this proposed option was not surveyed on foot and only a desktop assessment for this section was undertaken. As a result of the desktop assessment a number of areas of Aboriginal archaeological potential were identified. The details of these are outlined below.

BH2

Description: This site comprises two stone artefacts located on the man made drainage systems adjacent to the existing electricity sub-station (Plate 21). Small earthen mounds have been constructed to channel water along the natural drainage line to a medium sized dam.

Site Condition: The stone artefacts are located on the excavated mounds. Much of the area along the drainage has been disturbed by the construction of the mounds and the dam.

Feature Description: The site comprises one quartz flake (Plate 22) and one silcrete flake.

Plate 21: Location of BH2 on small built drainage rise

Plate 22: The quartz stone artefact recorded at BH2

Areas of Aboriginal archaeological potential

There are a number of landforms along the proposed gas pipeline that are considered to have potential for Aboriginal archaeological sites (Figure 4). These areas consist of sensitive landforms, such as minor water lines and alluvial rises adjacent to water courses. It is likely that further cultural material in undisturbed areas will also contain Aboriginal archaeological material. Along the ridgelines, the deposits consist of shallow gravely silts, whereas the low lying drainage and creek lines consist of much deeper alluvial deposits.

It should be noted however that this area was not surveyed on foot and that it is highly likely that other areas of potential may exist that cannot be identified from aerial and contour maps. Areas that are likely to contain undisturbed archaeological deposits will include the ridgelines that consist of shallow gravely silts, with low lying drainage and creek lines consisting of much deeper alluvial deposits.

6.4.4 Proposed Electricity Transmission Line

No Aboriginal archaeological sites were recorded within the proposed electricity transmission line.

Areas of Aboriginal archaeological potential

There is one small area of archaeological potential where the electricity easement meets the turbine envelope (Figure 4). This includes a moderate hill overlooking a small drainage line and the area between the hill and the Wollondilly River.

6.4.5 Discussion

The results of the field survey reflect the predictive modelling based on previous archaeological work in the Southern Tablelands region. These predictions identified water courses and their associated alluvial terraces as having the highest potential for Aboriginal archaeological sites. The findings of other archaeological assessment work have also

identified prominent ridge lines and ridge saddles as being of high Aboriginal archaeological potential.

Many of the recorded Aboriginal sites for this project were all identified in heavily eroded or excavated exposures as a result of water or animal disturbance. In many instances where sites were identified in wombat burrows, the excavated holes were quite significant and were dug well over 1 metre into the underlying deposits. As many of the artefacts were identified in these deep alluvial deposits, it can be suggested that the cultural material will be found at significant depths and not just in the upper soil layers.

The findings of the field assessment clearly identified those landforms within the study area that are most likely to contain Aboriginal archaeological deposits. Each of the proposed options traverses various landforms which do contain and are likely to contain Aboriginal archaeological sites.

Both of the proposed gas fired turbine facility footprints are situated within a landform that is considered to have moderate Aboriginal archaeological potential for subsurface cultural material. These sites have generally been disturbed by farming practices, initially with land clearance and subsequently continuous grazing. However, due to the deep nature of the alluvial deposits associated with this landform, these levels of disturbance are superficial, impacting only on surface deposits, and will not have impacted on deeper cultural stratified deposits. These deposits are significant at the Marulan, indicating that the cultural values are considered to be moderate within the Marulan site.

The most sensitive identified landforms are associated with the sandy alluvial terraces that occur within close proximity to the Wollondilly and Paddy's rivers, along with their associated tributaries and drainage lines. A number of Aboriginal archaeological sites were identified within these sandy alluvial deposits, which had been expertly excavated by a number of wombats. These burrows were to significant depth and identified cultural material was being identified on the top of these excavated spoil. This again indicates that cultural material will be found well below ground surface, and that periodic flooding and disturbances from land clearance and grazing will not have impacted these deposits. Previous archaeological work within the region has clearly documented large open stone artefact scatters, the remains of permanent and seasonal campsites, along the Wollondilly River and other major water lines.

The field assessment also identified large stone artefact scatter sites on major ridge lines and ridge saddles. These landforms do not contain deep deposits, and minimal ground disturbance and water erosion across these landforms will quickly expose any underlying cultural material. The areas immediate to the identified sites have been impacted by farm vehicle tracks, however other areas of these landforms remained undisturbed and protected by remnant vegetation.

It is more difficult to determine the significance of cultural values along the proposed gas pipeline corridor as much of the area was not surveyed on foot, hindering the identification of

sites on the ground and the levels of disturbance that may have occurred at these sites and within areas of identified Aboriginal archaeological potential. The location of one Aboriginal archaeological site within the section of the proposed gas pipeline that was surveyed indicates that despite high levels of ground disturbance from existing infrastructure, cultural material is still present. However, due to these levels of disturbance, cultural values within this section of the proposed pipeline are considered to be low. This is not the case for the southern two thirds of the proposed gas pipeline route, in which a number of sensitive landforms were identified through desktop assessment, using the results of other archaeological work completed in the region. Based on the identification of these landforms as having Aboriginal archaeological potential, this proposed pipeline is considered to have moderate cultural values.

Overall, much of the general landscape within the wider study area is considered to have potential for Aboriginal archaeological potential. However, within this landscape some landforms will contain higher cultural values than others.

6.5 Historic Sites

No historic sites or features were identified within the Marulan site and it is unlikely that any sites occur here.

6.5.1 Discussion

The results of the field survey reflect the previously discussed predictive model. Regionally historical features have been limited to the Macquarie Track and rural buildings that have been clustered together, while the remainder of the area was cleared from grazing purposes. Away from the main dwelling areas, it was expected that limited other historical buildings and structures would exist as the use of the land was for grazing, which did not require outpost facilities. There is the potential for other historical archaeological remains to be present within the greater area of the original land grant area, however, from the location of the service easement and power station foot prints, the topography and survey results, the proposed options do not and will not impact on any historical archaeological or European heritage sites.

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 the following significance categories:

- **historical** significance (evolution and association) refers to historic values and encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.

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

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

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

The significance of Aboriginal and historic sites and places will be assessed on the basis of the significance values outlined above. As well as the ICOMOS Burra Charter significance values guidelines, various government agencies have developed formal criteria and guidelines that have application when assessing the significance of heritage places within NSW. Of primary interest are guidelines prepared by the Commonwealth Department of Environment and Heritage (DEH) and the NSW Department of Environment and Conservation (DEC) and the NSW Heritage Office. 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.

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 the archaeological or scientific significance, although other values – such as educational or tourism values - may also be considered. 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.

In this report the determinations of Aboriginal significance for sites and places will 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 framework

The NSW DECC recognises that the '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.

7.2.2 Aboriginal archaeological or scientific values framework

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

In the past, a consideration of scientific (archaeological) value was the focus of most approvals assessment processes for Aboriginal heritage, and this will still be an important component of most assessment processes. The intent of these *DEC Guidelines* (2006) is to ensure that these values are incorporated within a broader consideration of Aboriginal heritage significance.

While various criteria for archaeological assessment have been advanced over the years, most can be considered under the heading of research potential. Significance in this case lies in the potential of sites or places to elucidate past behaviour, rather than the potential to yield artefact collections or the potential to apply a particular analysis. The major issues in the assessment of research potential are considered to be:

- ***Site intactness or integrity***: This summarises the state of preservation of archaeological remains (e.g. animal bones, plant remains, art works, stone artefacts, and ancestral remains). It considers both natural and cultural disturbance processes acting on the site (called 'taphonomy') and the stratigraphic integrity of the site. Examples of processes that will affect the integrity of a site include natural agents such as roots and burrowing animals, or cultural agents such as land clearing and excavation, artefact collection, or vandalism.

- ***Site representativeness***: This refers to the regional distribution of a particular site type. Representativeness is assessed by whether the site is *common*, *occasional*, or *rare* in a given region, and whether the site contains exemplary characteristics and features for its type. Assessments of representativeness are subjectively biased by current knowledge of the distribution and number of archaeological sites in a region. This varies from place to place depending on the extent of archaeological research. Any such site should be subject to re-assessment as more archaeological research is undertaken.

- ***Site antiquity***: This firstly relates to the potential of a site to provide a chronology extending back into the past. If this chronology is dateable its research potential is enhanced. In some environments the mere presence of a stratified deposit or a vertical series of artefact-bearing soils, may be a sufficiently rare occurrence as to put any site that has them into the 'higher research potential' category. It also considers that the connectedness of the site to other sites may be a major factor in its research potential. In other words, the site, taken in conjunction with other sites, may have a research potential it would not have in isolation.

7.2.3 Aboriginal Sites – Statements of Significance

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 assessment of significance for each recorded site has been based on the results of the archaeological survey, an understanding of regional Aboriginal site patterning, and from comment and input provided in the field by the relevant Aboriginal groups.

Marulan Site - Facilities Footprint

BH7 is considered to be of moderate scientific significance, and has moderate cultural significance. The site comprises a single stone tool located on the spoil of a wombat burrow at the base of a small tree. Despite the site being disturbed by the excavation of the wombat burrow, the site consists of a formal tool, which has been specifically manufactured and then utilised. The surrounding topography of the immediate area suggests that this artefact is not likely to indicate further sub-surface cultural material. It is more likely that this tool has been 'lost' or 'dropped' as a result of moving through the region. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. Such site types are not considered rare and it is difficult to predict their location within the wider landscape.

BH8 is considered to be of moderate scientific significance, and has moderate cultural significance. The site comprises three stone artefacts identified on the spoil of a wombat burrow on the crest of a moderate rise. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. Despite the site being disturbed by the excavation of the wombat burrows, two broken quartz flakes and one quartz tool were recorded. These artefacts have been specifically manufactured and then utilised. The depth of excavated sand deposits by the wombats and the topography of the immediate area suggest that this artefact is likely to indicate further sub-surface cultural material. Such site types are considered to be rare within this landscape, as it is located a reasonable distance from the Wollondilly River, although the site location may reflect changes within the landscape which are no longer present.

BH9 is also considered to be of moderate scientific significance, and has moderate cultural significance. The site comprises three stone artefacts identified on the spoil of a wombat burrow on the crest of a moderate rise. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. Despite the site being disturbed by the excavation of the wombat burrows, one quartzite core and one quartzite broken flake were identified. These artefacts indicate that the site was used for stone artefact manufacture. The depth of excavated sand deposits by the wombats and the topography of the immediate area suggest that this artefact is likely to indicate further sub-surface cultural material. Such site types are considered to be rare within this landscape, as it is located a reasonable distance from the Wollondilly River, although the site location may reflect changes within the landscape which are no longer present.

Marulan Site Generally

BH1 is considered to be of low scientific significance, and has moderate cultural significance. The site consists of a single stone artefact situated in a disturbed context through the construction of the existing overhead powerlines. Due to this disturbance, any further cultural

material that may have been associated within this site will be poorly preserved. This site type is not considered to be rare based on previous archaeological work in the region and comprises a waste flake. The site is also located over 200 metres south from the Wollondilly River, beyond the identified area of potential archaeological deposit. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. Overall, the site has low research potential.

BH3 is considered to be of high scientific significance, and has moderate cultural significance. The site consists of a number of stone artefacts exposed on farm vehicle tracks. This site is located on the upper slopes on the eastern side of the Wollondilly River. Despite the partial disturbance from the vehicle track, much of this river rise comprises relatively undisturbed deposits. The site includes several waste flakes and core rejuvenation flakes, indicating that this area was used as a stone manufacturing site. Such site types are generally common to occasional within the wider region, with the majority of high density stone artefact scatter sites occurring within close proximity to water sources. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. The sensitive landform on which the site is located is likely to contain further intact cultural material from which significant information can be gathered, including site use and age.

BH4 is considered to be of moderate scientific significance, and has moderate cultural significance. The site consists of a single stone artefact situated on a partially disturbed farm vehicle track in an otherwise intact sensitive landform. The site is situated on the southern crest of a small drainage line. Despite the partial disturbance from the vehicle track, a large section of this drainage bank is relatively undisturbed. The site comprises a single core preparation flake, indicating that locally available quartz material was locally collected and used in the manufacture of stone artefacts. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. It is likely that further cultural material will occur sub-surface along the drainage line and thus contains research potential.

BH5 is considered to be of moderate scientific significance, and has moderate cultural significance. The site consists of a single stone artefact located on a partially disturbed rough farm vehicle track in an otherwise intact sensitive landform. This site is located on top of an open plain, adjacent to the Wollondilly River. Despite the partial disturbance from the vehicle track, much of area is relatively undisturbed. It comprises a single silcrete core, an indication of stone tool manufacture on raw materials that are not locally available. Such site types are generally common to occasional within the wider region. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. The sensitive landform on which the site is located has potential to contain further intact cultural material, from which significant information can be gathered.

BH6 is considered to be of high scientific significance, and has moderate cultural significance. The site consists of a high number of stone artefacts of various types and raw materials. It is located some distance from the Wollondilly River on the upper slope of a moderate rise overlooking the low lying plateau adjacent to the river. The artefact types

recorded indicate that this site was used as a manufacturing site. Although there is little topsoil across this part of the rise, it is likely that further undisturbed archaeological material exists sub-surface. These intact deposits contain high research potential. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community.

BH10 is considered to be of low scientific significance, and has moderate cultural significance. The site consists of only one stone artefact that was identified in a highly disturbed context. It is was situated in a fence gateway near a cattle trough. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. This site type is considered to be a common occurrence within the region and is unlikely to have any further research potential.

Gas Pipeline Corridor

BH2 is considered to be of low scientific significance, and has moderate cultural significance. The site consists of two stone artefacts situated in a highly disturbed context. Both artefacts were located on the top of excavated drainage mounds adjacent to an existing electricity substation. The area has been so heavily disturbed by these ground disturbance works that it is unlikely that site possesses any research potential. Any material which may still exist within this area will be highly disturbed. The site is a tangible reminder of the past, and provides a link with the past for the Aboriginal community. The site was most likely associated with the drainage line that runs north west into the Wollondilly River.

Electricity Transmission Line

There are no archaeological sites recorded within the Electricity transmission Line.

Summary of Significance for Each Site

The summary of significance presented in Table 5 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.

WORK AREA	*SITE NAME AND NUMBER*	*COMMUNITY OR CUTLRUAL VALUES OF EACH SITE*	*ARCHAEOLOGICAL OR SCIENTIFICIC VALUE OF EACH SITE*
Marulan Site – Facilties Footprint	BH7	Moderate -High	Moderate
	BH8	Moderate -High	Moderate
	BH9	Moderate -High	Moderate
Marulan Site Generally	BH1	Moderate -High	Low
	BH3	Moderate -High	High
	BH4	Moderate -High	Moderate
	BH5	Moderate -High	Moderate
	BH6	Moderate -High	High
	BH10	Moderate -High	Low
Gas Pipeline Corridor	BH2	Moderate -High	Low

Table 5: Summary of Aboriginal site significance within the study area.

7.2.4 Summary of Significance – Cultural Values

All pre-contact (pre-European settlement) sites that are located in the study area are considered to be of cultural significance to the Gundungurra Aboriginal Heritage Association Inc and Pejar LALC, and it is important that comment on the area is provided directly by members of these Aboriginal communities (see 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 region have been destroyed or disturbed as a result of land clearance and land-use practices in the historical period.

The opportunity to provide a description of the cultural values of the project area or individual sites was provided through the consultation, fieldwork and review process. Comments received from the Gundungurra Aboriginal Heritage Association Inc and the Pejar LALC do not contain specific advice regarding the cultural heritage values of the sites discussed in this report. In lieu of specific advice, and described above, this report regards all archaeological sites as having at least moderate cultural heritage values to the Aboriginal community. The comments from the Gundungurra Aboriginal Heritage Association Inc and the Pejar LALC have noted archaeological values and it is noted here that these values are not distinct from cultural values, but are a component of them. Archaeological sites provide evidence of past settlement of the landscape by Aboriginal people, and hence have intrinsic cultural heritage values. These values generally concern the demonstration of tangible links with the past for

Aboriginal communities, both through the location of archaeological sites in the landscape, and the artefacts contained within the sites, which are evidence of various situations and activities during pre-contact Aboriginal settlement of the project area. The management of archaeological sites further provides reification of cultural values, as contemporary Aboriginal communities are responsible for caring for country, including making decisions about the management of Aboriginal archaeological sites.

7.2.5 Summary of Significance – Aboriginal Cultural Landscape

Despite relatively little previous archaeological work in the immediate vicinity of the proposed development, the study area possesses scientific value based on its potential to contribute to an understanding of Aboriginal occupation and use of the local context and the broader Southern Tablelands, and along the Wollondilly River. The study area has been subjected to disturbance through European occupation and land-use practices such as farming. Nevertheless, stone artefact sites within the landscape have the potential to contribute important data regarding the nature of Aboriginal occupation in the region, and specific information concerning stone tool technologies. 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, or perhaps provide additional information or variations to the exiting models.

8.0 IMPACT ASSESSMENT

8.1 Proposed Development

The results of preliminary archaeological survey work and desktop assessment has identified the region as being highly sensitive for Aboriginal archaeological sites, particularly within close proximity to the Wollondilly River. Other sensitive landforms include ridgelines and ridge saddles.

8.2 Potential Impacts and Mitigation

As discussed above, the proposed development will involve significant disturbance within the study area. This disturbance may impact the physical remains and significance of archaeological sites in identified areas of Aboriginal archaeological potential. Potential impacts within the proposed gas turbine facilities, along proposed pipeline routes and along the proposed electricity transmission line are detailed below. For the proposed pipeline routes a linear area of 30 m width was assessed, however it is assumed the actual linear impact zone will be no wider than 10 m.

As outlined in Section 7.2.4 the cultural heritage values of the archaeological sites are directly related to the archaeological value, and the sites existence within the wider landscape as a whole. For individual sites at least, avoidance of impact to the known archaeological sites equates to avoidance of impact to Aboriginal cultural heritage values. In the first instance the mitigation measure considered has been to reduce impact through avoidance of known cultural heritage sites, by selecting appropriate locations for the facilities footprints. Where it was technically feasible and appropriate in consideration of managing impact to other constraints (ecological constraints, or minimising incidental cumulative effects) the facilities have been placed in locations where they will have as little potential for impact on cultural heritage sites as possible, or where they will impact sites of relatively lower archaeological and cultural heritage values. Further to this the facilities footprint will be reviewed subsequent to the proposed sub-surface testing of areas of archaeological potential associated with the known sites, and any further adjustments that will conserve archaeological and cultural heritage values will be made.

Where impacts have been unavoidable due to other constraining factors (such as those described above) a Cultural Heritage Management Plan will be developed to manage impact to the sites at a level appropriate to their archaeological and cultural heritage values. The Aboriginal community will be involved in the development and implementation of the plan, allowing direct input to the management of cultural values.

Marulan Site - Facilities Footprint

Ground disturbance works associated within the construction of the proposed gas turbine facilities at the Marulan site may impact on recorded Aboriginal archaeological sites BH7, BH8 and BH9. BH7 is an isolated artefact not associated with a potential archaeological deposit. The BH8 and BH9 sites contain artefacts that are associated with areas of potential archaeological deposit. The proposed footprint may impact on the artefacts and on the identified areas of Aboriginal archaeological potential, thus potentially impacting on unrecorded Aboriginal archaeological cultural material.

Marulan Site Generally

Outside of the identified footprint of the Marulan site facilities footprint, the proposed electricity easement, and the gas pipeline corridor and associated access tracks, no other construction works are proposed at the Marulan Site. Thus, recorded sites BH1, BH3, BH4, BH5, BH6 and BH10 will not be impacted by the assessed design.

Gas Pipeline Corridor

Ground disturbance works associated within the construction of the proposed gas turbine facilities may impact on recorded Aboriginal archaeological site BH2, which is located within 15 metres of the proposed pipeline. BH2 is in a disturbed context and has been assessed as having no further archaeological potential.

Proposed Electricity Transmission Line

The proposed electricity transmission line will not impact on any known Aboriginal archaeological sites. However, the proposed line traverses, and may impact, an area identified as having Aboriginal archaeological potential.

8.3 Discussion

As described above the proposed development has the potential to impact on 4 Aboriginal archaeological sites—BH2, BH7, BH8, BH9—which have been assessed as having moderate (BH7, BH8, BH9) and low (BH2) cultural heritage significance. The sites BH8 and BH9 have associated areas of archaeological potential, wherein sub-surface artefacts may occur. This section briefly considers the cumulative archaeological and cultural heritage impact of the proposal.

The sites BH2, BH7, BH8 and BH9 are open stone artefact sites, some with associated areas of archaeological potential. As such they are an example of the most common type of site to be recorded both in the study area for the project, and the region as a whole. A search of the AHIMS for the study area and immediate surrounds returned 40 Aboriginal archaeological site records (see Section 4.4). Without exception these records were all open sites, containing one or more stone artefacts. The archaeological survey for this project has discovered an additional 10 Aboriginal archaeological sites, and again all are open stone artefact sites. The

four sites that will be potentially impacted by the development do not have any distinctive or unique characteristics compared to the larger assemblage of sites from the study area and surrounds, and have commensurate archaeological and cultural heritage values (Table 3). Assuming the areas of archaeological potential at BH8 and BH9 contain a similar number and density of artefacts to what is evidenced on the surface at these sites, there will be only a low impact and loss of value to the overall assemblage of sites in the study area and region.

The cultural heritage impact of the proposed development is considered to be low. The physical impact and associated loss of cultural values associated with the sites BH2, BH7, BH8 and BH9 is considered acceptable because both the study area, and wider region, contain an assemblage of sites that adequately represents the class, contents and cultural heritage values of the sites that will be impacted. In addition the site BH2 is located in a highly disturbed context meaning it has already suffered considerable loss of values prior to the current proposal. The areas of archaeological potential associated with the sites BH8 and BH9 are also well represented both within the study area in areas that will not be impacted, and in the wider regional context by other open stone artefact sites and areas of archaeological potential. The archaeological potential of BH8 and BH9 will be realised through the sub-surface testing program that will precede the proposed development, and cultural heritage impacts will be mitigated to an extent by the implementation of the Cultural Heritage Management Plan.

9.0 RECOMMENDATIONS

RECOMMENDATIONS

Aboriginal archaeological sites

Aboriginal cultural heritage values are present within the study area as 10 Aboriginal archaeological sites and a number of archaeologically sensitive landforms have been identified.

The following recommendations give specific details for the mitigation and management of cultural heritage values associated with the site of the proposed gas turbine facilities, and shared infrastructure including access roads, a gas pipeline and high voltage transmission grid connections, identified during the cultural heritage assessment of the study area.

All recommendations have been made based on findings from field and desktop archaeological assessment across the study area.

Marulan Site - Facilities Footprint

- A sub-surface investigation program be undertaken when the areas of ground disturbance for the Facilities within the Marulan Site and associated infrastructure are known following detailed design and prior to construction. This sub-surface investigation program would aim to determine the presence of buried Aboriginal archaeological sites and to identify the extent of the recorded sites. These investigations would involve:
    - the excavation of a number of shovel probe holes spaced evenly (grid pattern) across the sub-surface impact footprint.
    - a number of test pits would be excavated at 10 metre intervals within the areas of identified archaeological potential and at recorded sites BH8 and BH9 to determine the presence and extent of cultural material.
    - Aboriginal archaeological cultural material identified would be recorded in detail.
- All attempts by Delta Electricity and EnergyAustralia should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.
- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facilities, then all attempts to reduce and mitigate impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area. The CEMP

would include a requirement for contractors to be briefed on the Aboriginal cultural heritage values of the area.

Marulan Site Generally

- All attempts by Delta Electricity and EnergyAustralia should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.

- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facility, then all attempts to reduce and mitigate impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area. The CEMP would include a requirement for contractors to be briefed on the Aboriginal cultural heritage values of the area.

Gas Pipeline Corridor

- The southern section of the proposed gas pipeline alignment between the TransGrid Switchyard and the Moomba to Sydney Gas Main should be surveyed in detail to identify cultural values. Known areas of Aboriginal archaeological potential along this proposed pipeline should be subject to a detailed sub-surface investigation program (Figure 4).

- All attempts by Delta Electricity and EnergyAustralia should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.

- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facilities and associated infrastructure, then all attempts to reduce and mitigate impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area. The CEMP would include a requirement for contractors to be briefed on the Aboriginal cultural heritage values of the area.

Proposed Electricity Transmission Line

A sub-surface investigation program should be undertaken within identified areas of archaeological potential to determine the presence of archaeological sites when the areas of ground disturbance for the infrastructure are known following detailed design and prior to construction. These investigations would involve:

- excavation of a number of shovel probe hole test pits excavated at 20 meter intervals within areas of Aboriginal archaeological potential along linear transects

- All attempts by Delta Electricity and EnergyAustralia should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.

- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facilities and associated infrastructure, then all attempts to reduce and mitigate impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area. The CEMP would include a requirement for contractors to be briefed on the Aboriginal cultural heritage values of the area.

Historical archaeological sites

- No historical sites are situated within the current development proposal area for the Marulan gas turbine facilities and associated infrastructure. Given this, no further archaeological work will be required with regard to historic sites or places within the study area.

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Maps

Maps of the following parishes:
Uringalla

Websites

http://www.sca.nsw.gov.au/dams/flows.html

http://www.bom.gov.au

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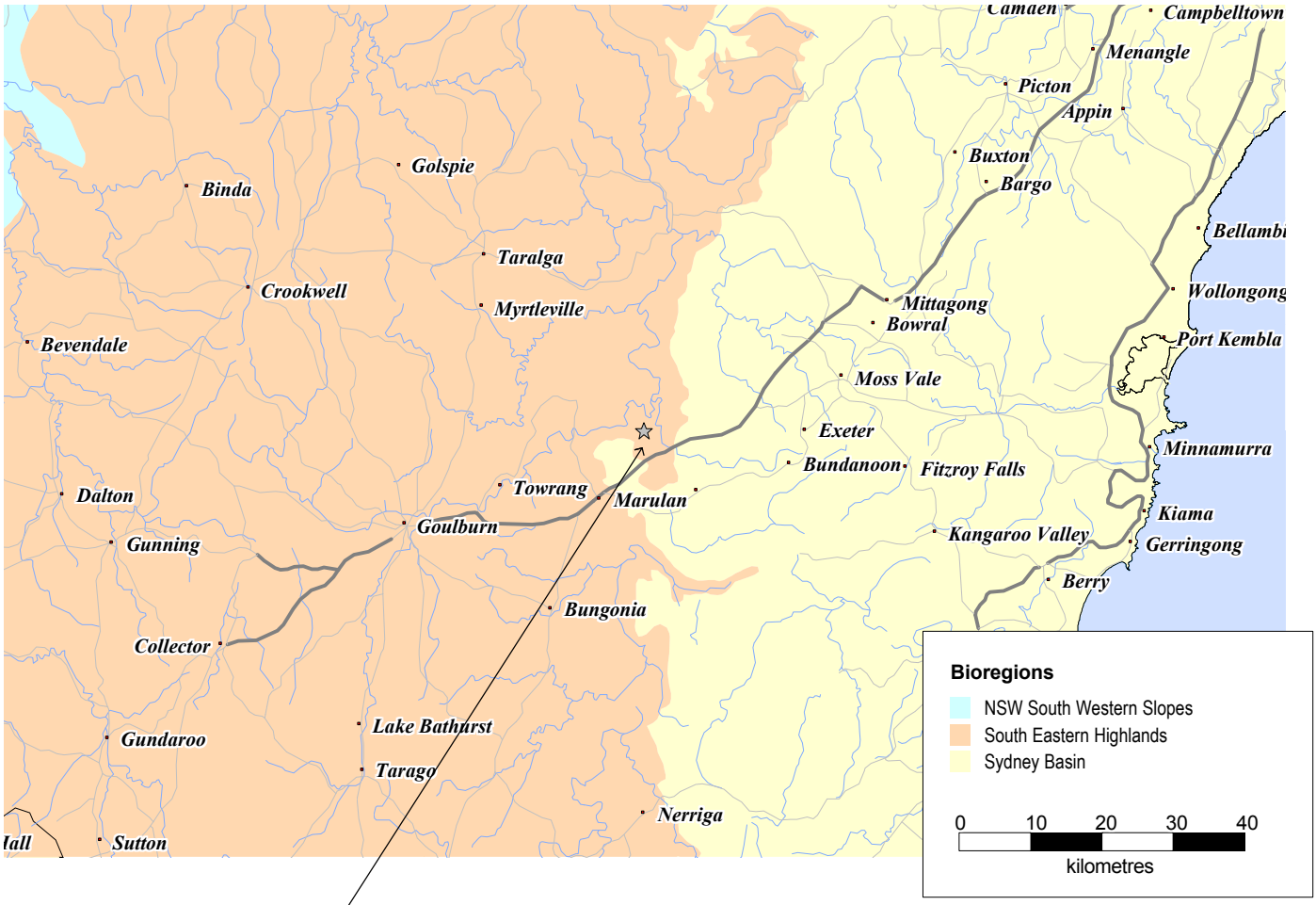
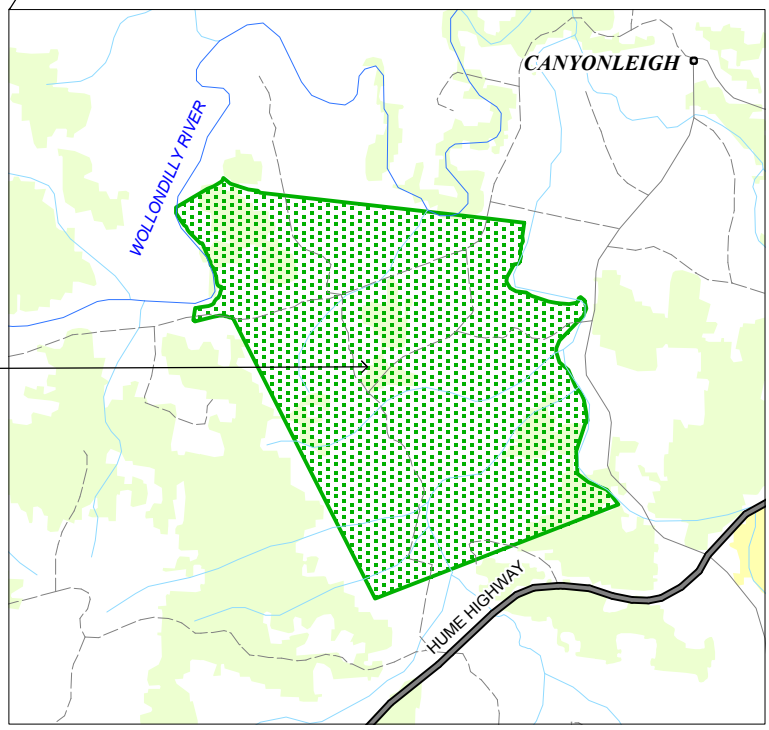
http://www.dlwc.nsw.gov.au/care/soil/index.html

FIGURES





Study area

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Chippendale
NEW SOUTH WALES 2008

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

DATE: 5 February 2008

Checked by: SEB | File number: S4901

Location:-...4000\4900s\4901\Mapping\S4901 F1_locality.WOR

Scale: 0 1 2 3 4 kilometres

N W E S

Legend

Survey effort

Transect

Proposed development

Proposed Gas Pipeline - Option 1

Proposed Gas Pipeline - Option 2

Transmission Line

Indicative Delta Facility

Indicative Energy Australia Facility

TransGrid Site

Marulan Site

Gas Pipeline Corridor

Acknowledgements: URS and NSW Department of Lands 1:25000 topographic map series (2006)

Transect 1

Transect 2

Transect 3

Transect 4

Transect 5

Transect 6

Transect 7

LLONDILLY RIVER

614

658

646

locked

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Figure 2: Transects within the Study Area.

DATE: 5 February 2008

Checked by: SEB | File number: S4901

Location:-..4000\4900s\4901\Mapping\S4901 F2_transects.WOR

Scale: 0 75 150 225 300 375 metres

Figure 2: Transects within the Study Area.

BH17
BH16
BH18
BH15
BH14
BH13
BH11
BH12
BH10
BH8
BH9
BH7
BH6
BH5
BH4
BH3
BH2
BH1
52-4-0134
WOLLONDILLY RIVER
URINGALLA
PADDYS RIVER
Gibraltar Creek
GIBRALTAR ROCKS
Sheep Dip Gully
Uringalla Creek
Back Creek
Mallaganee
Yacamunda
Highland Farm
Summer Hill
Kyabra
Keewatin
Wollumbi
Ratmon Place
CANYONLEIGH ROAD
RED HILLS ROAD
DAIRY ROAD
INVERARY ROAD
WOLLUMBI ROAD
330kV
landing ground
quarry
ford
Holt 615
Dairy 726

Legend

Sites

- New Archaeological Area
- New Archaeological Site
- Previously recorded site

Proposed development

- Proposed Gas Pipeline - Option 1
- Proposed Gas Pipeline - Option 2
- Transmission Line
- Indicative Delta Facility
- Indicative Energy Australia Facility
- TransGrid Site
- Marulan Site
- Gas Pipeline Corridor

Acknowledgements: URS and NSW Department of Lands 1:25000 topographic map series (2006)

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Figure 3: New sites located during survey.

DATE: 5 February 2008
Checked by: SEB
File number: S4901
Location:-..4000\4900s\4901\Mapping\S4901 F3_sites.WOR

Scale: 0 0.25 0.5 0.75 1.0 1.25 kilometres

Figure 3: New sites located during survey.

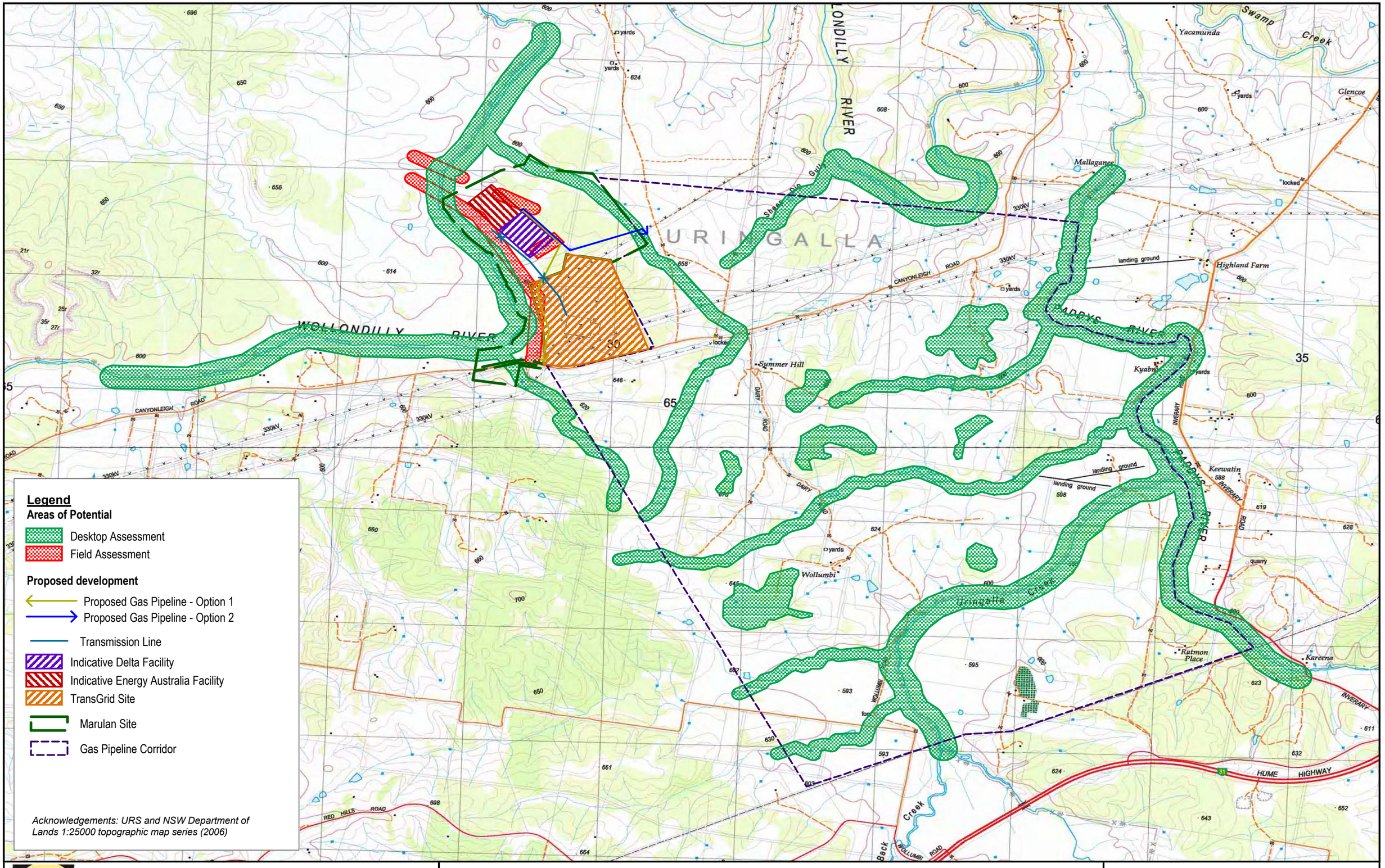

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Figure 4: Areas of Archaeological Potential.

DATE: 5 February 2008
Checked by: SEB
File number: S4901
Location:-..4000\4900s\4901\Mapping\S4901 F4_potential.WOR

Scale: 0 0.25 0.5 0.75 1.0 1.25 kilometres

Figure 4: Areas of Archaeological Potential.

APPENDICES

APPENDIX 1

ABORIGINAL COMMUNITY COMMENT

GUNDUNGURRA Aboriginal Heritage Association Inc

E-mail ghal6522@ bigpond.net.au **ABN 90613660079**

Fax 02 4757-3293 Tel 02 4757 3223

MAILING ADDRESS: PO Box 31 Lawson NSW 2783

Chairperson: Merle Williams
Vice Chairperson David King
Secretary: Sharyn Halls
Treasurer: Jean Murphy

19h December 2006

Biosis Research Pty Ltd
15-17 Henrietta Street
Chippendale NSW
2008

Re: Assessment of the proposed Big Hill Gas Turbine Power Station Marulan NSW

Gundungurra Aboriginal Heritage Association Inc representative Sharyn Halls meet with Melanie Thomson 27th September 2006

GAHAI has read all the information provided by the Biosis.

I (Sharyn Halls) have walked the area to be in affected the project.

GAHAI has a good understanding of the area that will be affected and we support the recommendations outlined in **9.0**.We have no concerns about the project at this stage and would will to take part in all further discussion and site visits.

Yours sincerely,

Sharyn Halls
Secretary

PEJAR LOCAL ABORIGINAL LAND COUNCIL
PO Box 289 Goulburn NSW 2580
Phone (02) 4822 3552 • Fax (02) 4822 3551
email address: pejar@goulburn.net.au
ABN: 72 662 632 151

RECORD OF FINAL SITE ASSESSMENT – INCLUDING RECOMMENDATIONS

Date: 12/ 11 / 06

Pejar LALC Representative:

Owner/Developer/Council or other Representative: Biosis research - 96902577

Date of Inspection		**Comments**
DA Number		
Lot Number		
DP Number		
REF Number		
Other	Big Hill Gas pipeline proposal	

Has a Site Assessment been carried out by Pejar LALC? **Yes** No

Inspection carried out with: DEC **Archaeologist** other

Aboriginal Heritage Identified during Pejar LALC inspection **Yes** No

Comments: Recommendations following

Archaeological Report: **Yes** No

By Who: Biosis Research

Aboriginal Protocol Condition to be applied to DA: **Yes** No

Condition:
That a Pejar LALC representative is on site before and during any work, at least 7 days notice in writing will be required and a fee will be charged to the developer/owner or their representative of $100 per hour plus GST.

Authorised Pejar LALC Representative Signature: Delsie Freeman

Recommendations (if any):

The Pejar LALC agree with the recommendations made by the Archaeoligist with regard to the above proposal.

Aboriginal archaeological sites

Aboriginal cultural heritage values have been identified within the study area as 19 Aboriginal archaeological sites and a number of archaeologically sensitive landforms have been identified.

As recommended by DEC to the Department of Planning (correspondence dated 9 June 2006), detailed archaeological assessment and Aboriginal community consultation should occur as outlined in *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* to adequately assess the cultural heritage values within the study area.

The following recommendations give specific details to the mitigation and management of cultural heritage values within the proposed gas turbine facility, proposed gas pipelines and the proposed electricity transmission line based on preliminary archaeological assessment of the study area. Ideally, all recommended archaeological investigation should be completed prior to the development design being finalised

All recommendations have been made based on findings from preliminary field and desktop archaeological assessment across the study area.

Big Hill Proposed Gas Turbine Facility footprint

- A sub-surface investigation program should be undertaken across the proposed gas turbine facility footprint to determine the presence of Aboriginal archaeological sites and to identify the extent of the recorded site. These investigations would involve:
  - the excavation of a number of shovel probe hole test pits spaced evenly across the sub-surface footprint.

- a higher number of test pits would be excavated within the area of identified archaeological potential and within close proximity to the recorded site BH18 (52-2-####)

- All further Aboriginal archaeological cultural material identified a result of the sub-surface investigation program will be recorded in detail. The archaeological and cultural significance of each site must be assessed prior to ground disturbance works.
- All attempts by Delta Electricity should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.
- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facility, then all attempts to reduce impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area.

Marulan Switchyard Proposed Gas Turbine Facility footprint

- A sub-surface investigation program should be undertaken across the proposed gas turbine facility footprint to determine the presence of Aboriginal archaeological sites and to identify the extent of the recorded site. These investigations would involve:
  - the excavation of a number of shovel probe hole test pits spaced evenly across the sub-surface footprint.
  - a higher number of test pits would be excavated within the area of identified archaeological potential and within close proximity to the recorded site BH7 (52-2-####)
- All further Aboriginal archaeological cultural material identified a result of the sub-surface investigation program will be recorded in detail. The archaeological and cultural significance of each site must be assessed prior to ground disturbance works.
- All attempts by Delta Electricity should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.
- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facility, then all attempts to reduce impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area.

Proposed Big Hill Option 2 Gas Pipeline

- The southern section of the proposed Big Hill Option 2 gas pipeline between the Transgrid Switchyard and the Sydney to Moomba Gas Main should be surveyed in detail to identify cultural values. Known areas of

Aboriginal archaeological potential along this proposed pipeline should be subject a detailed sub-surface investigation program (Figure 4).

- A sub-surface investigation program should be undertaken within the vicinity of recorded Aboriginal archaeological sites BH1, BH3, BH4, BH5, BH12, BH14 and BH16 to determine the extent and significance of the sites and areas of archaeological potential. These investigations would involve:
  - a number of shovel probe hole test pits excavated at 20 meter intervals within areas of Aboriginal archaeological potential and within close proximity to the recorded sites BH1, BH3, BH4, BH5, BH12, BH14 and BH16 (52-2-####).
- All further Aboriginal archaeological cultural material identified a result of the sub-surface investigation program will be recorded in detail. The archaeological and cultural significance of each site must be assessed prior to ground disturbance works.
- All attempts by Delta Electricity should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.
- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facility, then all attempts to reduce impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area.

Proposed Marulan Switchyard Option 1 Gas Pipeline

- The southern section of the proposed Marulan Switchyard Option 1 gas pipeline between the Transgrid Switchyard and the Sydney to Moomba Gas Main should be surveyed in detail to identify cultural values. Known areas of Aboriginal archaeological potential along this proposed pipeline should be subject a detailed sub-surface investigation program (Figure 4).
- A sub-surface investigation program should be undertaken within the vicinity of recorded Aboriginal archaeological site BH2 to determine the extent and significance of the sites and areas of archaeological potential. These investigations would involve:
  - a number of shovel probe hole test pits excavated at 20 meter intervals within areas of Aboriginal archaeological potential and within close proximity to the recorded site BH2.
- All further Aboriginal archaeological cultural material identified a result of the sub-surface investigation program will be recorded in detail. The archaeological and cultural significance of each site must be assessed prior to ground disturbance works.
- All attempts by Delta Electricity should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.

- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facility, then all attempts to reduce impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area.

Proposed Electricity Transmission Line

- A sub-surface investigation program should be undertaken within the vicinity of recorded Aboriginal archaeological sites BH13 and BH15 to determine the extent and significance of the sites and areas of archaeological potential. These investigations would involve:
  - a number of shovel probe hole test pits excavated at 20 meter intervals within areas of Aboriginal archaeological potential and within close proximity to the recorded sites BH13 and BH15.
- All further Aboriginal archaeological cultural material identified a result of the sub-surface investigation program will be recorded in detail. The archaeological and cultural significance of each site must be assessed prior to ground disturbance works.
- All attempts by Delta Electricity should be made to avoid significant Aboriginal archaeological sites within the study area through changes to the proposed design plans and construction methods.
- If the Aboriginal archaeological cultural material cannot be avoided by the proposed gas turbine facility, then all attempts to reduce impact should made through the development of a Cultural Heritage Management Plan (CHMP). The CHMP will outline strategies for dealing with recorded and un-recorded Aboriginal archaeological sites encountered within the proposed development area.

Other recorded archaeological sites outside proposed construction zone

- Recorded Aboriginal archaeological sites BH6, BH10, BH11, BH17 and BH19 will not be impacted by the currently proposed project works. No further investigation of these sites is required.

Historical archaeological sites

- Impact to the former domestic site from the proposed development will not occur. Given this, no further archaeological work will be required with regard to historic sites or places within the study area.

Proposed upgrade works to Old Macquarie Track (Old Sydney Road) will not impact on the Local Historical Values of this road. It is however recommended that the existing alignment for this track should remain unchanged to maintain these cultural heritage values.

- If any previously undetected Aboriginal site or relic is uncovered or unearthed during any activity, work at that location must cease immediately and advice on appropriate action be obtained from the Pejar

LALC in conjunction with NSW Department of Environment and Conservation

PEJAR LOCAL ABORIGINAL LAND COUNCIL
80 Combermere St (PO Box 289) Goulburn NSW 2580
Phone (02) 4822 3552 • Fax (02) 4822 3551
email address: pejar1@goulburn.net.au
ABN 72 662 632 151

31 January 2008

Mr Jamie Reeves
Biosis Research Pty Ltd
15 – 17 Henrietta St
Chippendale NSW 2008
Fax: 02 96902577

Dear Jamie

Delta Electricity and Energy Australia – Marulan Gas Turbine

In reference to your letter dated 24 January 2008 regarding the above project I would like to state that the Pejar LALC have been involved with this from the very beginning. However, as stated in your letter and telephone conversation, we need to re-register an interest for future consultation regarding the Aboriginal Cultural Heritage assessment and Management program, please consider this letter as our registration and expression of interest.

If there is any further information that you may require, then please do note hesitate to contact me on the above numbers.

Yours sincerely

Delise Freeman

Delise Freeman
Chief Executive Officer

APPENDIX 2

PRELIMINARY RESEARCH DESIGN OF CULTURAL HERITAGE WITHIN THE PROPOSED MARULAN GAS FIRED POWER STATION STUDY AREA

Investigation and Conservation principles

The desktop study and field surveys have identified the following Aboriginal archaeological resources in the study area:

- 10 archaeological sites (all stone artefact sites) (see Figure 3)
- numerous areas of archaeological potential (see Figure 4)

The table below (see Table 5 and Figures 3 and 4 in main document) describes the heritage values of each site, and the location of each site and number of areas of archaeological potential in relation to the components of the Concept Design.

PROPOSED OPTIONS	*SITE NAME AND NO*	*COMMUNITY OR CUTLRUAL VALUE*	*ARCHAEOLOGICAL VALUE*	*AREAS OF ARCHAEOLOGICAL POTENTIAL PRESENT*
Plant Location Envelope	BH7	Moderate -High	Moderate	Yes
	BH8	Moderate -High	Moderate	
	BH9	Moderate -High	Moderate	
Marulan Site	BH1	Moderate -High	Low	Yes
	BH3	Moderate -High	High	
	BH4	Moderate -High	Moderate	
	BH5	Moderate -High	Moderate	
	BH6	Moderate -High	High	
	BH10	Moderate -High	Low	
Gas Pipeline	BH2	Moderate -High	Low	Yes
Electricity Transmission Line	n/a	n/a	n/a	Yes

Table 6: Archaeological sites identified in the study area

The results of the archaeological survey and desktop study present three potential impact scenarios that need to be investigated further by archaeological sub-surface testing:

1. Quantification of the contents and heritage value of sites that will be directly impacted;
2. Confirmation of the sub-surface boundaries—and quantification of contents and heritage value—of sites that are within the vicinity of impact;
3. Quantification of contents and heritage value of areas of archaeological potential.

The sub-surface testing program described below presents a methodology that achieves the above three requirements, whilst also being based on the nature of the proposed development (linear or area footprint). Subsequent to the sub-surface testing program the entire archaeological heritage resource (both surface and sub-surface) can be more accurately

quantified in relation to the potential impacts of the proposal and detailed management strategies can be made.

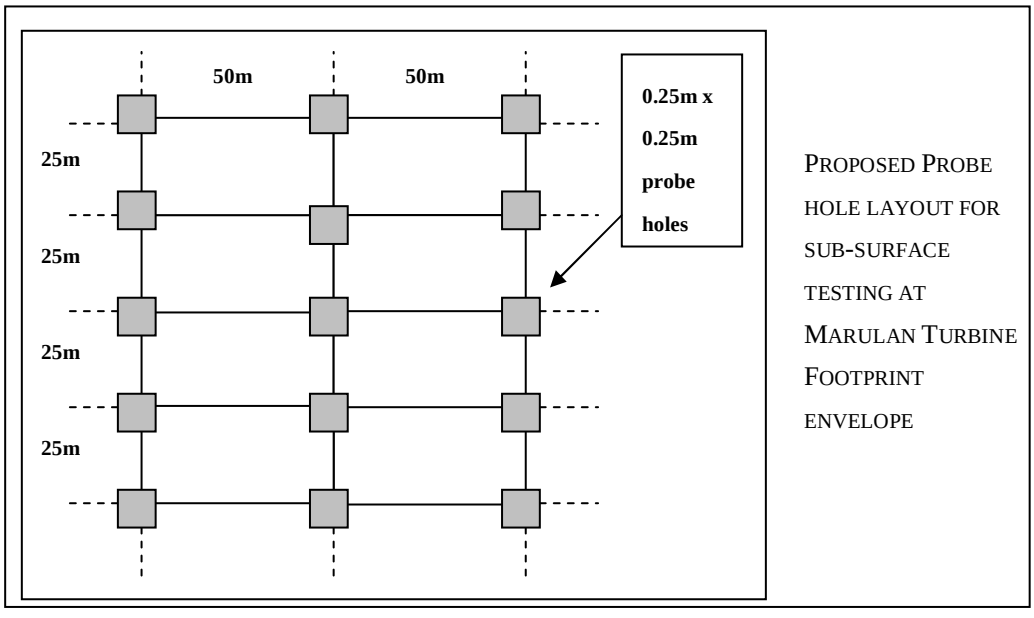
Archaeological methods

At Crookwell, in their assessment of wind farm developments that included both linear and area footprints McDonald and Garling (1997) and Reeves (2005) achieved successful sub-surface testing regimes. In both cases the methods employed identified the 'background scatter' of artefacts and also identified larger sites with higher artefact density. The background scatter of stone artefacts is usually found in areas of the landscape that would have been used transiently by Aboriginal hunter-gatherers in the past, whilst sites with a high density and diversity of artefacts represent areas of more intense activity, and sometimes repeated, long term occupation. The environmental and landscape context at Marulan is very similar to that of Crookwell - namely broad, well incised ridges above the Wollondilly River valley. Because of this similarity and the previous success the methodology proposed below for sub-surface testing at Marulan is based on the techniques developed at Crookwell in 1997 and 2005.

In regard to testing of the linear corridors the methods are designed to be flexible and able to cover reasonably large areas with a consistent (and hence intra-site comparable) approach that also provides thorough coverage. At the area footprint building sites the methods are intended to provide a very detailed coverage of the area.

Sub-surface testing at Marulan gas turbine building site

At the proposed Marulan gas turbine footprint envelope it is proposed to excavate 0.25m x 0.25m probe holes on a 50m x 50m square grid across the entire L-shaped area. An example of the proposed grid excavation layout is shown in the figure below, across a 100 x 100m section of the grid.



PROPOSED PROBE HOLE LAYOUT FOR SUB-SURFACE TESTING AT MARULAN TURBINE FOOTPRINT ENVELOPE

The proposed L-shaped Marulan gas turbine footprint envelope measures approximately 650m x 600m, meaning that approximately 200 probe holes (an area of m^2) will be excavated here. The use of 0.5m x 0.5m probe holes will also be flexible at each site allowing the holes to be moved around, or probe holes added to, the grid if required.

The following excavation methods will be used:

1. Each excavation grid will be aligned with the proposed L-shaped footprint envelope area and measured from a GPS derived datum.

2. Probe holes will be dug in arbitrary 10cm spits using spades or shovels to the base of the solum (bulk spits may be used if no stratigraphy is present or vertical control is not considered necessary – eg. in very shallow soils).

3. The soil from the probe holes will be dry sieved using hand held medium fraction (5mm - 10mm) mesh sieves. Trowels will be used to break up soil in sieves if required.

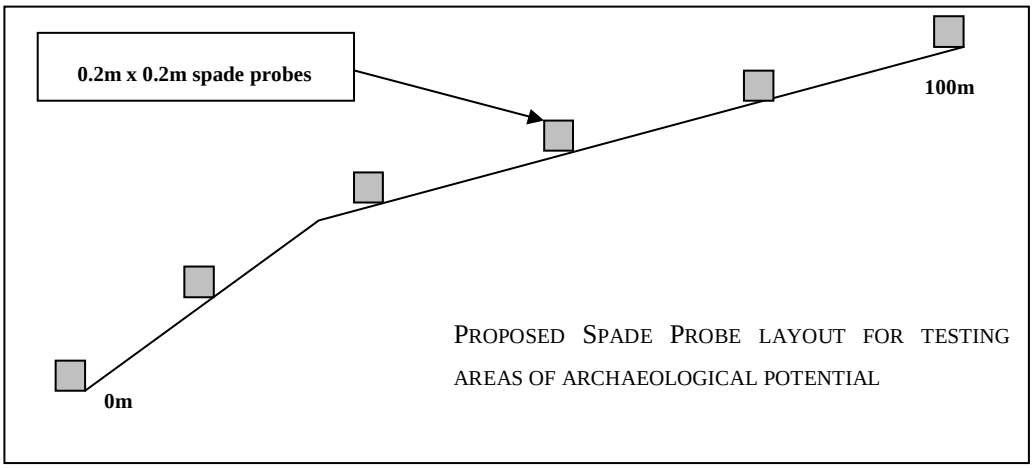
4. For each probe hole that is excavated, the following documentation will be made on project specific recording forms:

    - Unique gas-turbine precinct number and alpha-numeric grid references;
    - MGA grid coordinates using hand-held GPS unit;
    - Soil colour, fabric and texture;
    - Stratigraphy;
    - Amount and location of artefacts within deposit;
    - Nature of disturbance if present;
    - Archaeological features (if present);
    - Photographic records;
    - Spit / depth records.

5. If artefact density exceeds 10 artefacts in a single probe hole, or if distinct archaeological features are present, adjacent probe holes will be placed to better determine and define artefact density and the extent of artefact occurrence.

Sub-surface testing: areas of archaeological potential in proposed linear corridors

Where there are areas of archaeological potential in the linear corridors it is proposed to excavate spade probes in linear transects. Each transect will be sampled by placing probes every 20m along the transect.



PROPOSED SPADE PROBE LAYOUT FOR TESTING AREAS OF ARCHAEOLOGICAL POTENTIAL

The following excavation methods will be used:

1. Transects will be sampled in adjoining 100m sections, covering the length of the area of archaeological potential.

2. The spade probes will be dug to the width of the spade blade (approximately 200mm) and excavated in 10cm spits to the base of the solum.

3. The soil from the spade probes will be dry sieved using hand held medium fraction (5mm - 10mm) mesh sieves. Trowels will be used to break up soil in sieves if required.

4. For each spade probe that is excavated, the following documentation will be made:

    - Each transect will have a GPS derived datum.
    - Unique transect number numeric probe references;
    - MGA grid coordinates using hand-held GPS unit;
    - Soil colour, fabric and texture;
    - Stratigraphy;
    - Amount and location of artefacts within deposit;
    - Nature of disturbance if present;

- Archaeological features (if present);
- Photographic records;
- Spit / depth records.

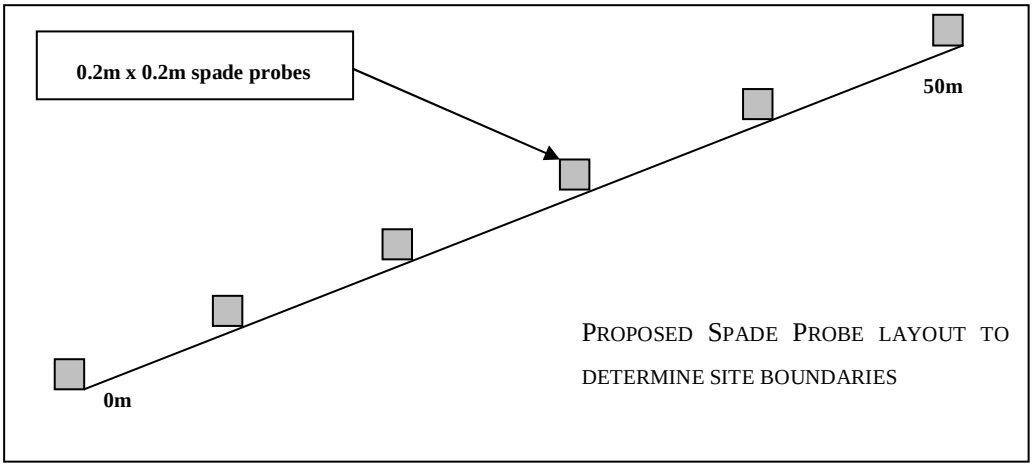
5. If artefact density exceeds 10 artefacts in a single spade probe, or if distinct archaeological features are present adjacent probes will be placed to better determine and define artefact density and the extent of artefact occurrence.

Sub-surface testing to determine site boundaries of known archaeological sites

To satisfy the conservation principles described above only those areas where potential impacts approach site boundaries will be investigated. Wherever and as far as possible the testing will focus on the overlap of site and impact areas.

Linear Corridors

Where there are known sites within the linear corridor areas, the following method will be employed.



PROPOSED SPADE PROBE LAYOUT TO DETERMINE SITE BOUNDARIES

The following excavation methods in these impact areas will be used:

1. In the impact areas in the vicinity of the sites spade probes will be placed every 10m in 50m liner transects parallel with the nearest point to the sites.

2. The spade probes will be dug to the width of the spade blade (approximately 200mm) and excavated in 10cm spits to the base of the solum.

3. The soil from the spade probes will be dry sieved using hand held medium fraction (5mm - 10mm) mesh sieves. Trowels will be used to break up soil in sieves if required.

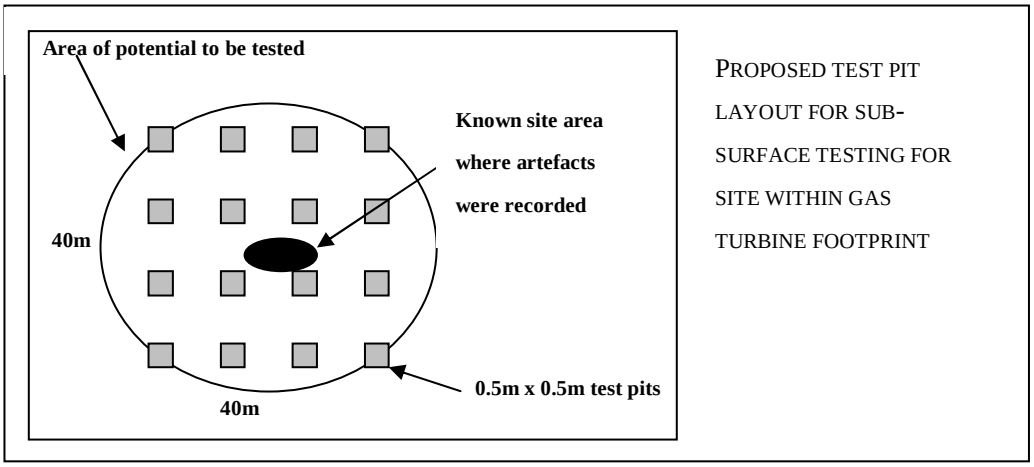
4. For each spade probe that is excavated, the following documentation will be made:

    - Each transect will have a GPS derived datum.
    - Unique transect number numeric probe references;
    - MGA grid coordinates using hand-held GPS unit;
    - Soil colour, fabric and texture;
    - Stratigraphy;
    - Amount and location of artefacts within deposit;
    - Nature of disturbance if present;
    - Archaeological features (if present);
    - Photographic records;
    - Spit / depth records;
    - Sketch map showing relationship between the known site area and area that is tested.

5. If artefact density exceeds 10 artefacts in a single spade probe, or if distinct archaeological features are present adjacent probes will be placed to better determine and define artefact density and the extent of artefact occurrence.

Footprint Envelope

Where there are known sites within the proposed gas turbine footprint or envelope, the following methods will be used. At the proposed gas turbine footprint envelope it is proposed to excavate 0.5m x 0.5m test pits on a 10m x 10m square grid around the recorded sites to determine exact site boundaries, as shown in the figure below.



PROPOSED TEST PIT LAYOUT FOR SUB-SURFACE TESTING FOR SITE WITHIN GAS TURBINE FOOTPRINT

The use of 0.5m x 0.5m pits will also be flexible at each site allowing the pits to be moved around, or pits added to, where required to determine the extent of site boundaries.

The following excavation methods will be used:

6. Each excavation grid will be aligned with the proposed footprint envelope and measured from a GPS derived datum.

7. Test pits will be dug in arbitrary 10cm spits using spades, mattocks and trowels to the base of the solum (bulk spits may be used if no stratigraphy is present or vertical control is not considered necessary – eg. in very shallow soils).

8. The soil from the test pits will be dry sieved using hand held medium fraction (5mm - 10mm) mesh sieves. Trowels will be used to break up soil in sieves if required.

9. For each test pit that is excavated, the following documentation will be made on project specific recording forms:

    - Unique gas-turbine precinct number and alpha-numeric grid references;
    - MGA grid coordinates using hand-held GPS unit;
    - Soil colour, fabric and texture;
    - Stratigraphy;
    - Amount and location of artefacts within deposit;
    - Nature of disturbance if present;

- Archaeological features (if present);
- Photographic records;
- Spit / depth records.

10. If artefact density exceeds 10 artefacts in a single test pit, or if distinct archaeological features are present adjacent test pits will be placed to better determine and define artefact density and the extent of artefact occurrence.

Reporting

At the conclusion of the sub-surface testing a report will be compiled and forwarded to the relevant Aboriginal communities and the NSW DEC Archaeologist at Queanbeyan, advising the Department of the results of the testing for each stage. The report will include:

- The results of the archaeological fieldwork, noting the position, extent and significance of any archaeological material found;
- Clear descriptions and maps showing the locations of all archaeological sites within the study area;
- An assessment and appraisal of all archaeological sites that will be impacted by the proposed development;
- An assessment and appraisal of the likely impact to the Aboriginal cultural heritage resources of the area arising from the proposed development;

In addition the report will include:

- A discussion placing the recorded data into a local and regional archaeological context;
- Ongoing management recommendations for particular sites or Aboriginal archaeological heritage as appropriate; and,
- Suggested additions to the CHMP to achieve the above.

Project progression

Once the sub-surface testing program is completed, the results will need to be analysed and a report identifying the cultural heritage impacts and suggested management requirements prepared to manage cultural heritage values throughout the life of the project. In order to this the following steps will be necessary:

- Conduct sub-surface testing program;
- Analyse results and prepare impact assessment report;
- Distribute report to Aboriginal communities for comment;
- Finalise mitigation and management strategies for cultural heritage;
- Prepare final Cultural Heritage Assessment and Management Report;
- Develop Cultural Heritage Management Plan.

The final report will identify mitigation and management strategies that may require ongoing consultation with the Aboriginal communities, and potentially additional archaeological work. For stone artefact sites there are three basic levels of management options available, in order of preference these are:

- Conservation through avoidance;
- Destruction mitigated by salvage or off set conservation;
- Unmitigated destruction.

Depending on the archaeological site, its associated cultural values and the project requirements these options may be used individually, or in combination, but must always be discussed in detail with the Aboriginal communities involved. For example, part of a site may be destroyed with the artefacts salvaged and taken to a keeping place, and part of the same site may be dedicated for conservation, in which case the salvaged artefacts may be relocated to the conservation area.

Additional archaeological work (salvage excavation or collection) may be required in the instance where major impacts to the archaeological values of an area are unavoidable. In other cases cultural monitoring may be an appropriate management strategy that the Aboriginal community wish to pursue. In this case the requirement for monitoring of construction activities can be seen as a cultural off-set of caring and managing country, rather than undertaking a simply archaeological function.

It is anticipated that any requirements for additional archaeological work and / or cultural monitoring would be determined and finalised concomitantly with the Cultural Heritage Assessment and Management Report. The management requirements would be outlined in the

final assessment and management report, and should be implemented through the Cultural Heritage Management Plan.

A Cultural Heritage Management Plan will be prepared to manage the future stages of the project. A couple of important contingencies that will require ongoing management through the CHMP are likely to arise from the final cultural heritage impact assessment and management report. The principal contingencies are:

- Possibility of additional salvage collection and conservation work;
- Possibility of encountering previously undiscovered artefacts during construction;
- Remote possibility of major event, such as the discovery of ancestral remains.

The scope and scale of any additional archaeological salvage work is dependant on the results of the sub-surface testing. The proponent should be prepared to assist the Aboriginal community with the conservation and storage of artefacts recovered during both the sub-surface testing and any additional work. This may involve a keeping place on site, or off site. Any additional work will need to be completed in accordance with relevant archaeological standards for excavation, collection and reporting.

The CHMP should outline procedures for dealing with any Aboriginal objects discovered during construction. The focus of these procedures should be:

- Stop work requirements for the effected area;
- Involvement of relevant Aboriginal representatives and archaeologists;
- Rapid assessment checklist of heritage potential, value and hence appropriate management options of objects;
    - *For low value – immediate object collection and removal, continuing construction (area effected for a maximum of some hours)*
    - *For high value – detailed recovery of significant objects and / or archaeological deposits (area effected for some days or weeks)*
- Implementing a strategy for recording and collecting objects and storing them out of harm's way as rapidly as possible (dependant on the above);
- Implementing procedures that clearly identify when and where construction activities can proceed after objects are found.

The CHMP should also document emergency procedures for the unlikely event of discovering Aboriginal ancestral remains. In this case a major project disruption would be unavoidable; however requirements for a protection zone around such an effected area could be specified, as well as procedures for continuing work outside of the effected area.