HERITAGE ASSESSMENT

TECHNICAL PAPER 2

Aboriginal Archaeological Assessment & Statement of Heritage Impact

Proposed Gas Turbine Facility

Munmorah Power Station

FINAL REPORT

Prepared by

Heritage Concepts Pty Ltd

for

On behalf of

Delta Electricity

October 2005

Heritage Concepts Pty Ltd- Archaeological & Cultural Heritage Management

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Executive Summary

Introduction

Heritage Concepts Pty Ltd has been commissioned by Parsons Brinkerhoff on behalf of Delta Electricity to conduct an archaeological assessment of Aboriginal cultural heritage values for the proposed gas-fired power generation facility at Munmorah Power Station.

Study Area

Munmorah Power Station is on the Central Coast of New South Wales, approximately 10 km north-east of Wyong, in the Wyong Local Government Area. The study area consists of the site of the proposed open cycle gas turbine (OCGT) peaking plant and a lateral gas pipeline which will connect the OCGT peaking plant to the Horsley Park-Hexham natural gas transmission main. The lateral gas pipeline extends for a distance of approximately 7 km west of the Munmorah Power Station and will be routed via the existing 330 kV electricity transmission corridor. The OCGT peaking plant will be located within the Munmorah Power Station site. This site encompasses a total area of 940 hectares, much of which is undeveloped and includes a buffer zone between the power station and the surrounding residential areas. There are also two collieries in the power station site: the Munmorah State Coal Mine, which is to the west of the power station and is still in operation, though at a limited capacity, and the Endeavour Colliery to the south-east of the power station, which is decommissioned.

Proposed Development

The OCGT peaking plant will be located within the grounds of the Munmorah Power Station and is designed to operate as a peak-load plant, i.e., it will supply electricity at short notice during periods of peak power demand.

The proposed development involves the construction of:

- ☑ An open cycle gas turbine (OCGT) peaking plant; and
- ☑ An underground lateral gas pipeline to connect the OCGT to the Horsley Park-Hexham natural gas transmission main.

Power from the OCGT peaking plant will enter the grid both by the use of the existing TransGrid substation (located near the proposed site) and the existing overhead powerlines.

The OCGT peaking plant will comprise the following:

- Four gas turbines with a combined total net power output range of approximately 600MW. These turbines will be capable of running on a primary fuel of natural gas and a backup fuel of distillate gas when the supply of natural gas is interrupted or if the peak demand period extends beyond the nominated gas supply period; and
- Ancillary plant items including distillate fuel and demineralised water storages, a gas compressor and an evaporative inlet air cooling unit.

The lateral gas pipeline will:

- Connect the OCGT peaking plant with the existing Horsley Park-Hexham pipeline;
- Extend for a length of approximately 7 km; and
- Be routed along the existing 330 kV electricity transmission corridor (21TL) currently under TransGrid management.

Project Objectives

The key objectives of this project in accordance with the brief are as follows:

- Identification of statutory requirements to be met by this study;

- Review of the Department of Environment and Conservation (DEC) / National Parks & Wildlife Service (NPWS) Aboriginal Heritage Information Management System (AHIMS);
- Consultation with the NSW Regional and Local Aboriginal Land Council and interested Aboriginal stakeholders;
- Identification of Aboriginal stakeholders, including Native Title Claimants by searching National Native Title Tribunal (NNTT) registers;
- Review of existing documents including previous archaeological reports, Aboriginal and historic heritage studies, conservation plans, site history and local history documents;
- Review of Local and Regional Environmental Plans;
- Site survey and assessment of cultural heritage values of the study area;
- Identification and recording of Aboriginal archaeological and/or cultural heritage sites and places within the study area;
- Assessment of heritage significance of all heritage items identified, including potential archaeological values;
- Identification of areas of Aboriginal archaeological or cultural heritage value or sensitivity;
- Development of management guidelines in light of statutory heritage requirements and "best practice" heritage principles.

Aboriginal Stakeholder Consultation

Aboriginal stakeholder consultation for the current project has been undertaken by Heritage Concepts on behalf of Parsons Brinkerhoff. The study area falls within the boundaries of the Darkinjung Local Aboriginal Land Council (DLALC). A search lodged with the National Native Title Tribunal on the 5th August 2005 and conducted the same day indicated that there were no Native Title claims within Wyong Shire. Aboriginal consultation for the current project was undertaken in accordance with DEC *National Parks and Wildlife Act 1974: Part 6 Approvals* Interim Community Consultation Requirements for Applicants. Advertisements seeking Aboriginal stakeholder participation in the project were placed in the following newspapers:

- Central Coast Express Advocate on Wednesday, 17th August 2005
- Central Coast Sun Weekly on Thursday, 18th August, 2005

DLALC were the only respondents to the advertisement. No other Aboriginal stakeholders came forward in response to the advertisement.

DLALC were provided with details of the project and participated in the field inspection of the study area. A copy of the draft report has been forwarded to DLALC for review. Any comments received by DLALC will be incorporated into the final report.

Site Inspection

The archaeological site inspection of the study area was conducted by Frances Scully and Sharon Lane (Heritage Concepts) and Jodi Cameron, Jason Taylor and Rodney Mackeson (Darkinjung Local Aboriginal Land Council) on the 13th and 14th of September 2005.

Results

Two artefact scatters that had previously been recorded on the AHIMS database were relocated within the study area. A further three isolated artefacts were also located within the study area during the survey.

Predicted Impact

The study area has previously been subjected to disturbance in the form of clearance and the erection of pylons along the route of the easement as well as the construction of the power station.

The construction of and subsequent modifications to the power station are likely to have disturbed or destroyed Aboriginal archaeological deposits in this area. Therefore, it is unlikely that construction works

for the OCGT peaking plant will have an impact on Aboriginal archaeological deposits. Construction of the delivery facility may have an impact on any Aboriginal archaeological deposits found within that area.

The erection of pylons may have disturbed Aboriginal archaeological deposits, but not destroyed them. The proposed gas pipeline will have a maximum easement of 20 m and will be inserted in the south side of the existing TransGrid easement. The actual pipe will be about 1 m in diameter. Construction of the pipeline will involve both tunnelling and open excavation. The areas of open excavation are likely to have an extensive impact on both known and potential PADs where they are located within the gas pipeline easement. Construction traffic may also impact on the integrity of surface scatters along the route of the pipeline. Ground surface disturbance works in the swamps and swamp marginal areas have a high potential to uncover sub-surface Aboriginal archaeological deposits.

Recommendations

The following recommendations are made in relation to the proposed gas turbine facility at Munmorah Power Station. Impacts to Aboriginal cultural heritage should be minimised and/or mitigated wherever possible and the following recommendations have been prepared with this in mind.

Recommendation 1

Sites IA1, IA2 and IA3 will be registered on the Aboriginal Heritage Information Management System (AHIMS) database. Site cards will be submitted to the Department of Environment and Conservation (DEC) with information and site descriptions so they can be entered onto the AHIMS database.

Sites AS1 and AS2 correlate to registered Aboriginal sites 45-5-3187 and 45-3-3180 respectively. New site cards with updated information and site descriptions will also be lodged with DEC.

Recommendation 2

The Potential Archaeological Deposits (PADs) surrounding AS1 and AS2 should be subject to targeted preliminary archaeological test excavations. These test excavations will need to be carried out under the auspices of a Section 87 Preliminary Research Permit (PRP). The S87 permit will need to be accompanied by a research design written by a qualified archaeologist in conjunction with input from Darkinjung Local Aboriginal Land Council. No ground disturbance at sites AS1 and AS2 may occur until the S87 permit is issued.

Explanation of process:

Based on the results of the preliminary archaeological test excavation (S87PRP), a Section 90 Consent permit will need to be lodged with DEC. A Section 90 Consent is a multi faceted permit that allows the applicant to seek approval to destroy / disturb a site. The level of disturbance and the type of S90 Consent permit required is hinged on the results of the S87 PRP.

Types of Section 90 Consent permits include:

- Consent to Destroy;
- Consent to Destroy with Salvage;
- Consent to Destroy with Surface Collection;
- Care and Control permit for any artefactual remains collected as part of the S90 activities.

The S90 Consent permit will need to be accompanied by a research design prepared by a qualified archaeologist with input from the identified Aboriginal stakeholder groups.

Under the new Interim Aboriginal consultation guidelines, the relevant Aboriginal stakeholders must be provided the opportunity to review the draft research design and provide input into the proposed methodology for the test excavation.

Recommendation 3

It is recommended that all workers and contractors are briefed on the potential of uncovering archaeological deposits around wetlands/swamps and their marginal areas prior to works commencing. This briefing can be included as part of a general 'toolbox' or induction for the overall project.

Explanation of process:

Traditionally, wetlands were important resource areas for hunting and gathering foodstuffs. They were likely to be frequented by local groups and as such, it is likely that occupational debris is preserved within them. At the site of Wyrie Swamp in South Australia, for example, seven wooden boomerangs, several hard wood double-pointed objects and a barbed wooden spear head were found in association with stone scrapers dating to approximately 10,000 years ago (Jones 1998:114).

Wetlands / swamps and their marginal areas generally have high potential to retain and preserve archaeological deposits.. It is unusual that no archaeological deposits were identified in these areas during this survey. It is likely that poor ground surface visibility and other activities along the easement have contributed to this. However, ground disturbance works in these areas may uncover archaeological items. These areas have therefore been identified as PADs

Recommendation 4

It is recommended that a nominated Aboriginal Cultural Officer from the Darkinjung Local Aboriginal Land Council is notified in advance of the dates of commencement of the proposed works in order to undertake cultural surveillance of initial earth works.

Explanation of process:

The Darkinjung Local Aboriginal Land Council have specifically requested that they be alerted of and allowed to attend ground disturbance works in order to watch for any unanticipated archaeological material that may be uncovered within the works area.

Recommendation 5

It is recommended that in the event that Aboriginal cultural fabric or archaeological deposits are encountered, works must cease immediately and an archaeologist and DLALC Cultural Officer contacted in order to make an assessment of the 'chance' find (as required by the *NSW National Parks and Wildlife Act 1974)*. The archaeologist will need to consult with the NSW DEC and the relevant local Aboriginal groups (Darkinjung Local Aboriginal Land Council) to seek direction on the most appropriate course of action to mitigate the 'chance' find.

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1.1 Project Background

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1.2 The Study Area

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1.3 Proposed Development

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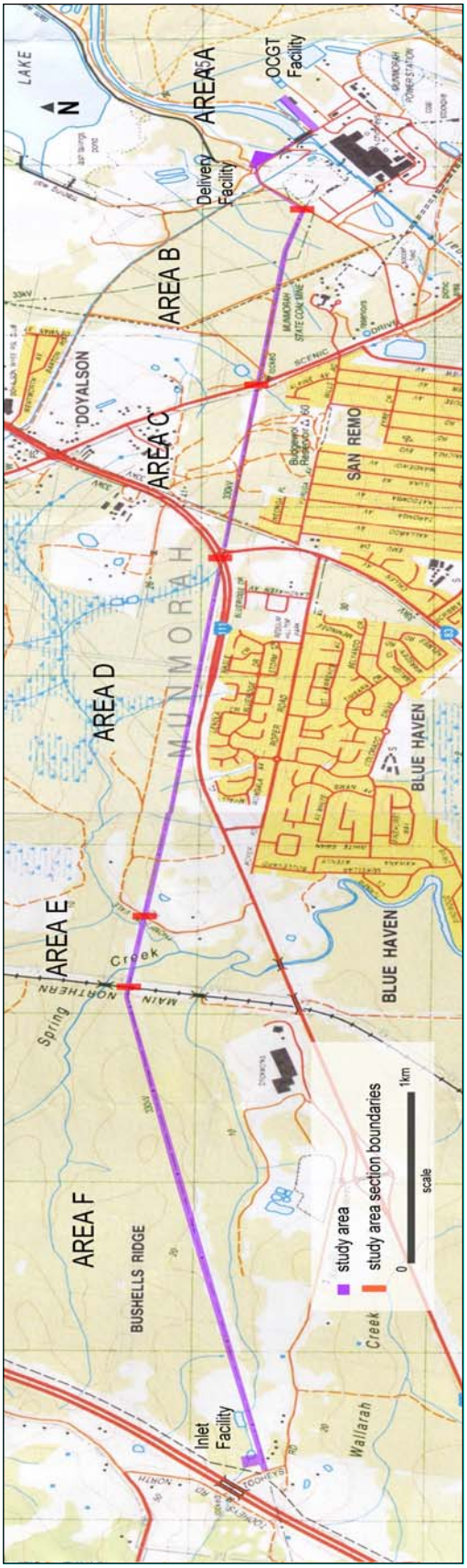

Figure 1.1: General location of study area (Base Maps: *Dooralong 9131-1S & Catherine Hill Bay 9231-4S Topographic & Orthophoto Map* 1:25,000, Land & Property Information NSW)

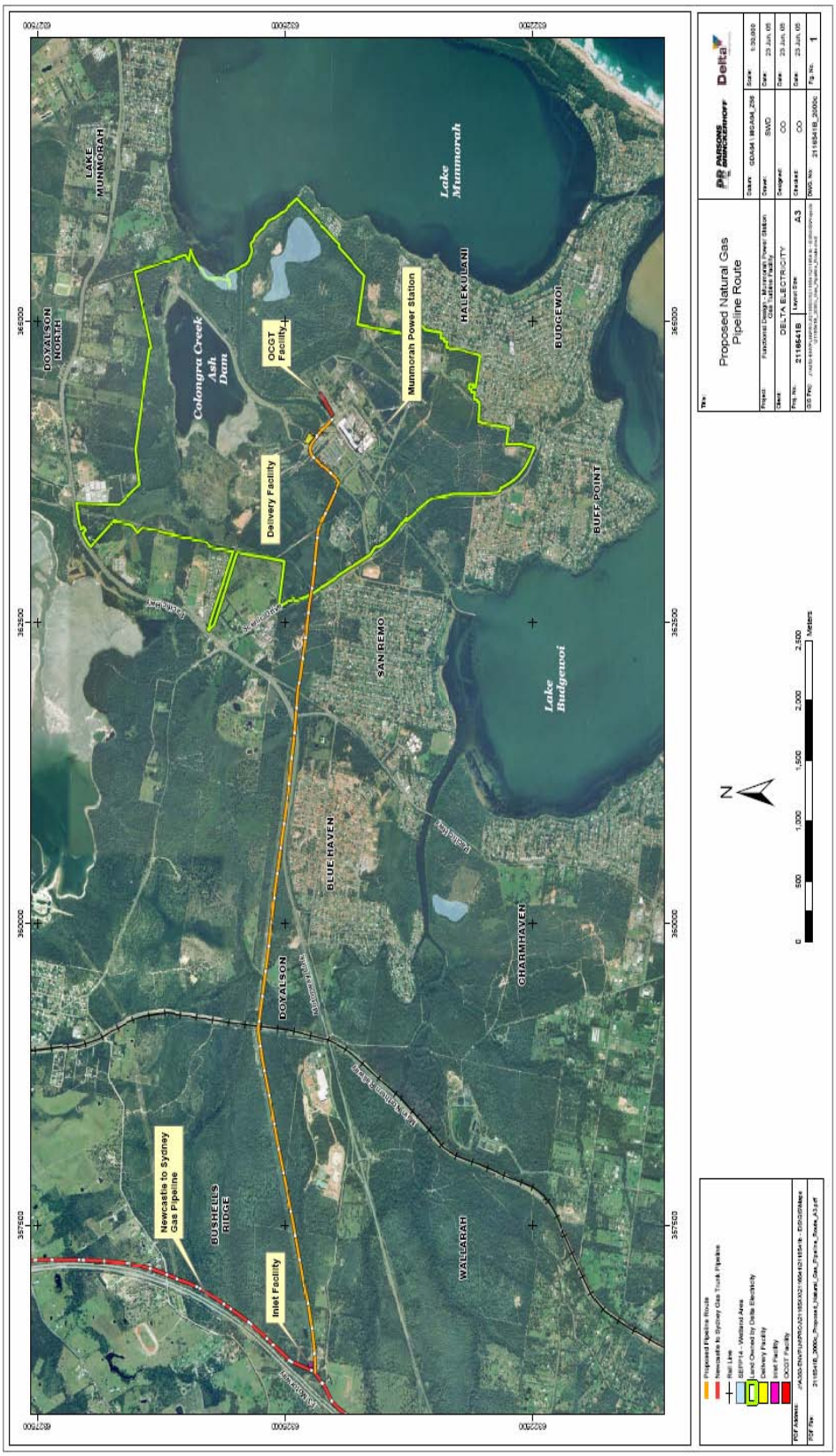

Figure 1.2: Proposed pipeline route and gas turbine facility (source: Parsons Brinkerhoff)

1.4 Project Objectives

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The study area falls within the boundaries of the Darkinjung Local Aboriginal Land Council (DLALC).

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Advertisements seeking Aboriginal stakeholder participation in the project (see below) were placed in the following newspapers:

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This advertisement is included in Appendix 2.

DLALC were the only respondents to the advertisement. No other Aboriginal stakeholders came forward in response to the advertisements.

DLALC were provided with details of the project and participated in the field inspection of the study area. A copy of the draft report has been forwarded to DLALC for review. Any comments received by DLALC will be incorporated into the final report.

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The archaeological site inspection of the study area was conducted by Frances Scully and Sharon Lane (Heritage Concepts) and Jodi Cameron, Jason Taylor and Rodney Mackeson (Darkinjung Local Aboriginal Land Council) on the 13th and 14th of September 2005.

1.7 Authorship

This main body of the report was produced by Frances Scully with input from Sharon Lane. Lori Sciusco prepared the project objectives, the legislative framework (i.e., Section 2.3.3) and assisted Frances with the development of recommendations. The report was reviewed by Lori Sciusco and Christine Costin of Heritage Concepts.

1.8 Acknowledgements

The input and participation of the following people are gratefully acknowledged:

- Carlos Olles — Parsons Brinkerhoff
- Greg Gray — TransGrid
- Brett Corderoy — Delta Electricity
- Jodi Cameron — Darkinjung Local Aboriginal Land Council
- Jason Taylor — Darkinjung Local Aboriginal Land Council
- Rodney Mackeson — Darkinjung Local Aboriginal Land Council
- Rebecca Simon — Department of Environment & Conservation

1.9 Abbreviations Used

The following abbreviations have been used throughout this document:

AHIMS	Aboriginal Heritage Information Management System
DEC	Department of Environment & Conservation (formerly NPWS)
DLALC	Darkinjung Local Aboriginal Land Council
EIA	Environmental Impact Assessment
EPBC	Environment Protection & Biodiversity Conservation Act 1999
IHO	Interim Heritage Order
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
NPWS	National Parks & Wildlife Service (NSW)
NNTT	National Native Title Tribunal
NT	National Trust of NSW
OCGT	Open Cycle Gas Turbine
PAD	Potential Archaeological Deposit
REF	Review of Environmental Factors
RNE	Register of the National Estate

SHR	State Heritage Register
SOHI	Statement of Heritage Impact
SREP	Sydney Regional Environmental Plan
WLEP	Wyong Local Environmental Plan
21TL	Transmission Line 21

2 Legislative Framework

2.1 Introduction

Aboriginal and historic cultural heritage in Australia is protected and managed under a variety of legislation. The following section provides a brief summary of the Acts which are relevant to the management of cultural heritage in NSW. It is important to note that these are not presented as legal interpretations of the legislation by the consultant.

2.2 Commonwealth Legislation

2.2.1 Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)

The Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 (EPBC Act) provides a national framework for the protection of matters of national environmental significance and the conservation of Australia's biodiversity. Under the EPBC Act, "environment" includes

(a) ecosystems and their constituent parts, including people and communities;

(b) natural and physical resources;

(c) the qualities and characteristics of locations, places and areas;

(d) heritage values of places; and

(e) the social, economic and cultural aspects of a thing mentioned in paragraph (a), (b) or (c).

Under Part 9 of the EPBC Act, any action that has, or is likely to have, a significant impact on a matter of National Environmental Significance (known as a *controlled action* under the Act), may only progress with the approval of the Commonwealth Minister for the Environment. An *action* is defined as a project, development, undertaking, activity (or series of activities), or alteration to any of these. Where an exception applies, an action will also require approval if it:

1. It is undertaken on Commonwealth land and will have or is likely to have a significant impact;
2. Is undertaken outside Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; and
3. Is undertaken by the Commonwealth and will have or is likely to have a significant impact.

Under Section 28 subsection (1) "The Commonwealth or Commonwealth Agency must not take inside or outside Australian jurisdiction an action that has, will have, or is likely to have a significant impact on the environment inside or outside Australian jurisdiction".

Recently, Australia has changed the legislation that protects its national heritage places. Three new laws came into effect on January 2004, which provide changes that offer greater legal protection under the existing *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and repeal the *Australian Heritage Commission Act 1975*.

The three new Acts are;

- The *Environment and Heritage Legislation Amendment Act (no.1) 2003.*

This Act amended the *EPBC Act* to include 'national heritage' and protect listed places to the fullest extent under the Australian Constitution. Under the new system, National Heritage joins six other important '*matters of national environmental significance'* (NES matters) already protected by the EPBC Act. The *Environment and Heritage Legislation Amendment Act*

(no.1) 2003 also establishes the National Heritage List which records places with outstanding natural and cultural heritage values that contribute to Australia's National identity; and the Commonwealth Heritage List which comprises the natural, Aboriginal and historic places owned or managed by the Commonwealth.

- The *Australia Heritage Council Act 2003.*

This Act establishes a new independent heritage advisory body to the Minister for the Environment and Heritage, the Australian Heritage Council (replacing the Australian Heritage Commission established under the *Australian Heritage Commission Act 1975)* and retains the Register of the National Estate (RNE). The RNE was also established under the *Australian Heritage Commission Act 1975* which defined it as a register of *those places being components of the natural environment of Australia, or the cultural environment of Australia, that have aesthetic, historic, scientific or social significance or other special value for future generations, as well as for the present community.* Listings on the RNE are not legally binding but provide widely acknowledged recognition of the cultural value of the listed place or item. Listing of an item or place on the RNE has certain implications for how Commonwealth agencies may deal with an item.

- The *Australian Heritage Council (Consequential and Transitional Provisions) Act 2003.*

This Act repeals the Australian Heritage Commission Act, amends various Acts as a consequence of this repeal and allows for the transition period whilst the National and Commonwealth Heritage Lists are finalised. During this transition period the Register of the National Estate will act in conjunction with the formative National and Commonwealth lists to provide full coverage for items already identified as having cultural heritage significance.

Approval under the *EPBC Act* is required if an action is proposed that will have, or is likely to have, a significant impact on the National Heritage values of a National Heritage place and/or any other NES matter. This action must be referred to the Australian Government Minister for the Environment and Heritage. The Minister will decide whether an action will, or is likely to, have a significant impact on a matter of national environmental significance.

The heritage provisions of the EPBC Act allow for a transition period whilst the National and Commonwealth Heritage Lists are finalised. During this transition period the Register of the National Estate acts in conjunction with the formative National and Commonwealth lists to provide full coverage for items already identified as having cultural heritage significance.

Application to the study area – Commonwealth Listings
No items within the study area are listed on the Register of the National Estate, the National Heritage List or the Commonwealth Heritage List

2.2.2 Aboriginal and Torres Strait Islander Heritage Protection Amendment Act 1987

The *Aboriginal and Torres Strait Islander Heritage Protection Amendment Act* of 1987 is a Federal act administered by the Aboriginal and Torres Strait Islander Commission and provides protection for Aboriginal heritage in circumstances where such protection is not available at a state level. This Act comes under Commonwealth jurisdiction which means that it can override state and territory provisions.

2.3 State Legislation

2.3.1 National Parks and Wildlife Act 1974

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

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

An Aboriginal place is defined under the *National Parks and Wildlife Act 1974* as an area which has been declared by the Minister administering the Act as a place of special significance for Aboriginal culture. It may or may not contain physical Aboriginal objects.

Under Section 90 of the *National Parks and Wildlife Act 1974*, it is an offence to knowingly destroy, deface, damage or desecrate, or cause or permit the destruction, defacement, damage or desecration of, an Aboriginal object or Aboriginal place, without the prior written consent from the Director-General of the Department of Environment and Conservation (formerly the National Parks & Wildlife Service). In order to obtain such consent, a Section 90 Consent Application must be submitted and approved by the DEC Director-General. In considering whether to issue a S. 90 Consent, DEC will take into account:

- The significance of the Aboriginal object(s) or place(s) subject to the proposed impacts;
- The effect of the proposed impacts and the mitigation measures proposed;
- The alternatives to the proposed impacts;
- The conservation outcomes that will be achieved if impact is permitted; and
- The outcomes of the Aboriginal community consultation regarding the proposed impact and conservation outcomes.

It is also an offence, Under Section 86 of the Act, to disturb or excavate land for the purpose of discovering an Aboriginal object, or disturb or move an Aboriginal object on any land, without first obtaining a permit (Preliminary Research Permit, Excavation Permit, Collection Permit or Rock Art Recording Permit) under Section 87 of the Act. In issuing a Section 87 Permit, DEC will take into account;

- The views of the Aboriginal community about the proposed activity;
- The objectives and justifications for the proposed activity;
- The appropriateness of the methodology to achieve the objectives of the proposed activity; and
- The knowledge, skills, and experience of the nominated person (s) to adequately undertake the proposed activity.

Under Section 91 of the Act, it is a requirement to notify the DEC Director-General of the location of an Aboriginal object. Identified Aboriginal items and sites are registered with the NSW DEC on the Aboriginal Heritage Information Management System (AHIMS).

The *National Parks and Wildlife Act 1974* also requires that reasonable precautions are taken and due diligence is exercised to determine whether an action would, or would be likely to,

impact on an Aboriginal object or Aboriginal place. Without being able to demonstrate due diligence, a person risks prosecution if Aboriginal objects or Aboriginal places are impacted upon and a Heritage Impact Permit has not been issued.

Application to the study area – NSW Department of Environment & Conservation (DEC) AHIMS listings

There are seventy two (72) Aboriginal objects and places registered with the NSW DEC within a 29 km x 15 km radius of the study area. Two (2) are within the study area.

2.3.2 NSW Heritage Act 1977 (amended 1999)

The NSW *Heritage Act* 1977 (amended 1999) is the primary piece of legislation affording protection to all historic heritage in NSW. The aim of the Act is to conserve the 'environmental heritage' of the state which includes items such as *buildings, works, relics moveable object or precinct* significant for its *historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value*. A 'Place' is defined as *an area of land, with or without improvements* and a 'Relic' is defined as *any deposit, object or material evidence:*

> *which relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and which is 50 or more years old.*

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).

In addition, Section 170 of the Act requires that culturally significant items or places managed or owned by government agencies be listed on the departmental Conservation and Heritage Registers – the State Heritage Register (SHR). NSW Heritage Council approval is required for any works proposed to a place or item on the SHR, or covered by an Interim Heritage Order (IHO).

The State Heritage Register is a list of places of particular importance to the people of New South Wales, made under the *Heritage Act 1977*. Heritage Council approval is required for works proposed to an item on the State Heritage Register or covered by an Interim Heritage Order (IHO).

Relics Provisions: The NSW *Heritage Act 1977* currently affords automatic statutory protection to 'relics' that form part of archaeological deposits. The Act defines a 'relic' as;

> *Any deposit, object or material evidence relating to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and which is 50 or more years old.*

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.

Application to the study area – NSW State Heritage Register listings

There are no heritage items within the study area listed on the NSW State Heritage Register.

2.3.3 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act* 1979 requires that environmental impacts are considered prior to land development. This includes impacts on Aboriginal and non-Aboriginal cultural heritage items and places. The Act also requires that Local Governments prepare Local Environmental Plans (LEP) in accordance with the Act to provide guidance on the level of environmental assessment required.

Section 34(1) of the Wyong Local Environmental Plan (WLEP) (1991) states that:

> *The council may grant consent to the carrying out of development on an archaeological site that has Aboriginal heritage significance or a potential archaeological site that is reasonably likely to have Aboriginal heritage significance only if:*
>
> *(a) it has considered an assessment of how the proposed development would affect the conservation of the site and any relic known or reasonably likely to be located at the site; and*
>
> *(b) it has notified the Director-General of National Parks and Wildlife of its intention to do so and taken into consideration any comments received from the Director-General within 28 days after the notice was sent.*

Schedule 1 of the WLEP lists the heritage items in the shire.

Application to the study area – Wyong Local Environmental Plan 1991 Schedule of heritage items
There are no items within the study area on the WLEP Schedule of heritage items

As a result of the WLEP, Wyong Shire has formed the Wyong Shire Wetland Development Control Plan No. 30. The objectives for this plan include the following:

- *To protect important wetland habitat and discourage development proposals that have the potential to fragment, pollute, disturb or diminish the environmental values of such areas.*
- *To maintain the functions of low lying lands for the purpose of improving downstream water quality for the benefit of the Tuggerah Lakes and Lake Macquarie systems.*

Section 2.2.7 of this Plan deals with Visual, Social and Cultural values and has as its objective the preservation of the aesthetic, social and economic values of wetland areas. Section vi of this states:

> *Wetland areas and their margins have a high potential to contain sites of cultural significance. In particular, archaeological* ***Aboriginal sites****. Application for development should have regard to Council's Aboriginal Sites Policy to determine any potential impacts.*

Under the *EP&A Act*, broad scale regional plans have also been developed which address cultural heritage resources which may extend beyond the geographic limit of one LGA. Wyong Shire is included in the boundary of the Sydney Regional Environmental Plan No 8 – Central Coast Plateau Areas (SREP 8), however, no items of cultural heritage significance are identified within the study area.

Application to the study area – Sydney Regional Environmental Plan No 8 – Central Coast Plateau Areas

SREP 8 identifies no items of cultural heritage significance within the curtilage of the study area.

2.4 Other Listings – The National Trust

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 NT lists items or places which have heritage or cultural value to the community and as such the NT encourages and promotes the public appreciation, knowledge, and enjoyment of heritage items for future and present generations.

Application to the study area – NSW National Trust

There are no items within the study area listed with the NSW National Trust

2.5 Summary of Cultural Heritage Listings within the Study Area

☑ Register of the National Estate	There are no items within the study area listed on the Register of the National Estate
☑ National Heritage List	There are no items within the study area listed on the National Heritage List
☑ Commonwealth Heritage List	There are no items within the study area listed on the Commonwealth Heritage List
☑ Department of Environment & Conservation (DEC) AHIMS	There are seventy two (72) Aboriginal objects and places registered with the NSW DEC within a 29 km x 15 km radius of the study area. Seven (7) fall within the study area and five (5) are in close proximity to the proposed pipeline
☑ NSW State Heritage Register	There are no items within the study area listed on the NSW State Heritage Register
☑ NSW National Trust	There are no items within the study area listed with the National Trust
☑ Wyong LEP 1991	There are no items within the study area listed on the Wyong Local Environmental Plan 1991
☑ Sydney Regional Environmental Plan No. 8 –	There are no items within the study area listed on the Sydney Regional Environmental Plan No. 8

3 Environmental Context

3.1 Topography

The current study area is located in the suburbs of (from West to East) Bushells Ridge, Blue Haven, San Remo, Doyalson, Buff Point, Budgewoi, Halekulani and Lake Munmorah, situated in the Central Coast Lowlands physiographic region. It is contained on the Gosford-Lake Macquarie 1:100,000 map sheet. The Central Coast Lowlands consists of relatively low lying terrain of low rises, alluvial plains, dunefields and coastal lake systems (Tuggerah, Munmorah and Macquarie). The study area is situated on a ridge between the Tuggerah Lake and Lake Macquarie drainage systems.

Numerous creeks and their tributaries fall within the study area, including Wallarah Creek, Spring Creek and Colongra Creek.

3.2 Geological Context

The Central Coast Lowlands are within the north-eastern portion of the Sydney Basin. The geology of the study area is predominantly Triassic age sediments, specifically the Triassic Narrabeen Group and its two subgroups, the Gosford Subgroup and the Clifton Subgroup. The Gosford Subgroup is characterised by the Terrigal formation of massive and cross bedded lenticular beds of lithic quartz sandstone, siltstone and claystone. The Clifton Subgroup includes the Patonga Claystone Formation, a red brown and light coloured claystone and siltstone with some sandstone and contains a high proportion of unstable clay minerals which weather rapidly on exposure. It also consists of Tuggerah Sandstone and Munmorah Conglomerates. The Tuggerah Sandstone formation has a light coloured lithic sandstone that is partially pebbly and a grey, green and red brown claystone and siltstone with rare conglomerate. The Munmorah Conglomerate consists of grey green and grey siltstone and claystone, conglomerate and pebbly sandstone.

There is coal within the study area. The Newcastle Coal Measures are of Permian age and consist of a number of subgroups including shale, sandstone, chert, tuff, conglomerate and coal. Quaternary alluvium is found along major watercourses. It consists of unconsolidated sands, silts, clays and gravels. The barrier beach system enclosing both Tuggerah Lake and Lake Munmorah has large deposits of Quaternary marine sediments (Murphy 1993:3).

3.3 Soil Landscapes

The study area is situated across the Doyalson, Disturbed Terrain and Tacoma Swamp soil landscapes;

→ *Doyalson (do)*

The Doyalson soil landscape is an erosional landscape present on Munmorah Conglomerate north of Tuggerah Lake (including Doyalson, Blue Haven, Lake Munmorah, San Remo, Bluff Point and Budgewoi). Doyalson soils consist of moderately deep (50 - 150 cm) Yellow Earths, Yellow Podzolics and Soloths on sandstones and conglomerates, moderately deep (50 - 150 cm) Yellow Podzolics, Soloths and some red podzolics on fine grained siltstones and claystones, moderately deep to deep (100 - >150 cm) Yellow Leached Earths, Grey Earths, Soloths and Gleyed Podzolics along drainage lines.

Doyalson soils are found along gently undulating rises, with slope gradients of < 10%. Their landscape is characterised by broad crests and ridges with long, gently inclined slopes. The vegetation is predominantly cleared eucalypt open forest.

Soils of the Doyalson soil landscape have a high erosion hazard and localised foundation hazard with a high localised run-on. They occur in mine-subsidence districts, are subject to seasonal waterlogging and are strongly acidic with low fertility (Murphy 1993: 49).

→ *Disturbed Terrain (xx)*

Disturbed Terrain is a disturbed landscape with highly variable soils that is found on a variety of geologies throughout the Gosford – Lake Macquarie Region. Disturbed Terrain is found on level plains to hummocky areas and has been extensively disturbed by human activity, namely, areas of landfill, gravel pits, sandmining, ash deposits and sludge dispersal areas. These activities may result in the disturbance, removal or burial of the original soil surface. In places, the original vegetation has been completely cleared and replaced with turf or grassland.

Disturbed Terrain may have mass movement hazards, steep slopes, foundation hazards, impermeable soils, poor drainage, erosion hazards, low fertility and toxic materials (Murphy 1993:111).

→ *Tacoma Swamp (ts)*

The Tacoma Swamp soil landscape is a swamp soil landscape localised to the drainage plains of the Central Coast Lowlands, particularly around the Wyong district. Soils include deep (>200 cm) Acid Peats and Humic Gleys.

Tacoma Swamps have slope gradients <3% with local relief of <5 m and are uncleared swamplands.

They are prone to flooding, strongly saline with permanent waterlogging, potentially may have acid sulphate soils, are a foundation hazard with high organic matter content and very low fertility (Murphy 1993:108).

3.4 Hydrology

The study area is situated on a ridge between the Tuggerah Lake and Lake Macquarie drainage systems. Numerous creeks and their tributaries fall within the study area, including Wallarah Creek, Spring Creek and Colongra Creek. The study area lies to the west of Lake Munmorah and north of Budgewoi Lake.

3.5 Organic Resources – Flora & Fauna

The Central Coast Lowlands generally provide a number of resources used by Aboriginal inhabitants. The coastal rock platforms would have provided areas where tools might be ground and sharpened and art might be engraved. Pigments for painting were also available within the sandstone.

A number of edible plant species would have been available within the study area. The topography of the general area includes several distinct resource zones including, marine, lagoon, alluvial plains and ridges. Each zone would have hosted different floral and faunal resources, all of which would have been utilised according to seasonal availability. Aboriginal inhabitants of the Wamberal area would have had access to a wide range of avian, terrestrial and marine fauna and repeated firing of the vegetation would have opened up the denser vegetated areas allowing ease of access through and between different resource zones. In

addition, the numerous ridgelines and creeks would have provided access routes to any resource zone with relative ease.

Both floral and faunal species would have provided many resources in addition to food. Animals such as Brush-tailed Possums were highly prized for their fur and plants such as the Gymea Lilly (located in the ridge lands above the study area) provided resin whilst the flower stems could be used as spear shafts. The mythological importance of floral and faunal species should not be neglected either. Many animals are depicted in rock art, whilst there is ethnographic evidence that certain plants and animals were off-limits to initiates.

Vinnicombe (1980:VI) identifies several different plant resources utilised by local Aboriginal peoples within the Gosford / Wyong area. Not all of the plants identified by Vinnicombe are located in environmental contexts similar to the study area; consequently, the following discussion pertains to only those resources identified within coastal and swampy areas.

Several plant species were recorded as resources for Aboriginal populations; however, very few of these species were identified. Some historic descriptions and continuing traditions have enabled identification of species and this is true of the Burrawang *Macrozamia communis*. Burrawang is a nut that is present only in the coastal fringes. The nuts were poisonous unless prepared correctly, and had to be soaked in fresh water for 7 or 8 days (to remove toxins) before being cooked.

Several flowering and fruiting species are also located within the coastal fringes. These include Lillipilli *Acmena smithii*, Dumplings *Billardicra scandens*, Native cherry *Exocarpus cupressiformis*, Blueberry Ash *Elaeocarpus reticulatus, Monotoca scoparia* and Geebung *Persoonia sp*. Fruits from these plants would have been eaten by Aboriginal peoples, as would the starch rich roots and tubers of Gristle Fern *Blechnum cartilagineum, Cayratia clematidae*, Bungwall Fern *Blechnum indicum,* Wombat berries *Eustrephus latifolius*, wild yam *Dioscorea transversa*, False Sarsparilla *Hardenbergia violacea* and *Geranium sp*.

Roots and reeds of "rushes *Phragmites sp* and *Typha sp*, both water fringe plants, were another good source of vegetable food and the rhizomes of various species of orchids were also used" (Vinnicombe 1980:VI:4)

Seasonal availability of plant resources would have played a major part in the utilisation of particular environmental zones.

In addition to the rich resources provided by vegetal communities, faunal resources would have contributed to the diet and tool kit of Aborigines. Several species of animal were utilised including molluscs, fish, birds and terrestrial animals.

Shellfish remains are generally found in middens in either coastal or estuarine locations. Coastal middens tend to be dominated by Oyster, Mussel, Limpet, Cartrut, Turban, Triton and Pipi species. Estuarine middens also include Oyster and Mussel species and vary from coastal middens with the inclusion of Sydney Cockles, Whelks, Mud oysters and Scallops (Vinnicombe 1980:V:10).

Data from the analysis of shell midden deposits, combined with ethnographic accounts, indicate that in coastal and riverine environments, fish was a dominant component of diet. Species identified from archaeological contexts are dominated by Snapper and Black Bream, whilst species such as Leatherjacket, Wrasse, Rock Cod and Groper are also present, although to a lesser degree.

Ethnographic accounts of fish species eaten by Aboriginals include Mullet (which has friable bones unlikely to survive long in exposed conditions) and Garfish (also possessing a flimsy skeleton) (Vinnicombe 1980:V:2).

Birds have been identified as a valuable food resource within the coastal areas of the Gosford / Wyong region; there is no evidence from rockshelters in inland sclerophyll areas that birds were consumed. However, in the coastal areas there is evidence that larger species such as gulls, cormorants, plovers, terns, black swans, pelicans and ducks were part of the diet (Vinnicombe 1980:V:32).

Many animals were consumed by the central coast Aboriginal population. These included Diamond Pythons, Dragon Lizards, Lace Monitors, Eastern Grey Kangaroo and Wallaroo (although the previous two did not favour the environment of the study area), Swamp Wallaby, Rat-kangaroos, Brush-tailed Possum, Ring-tail Possum, Echidna and flying Fox (or Fruit Bat) are all recognised as important food sources in the Gosford area (Vinnicombe 1980:V:19-31).

4 Aboriginal Background

4.1 Aboriginal Archaeological Context – the Wyong Area

Although there is quite a long history of archaeological investigations in the Central Coast region, much of this research has been somewhat limited, with areas selected on the basis of development or specific site types. Studies have generally been based on coastal areas, with little work carried out to the west of the lakes. As a result, there is not enough information available for a regional model of Aboriginal adaption and population movements to be developed (Dallas 1986:4). However, results of previous work indicate that all of the available environments (rocky shore, estuarine, beach and swamp) were exploited by Aboriginal populations. Known sites in this area include open camp sites, axe grinding grooves, middens, scarred / modified trees, shelters with art / deposits, burials and quarries.

The AHIMS search identified ten reports associated with the search area, only five of which were available at DEC. A further four reports were deemed germane to the wider district surrounding the study area. The following reports are summarised to present an overview of the archaeological resource in Wyong Shire and surrounds as it is applicable to the study area.

- *An Aboriginal Devil Rock – Walton 1932*

This article describes rock carvings at Maroota, on the old Newcastle road via Wiseman's Ferry. The rock was known to the local Aboriginal population as a Devil Rock and the author notes that the locality was avoided by local Aboriginal population because of this. The rock carvings consist of representations of the Goanna Spirit Ancestor with an emu adjacent to it. Several other emus are also visible, including one with eleven eggs. Other engravings include a bush turkey, boomerangs, fish, eels and other food animals, suggestive of food ceremonies. The Male Native Bear Spirit in also represented at this site. Both the Goanna Spirit Ancestor and the Male Native Bear Spirit display tribal markings on their bodies.

- *Predilection and Prediction: a study of Aboriginal sites in the Gosford – Wyong region – Vinnicombe 1980*

Undertaken as a means to integrate cultural heritage into the early stages of development planning, this study sought to categorise and define Aboriginal heritage resources in the Gosford / Wyong area. The project comprised a thorough background research, detailed survey and analysis of results to produce a predictive model for the region.

Vinnicombe identified various ecological zones within the study area and sought to determine the differences within and between these areas that might make Aboriginal site prediction more accurate. Three different environments were investigated, including open coastline and coastal estuary, riverine estuary and inland sclerophyll forest.

Vinnicombe conducted intensive 10 km^2 surveys within each of these three zones, identifying an average of 11 sites/km^2 in coastal estuary areas, 8 sites/km^2 in riverine estuary areas and 6 sites/km^2 in inland sclerophyll zones. Given the (then) current levels of development and the ecological make up of the Gosford / Wyong area, Vinnicombe predicted that there could be an overall total of 13,000 sites within the locality.

Vinnicombe related decreasing site densities directly to the distance from marine resources. Case studies from this work are summarized below (i.e., Putty Beach, Hardys Bay, Rileys Bay, Fishermans Bay, Empire Bay and Cockle Bay).

1) Putty Beach

Flanked by rocky headlands on each side and backed by a rock platform and a bluff of Narrabeen sandstone and shales, Putty Beach faces south and extends for 1.5 km. The beach is considerably exposed and high velocity surf pounds the beach, particularly in summer. Within this area seven sites were identified; a foreshore midden and burial, a rock platform with shallow grinding grooves, and five rock shelters with evidence of usage.

Two shelters were identified on The Bluff, despite the exposed nature of the beach, the steepness of the slope and the thick vegetation. These both contain shell deposits consisting of Cartrut and Black Elephant Snail with some Oyster, Limpets and Mussels as well as two species not found on the open coast, Sydney Cockles and Whelks. The shell is deposited as a thin layer, suggesting sporadic visits, and it was suggested that the shelters may have been used (despite their exposed nature) as they afforded an excellent view of the beach below.

Another two shelters were located near the ridge top overlooking Putty Beach and consist of a casual scatter of shells on the floor. The fifth shelter with evidence of usage was an exposed overhang with four flakes of fine grained, grey-white chert lying on the drip line.

Rutile mining activities have severely disturbed part of the area surveyed, although a local informant associated with the mining activity was able to re-locate the approximate area of a midden and burial. The midden was situated immediately east of a creek and it was during dredging and mining that human leg bones and vertebrae were uncovered. It is not known how many individuals were represented. Shell species were also not recorded.

The rock platform is located above one of the shelters and is covered with depressions which hold water after rain. Near these depressions are shallow, narrow abrasions associated with sharpening or shaping small objects such as shell fish hooks or points.

2) Hardys Bay

Hardys Bay is separated from the open ocean along Putty Beach by the Bouddi Ridge and is surrounded on three sides by steeply sloping forest clad hills reaching up to 100 metres in height. The Hardys Bay area is subject to a high level of housing development with artificial terracing a common feature given the steepness of the surrounding area. Within this survey area there were 30 sites identified: 11 foreshore middens, 14 rock shelters with evidence of occupation, 4 rock shelters with evidence of art and occupation and 1 engraving site.

The foreshore of Hardys Bay is basically one continuous accumulation of shell refuse which has been deposited in heaps rather than an even distribution of material. The division into 11 middens was arbitrarily achieved after amalgamating the heaps into clusters. The middens have been disturbed by the recent development along this section of the coastline.

Eighteen rock shelters show evidence of human occupation. The shelters range in size from those that might comfortably hold two people to larger, more open shelters where only part of the available floor space has been used. All of the shelters contain midden deposit, although the extent of midden accumulation varies between sites. In one site there was an area of shell debris 19 m long heaped against the back wall, whilst in others the disturbance has been so high that the midden is only present as remnant shells on the talus outside. Four of the shelters contain dry pigment drawings, however, the iconography is difficult to identify. These four sites are actively eroding and it is possible that more shelters in the area had art which has subsequently been destroyed.

The engraving site is located on the sandstone spur which divides Hardys Bay from Pretty Beach. The surface contains two engraved whale like figures and it is contended that the entire spur may have been seen as a large sea creature dividing the two bays.

3) Rileys Bay

Rileys Bay is fed by three major creeks which empty in to south facing beach 750 metres long. The bay has large areas of mud flats which are exposed at low tide, and there is a mangrove colony in the more protected south eastern section of the bay. Housing development in this area has been highly restricted by the lack of vehicular access, and there is currently only one house on the waterfront (development is encroaching following the construction of a road). Within the Rileys Bay survey area there were 11 foreshore middens 10 rock shelters with evidence of occupation, 4 rock shelters with art and occupation deposit, 1 engraving site with grinding grooves and one rocky gully with grinding grooves.

The midden deposits in Rileys Bay are like those in Hardys Bay, a generally intermittent layer of shells, with the layer varying in thickness from a few to 60 cm. The middens are generally composed of *Anadara* sp. of a uniform size. Stone artefacts, such as chert and basalt pebble flakes, chips, cores and uniface choppers were identified on the beach. These are thought to have eroded from the middens, although a careful search of all exposures failed to identify any stone tools in situ.

The fourteen rock shelters range from those used randomly, to those with considerable accumulations of shell and ash deposit. At some of the shelters, the midden deposits are located outside the shelter proper.

The engraving site with grinding grooves is located on a high point of a ridge between Hardys Bay and the Cockle Creek catchment. This site has fragmentary engravings, the iconographies of which are no longer identifiable. Grinding grooves were also located on a Hawkesbury sandstone exposure at the headwaters of a gully draining into Rileys Bay.

4) Fishermans Bay

Located north of Rileys Bay, Fishermans Bay is characterised by shallow mud flats which yield extensive numbers of Anadara and Whelk and a deep channel with high flow currents which provide deep water species. The bay is within a steep and forested basin with a freshwater creek emptying into the centre of the bay. Within this area there were 18 aboriginal sites: 9 foreshore middens, 6 shelters with midden deposits, 1 rock shelter with midden deposit and vestigial art, one engraved rock and one grinding groove site.

Two shelters were located adjacent to the creek, one of which has had the floor removed in historic times, the other of which still retains scattered Anadara deposit. Located in the mouth of the creek is a fallen boulder with the rough shape of a large fish. This boulder has been engraved with fish, eel like shapes and other indistinguishable shapes as well as historic graffito and a surveyors mark. Around the boulder there is an accumulation of Anadara shell up to 1.3 m deep. Level ground above the creek also has extensive midden accumulations.

The west facing shoreline is characterised by middens, either in discrete heaps or continuous layers up to 2 m long. Shells present within the midden deposits indicate that Sydney Cockles, Whelks, Mussels, Rock Oysters and Mud Oysters were consumed. Numerous stone tools have eroded out of the foreshore deposits and are visible at low tide. These mainly consist of uniface pebble tools, with some unifacially and bifacially flaked pebble choppers. Most of these tools are pointed and appear to have been used to prise away and open shells. In addition to these tools are smaller percentages of large flakes, hammerstones and pointed implements which might be for engraving rocks. Most artefacts were made from igneous material, while 26% were made from chert, silcrete, quartzite and quartz.

Rock shelters are located on the hillslope above the foreshore middens. These shelters range from those which are exceptionally dry with deep accumulations of deposit to those that are subject to inundation and rain wash with only scattered deposit. This suggests a pattern of opportunistic use of shelters, a pattern observable in most of the areas surveyed.

5) Empire Bay

Empire Bay is a north west facing bay, approximately 1.5 km in length. Waters in this bay are not deep. Two creeks enter the bay from the surrounding forested hills, one of which was associated with a freshwater spring. Development in this area is prolific; the entire waterfront is occupied by housing blocks. In this environment 19 sites were identified. These consisted of 8 foreshore middens, 4 rock shelters with deposit, 6 rock shelters with deposit and evidence of art and one engraving site with grinding grooves.

Many of the houses at Empire Bay are built on middens. The remnants of these sites can be seen in the cuttings for driveways, foundations, swimming pools and boat ramps.

On the ridge above the former fresh water spring is a complex of sites including open engravings and a rock shelter with drawings, stencils and engravings. The shelter is badly degrading, however it still retains evidence of engraved fishes, whales, macropods and humans with elongated head-dresses. A spotted fish is engraved to the west of the main site.

Axe grinding grooves were located around a rock pool which usually contains water. Near the pool was a smooth polished area of rock surface and it has been suggested that this smooth area is the result of grinding Burrawang *Macrozamia communis* nuts.

Several rock shelters are located in the hill slopes above the beach. These generally have scattered shell deposits, and some show evidence of cooking fires. One of the shelters, located with awkward access and a sloping floor contains a white pigment image which appears to be a sailing ship and two bone buttons. The occupation in this shelter includes contact deposition which would have been deposited between 1788 and 1868.

6) Cockle Bay

Cockle Bay is the area surveyed by Vinnicombe which bears the closest resemblance to the current study area. The Cockle Bay catchment is mainly flat marshland, the result of silt accumulation around the shallow waterway. Cockle Creek has a depth of between 1.5 and 3 m and Cockle Bay is approximately 350 m long. The intertidal area supports extensive mud flats and black and grey mangroves. As the name suggests, Cockle Bay supports great numbers of Cockles and there are currently several Oyster leases in the area. Around the periphery of Cockle Bay there are salt marsh areas and stands of paperbark. 10 Aboriginal sites were recorded in the Cockle Bay catchment, including 3 open middens, 3 rock shelters with deposit, 3 rock shelters with deposit and art and one engraving.

Only three midden sites were identified in the southern survey transect, these the result of disturbance which has removed the top soil resulting in the exposure of the underlying midden deposit. It is the opinion of Vinnicombe that there are more numerous and extensive midden deposits in this area, however, they are completely obscured by the recent accumulation of topsoil. The three sites identified in the survey were all located on the "first rise of dry ground beyond the periphery of the marsh surrounding Cockle Bay and the southern edge of Cockle Creek" (IX A:28). Two of the middens are associated with artefacts and are most likely to be open campsites.

The rock shelters are located on the ridge to the south and west of Cockle Bay and Cockle Creek. The shelters are between 700 m and 2 km from shell fish sources and six were

identified with shell remains. There is little depth of deposit in these shelters and it would appear that they were infrequently used. In one of the shelters there are 24 drawings including human figures with elongated head-dresses. Also within this shelter are areas of smoothed wall which are thought to be representative art. This is an art technique not before seen in Hawkesbury Sandstone formations (IX A:29). A single fish is engraved on a rock exposure on the ridge between Cockle Bay and Maitland Bay. This same ridge also contains engraved images of European motifs. Rock shelters are located on ridges, hill slopes and at the base of a spur. One of the shelters contains a charcoal drawing of what may be a sailing ship (similar to the ship in the Empire Bay survey area).

There were no grinding grooves identified in the Cockle Bay area.

The survey of the coastal areas resulted in the formulation of a predictive model for open coastal sites, a model which was tested and verified in the later stages of the project. The predictive model was specifically limited to open coastal areas as these comprised four of the sub-areas surveyed in this project, however broad trends and the specific results of the Cockle Bay survey may be applied to the study area. One of the results of Vinnicombe's work was to conclude that although rock shelters occur on both Hawkesbury and Narrabeen formations, they tend to occur with more frequency on the Hawkesbury Sandstone.

- ***Aboriginal Fishing Stations on the Newcastle Coastline, New South Wales – Dyall 1980***

Forming part of a 10 year study on coastal shell middens in the Newcastle area, this study of Aboriginal fishing technology is based on data from a salvage excavation conducted by the author in 1978 and 1979 at Birubi. The Birubi middens were originally extensive (in 1965 they covered 5ha), but by the time of the excavations they had been considerably reduced as a result of environmental factors, residential developments and off-road vehicles.

Evidence from one test trench (A-2) indicated the presence of a 'fish hook factory'. 35 intact fish hooks were recovered, with many more in all stages of manufacture. The raw material of the hooks was *Ninella torquata*, a heavy turban shell and the manufacturing method evidenced matched that described by Lampert and Turnbull (1970) from the south coast of NSW. Two types of finished fish hooks were found, C and J shaped, with varying dimensions from 19-36 mm. These shapes also conform to those described by Wooley in 1966 in the south coast of NSW.

Dyall goes on to state that shell hooks occur from the earliest layers of the midden and are found throughout its usage. He also asserts that the major fishing method at the site was angling. Remains of 481 fish were found, representing 23 different species, including snapper, kelpfish, mullet and shark. The midden also contains remnants of shellfish, both from the beaches and the rocky headland, such as sea urchin spines, which were usually burnt, crustacean claws, along with mammals (bandicoots, dogs, macropods), lizards and birds. Evidence of Tetrodonts indicated Aboriginal knowledge of the toxins contained in the fish and proper preparation of it for consumption. The evidence of this site suggests that the method of fishing utilized here was angling off the edge of the rocky headland and the use of a fish spear is not conclusively proved.

- ***Revised Report on Aboriginal Relics at Proposed site for power station at Chittaway Point, NSW – Dyall 1980***

This survey was conducted in advance of a proposed power station development at Chittaway Point, located to the west of Tuggerah Lake. It is bounded on the north by Wyong River and south by Ourimbah Creek. The proposed development site encompassed a 12 km area and

included the power station itself, coal mines and storage, a switchyard and associated works, an ash dam at Deep Creek and a pipeline corridor joining the ash dam with the power station site.

Two small cockle middens were found close to, but outside the study area on the banks of the Ourimbah Creek. Lithics were identified at 12 locations, five of which were classified as minor campsites. The raw materials included chert, quartzite, acid volcanics, quartz, siltstone and basalt, however few of the lithics were recognisable stone implements. In total, 5 used flakes, 1 split cobble with utilized edge, 3 axes and 1 sharpening stone were recorded. Two occupied rock shelters were identified, one outside the study area and one along Deep Creek. Two sets of axe grinding grooves were located, an individual one at Deep Creek and a large set at Rocky Knob. The Rocky Knob set are important due to both number (at leat 40) and location. They are situated at a point where no water flow is close by and any required water would need to come from the adjacent swamp. They are on the only sandstone outcrop in the Tuggerah Lake coastal wetlands and their depth attests to prolonged usage.

As a result of this survey, Dyall interpreted the Chittaway Point area as a wetland area showing occasional evidence of Aboriginal occupation.

- *A Preliminary Assessment of Aboriginal Relics on Power Station Site at Olney – Dyall 1981*

The Electricity Commission of New South Wales requested a preliminary assessment be carried out at the proposed power station site at Olney, west of Wyee. A total area of 120 square kilometres was covered by this survey, encompassing a variety of landforms, including steep Narrabeen sandstone ridges and Gosford sandstone outcrops.

Thirteen Aboriginal occupation sites were recorded during the survey. An 'art gallery' was identified at the head of Moran's Creek. Six rock shelters were located, one with a single drawing. Six sets of grinding grooves were also identified, ranging from a single groove to a set of seventeen, all were located in minor creeks, at locations where the creeks flow over sandstone shelves, high on the ridges. Two isolated finds of stone flakes were also recorded.

Based on the results of the preliminary survey, Dyall hypothesised that while it was unlikely that more art would be found within the study area, a more detailed survey should reveal more Aboriginal material, especially around the swamp areas.

- *Archaeological Survey along Hue Hue Road, Wyong, NSW – Dallas 1986*

Wyong Shire Council commissioned this survey as part of their Draft LEP. The study area consisted of land abutting Hue Hue Road, to the west of the Sydney-Newcastle Freeway. It was bounded on the north by Sparks Road and Sandra Street and to the west by existing properties abutting Dickson's Road.

Based on the limited previous archaeological work in the area and the environmental setting of the site, Dallas limited site prediction to open camp sites and scarred trees. Visibility during the survey was generally good.

A surface scatter of three artefacts was identified, on compact exposed clays and gravels, located on a slope overlooking a creek. The artefacts consisted of a yellow mudstone flake, a grey silcrete flake and a yellow chert flake. It was assessed as unlikely that any undisturbed subsurface deposits remain in the area.

The scatter was interpreted to represent sporadic use of the area. Its location may indicate use of the area by small foraging groups who would have exploited the resources of the nearby

swamp. However, European land use practices are likely to have obliterated any traces of substantial significant occupation sites within the study area.

- ***Analysis of an Australian Aboriginal Skeleton from Wamberal Beach, Central Coast of NSW – Donlon 1990.***

Donlon was commissioned by Darkinjung Local Aboriginal Land Council to analyse the skeletal remains recovered from a sand dune at Wamberal (AHIMS Site 45-3-1644). She determined that the skeleton was that of an Aboriginal male aged in his 40s. Evidence of blunt trauma was identified on the back of the skull, however, the cause of death was determined to be a circular fracture, also on the back of the skull, two centimetres in diameter, consistent with a wooden spear wound. Based on the lack of cavities and the moderate degree of wear on the teeth, Donlon determined that the deceased had subsisted on a traditional diet. Grave goods found with the skeleton include a fish hook file and a stone tool which is not found any earlier than 2,000 BP. Donlon concluded that the deceased had lived during the pre-contact period and had died sometime between 200 and 2,000 years ago (Donlon 1990: 5-6).

Additional grave goods included a cobble of red ochre, a layer of edible shell (Whelk and Cockle) placed immediately below the skeleton, the shaft of a small mammal bone covered in red ochre and stone items including a grey chert core and associated flakes, a sandstone fish hook file, a basalt edge ground axe, a flake of a coarse grained volcanic material and a circular water worn pebble. The stone could have originated from the local area, all these types being known to outcrop locally (Donlon 1990: 9).

As the skeleton was eroding from the sand dune the type of burial could not be determined with any accuracy. It appears highly likely that the body underwent an intentional burial (i.e. was not abandoned on a sand dune). This is confirmed by the presence of grave goods and the presence of shells under the body but not in the rest of the dune (Donlon 1990: 8).

Although it is not stated in this report, the AHIMS site card indicates that the remains were wrapped in paperbark and re-interred in the Wamberal Lagoon Nature Reserve in a location unlikely to be disturbed.

- ***Holocene Shell Middens of the Central Coast of New South Wales, An investigation of the management problems concerning coastal shell middens – Bonhomme 1994***

Following on from Dyall's 1977/1978 excavations at Birubi, Bonhomme undertook this study of middens in Gosford, Wyong and the Great Lakes Shires to find out more about the distribution, survival and range of midden sites in the study area. Project objectives also included the establishment of a management strategy for the surviving sites, particularly in the face of increased development, creating a schedule of sites that require protection, developing guidelines for Local Government for the recording of Aboriginal sites as part of the EIA process and to determine protocols for intervention with Councils and LALCs.

As a result of the survey, it was identified that middens in this region were predominantly located in foreshore reserve land. They were subject to several impacts from, for example, road and other constructions and infrastructure installation and maintenance among other activities. The shell species contained in lake and estuarine middens did not vary greatly and species were strongly dependant on localised conditions. For example *Anadara trapezia* survives in a wide range of water conditions and dominates middens in Broken Bay, Lake Macquarie and Wallis Lake. However, they do not survive in areas of lower water salinity. Other species also are unable to cope in these conditions, so no shell midden sites were found in the margins of Tuggerah or Budgewoi Lakes.

- *Test Excavations at The Hole, Mannering Bay, Lake Macquarie, NSW – Officer, Navin & Saunders 1996*

Navin Officer Archaeological Resource Management were commissioned by Pacific Power to carry out a sub-surface excavation of a site that had previously been identified by Pacific Power personnel during routine surveys of power station land at Mannering Bay, on the southwestern shores of Lake Macquarie. The site presented as lithics and shell, though the shell was possibly not anthropogenic in origin. Work at this site included surface survey, subsurface testing and a salvage program. The purpose of archaeological work at this site included the determination of the extent and nature of the site and to identify appropriate management strategies to be employed at the site.

Results of archaeological work identified the extant shell material to be of natural or recent human origin. The maximum site dimensions were of 180 x 100 m, although about 55% of the site had been disturbed by the construction of a channel. 137 artefacts were found during the investigations, 95 from the surface and 42 from test pits. Artefact types included flakes, blades, backed blades, microblades, flaked pieces, cores, blade cores and hatchet heads, with raw materials comprising tuff, silcrete, chert, quartz and quartzite among others.

The site has been dated to within the last 5000 years on the basis of the lithic assemblage, which belonged to the Small Tool Tradition. They interpretation of the site as having a relatively low to medium density of artefacts points to it as possibly representing an accumulation of periodic occupation debris from short-term camp sites, indicating frequent usage by small groups. Although it may also be interpreted as a base camp, the lack of associated midden material may preclude this.

4.2 Aboriginal Sites Recorded in the Local Context

A search of the Department of the Environment and Conservation Aboriginal Heritage Information Management System (AHIMS) indicated that within a 29 km x 15 km area including the study area (Dooralong, Catherine Hill Bay, Wyong and Toukley 1:25,000 AMG Zone 56, Eastings 346,000-375,000, Northings 6315,000-6330,000), seventy-two (72) Aboriginal sites had been identified and registered by September 2005 (Table 4.1). Table 4.1 shows the approximate location of the Aboriginal sites registered on the DEC AHIMS. Information regarding specific AMG co-ordinate locations is considered sensitive and has not been provided in this table.

It should be noted that the absence or paucity of records on the AHIMS database does not necessarily mean that Aboriginal sites or site types are not present within a given area. The DEC database contains only formally recorded sites. Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain sites and places which are not currently listed on the AHIMS database.

Site ID no	Site name	Site type	Site location	Recording & reports
45-3-0815	Hue Hue Road surface scatter	Open camp site	Located in open countryside, 130 m west of 132 kV transmission line	M. Dallas
43-3-1103	Wyong Creek	Shelter with art / shelter with deposit	Located on a sandstone scarp 10 m below the summit on the eastern side of a ridge	L.K. Dyall

Site ID no	Site name	Site type	Site location	Recording & reports
45-3-1104	Wyong Creek	Axe grinding groove	Located in the sandstone bed of the creek	L.K. Dyall
45-3-1223	Moran's Creek	Open camp site	Located on a farm track crossing the creek	L.K. Dyall
45-3-1224	Wyee Creek	Axe grinding groove	Located at the crossing point of a minor creek and sandstone outcrop close to Wyee Creek	L.K Dyall
45-3-1225	Wyee Creek	Axe grinding groove	Located on the west bank of a minor creek	L.K. Dyall
45-3-1226	Buttonderry Creek	Axe grinding groove	Located on the bed of a small creek crossing a sandstone outcrop	L.K. Dyall
45-3-1227	Moran's Creek	Axe grinding groove	Located on a rock shelf in the bed of a small creek, immediately above a 4 m drop	L.K. Dyall
45-3-1288	Moran's Creek	Shelter with art	Located in the head of the creek in a series of large sandstone outcrops	L.K. Dyall
45-3-1229	Olney	Shelter with art	Located in a sandstone outcrop 20 m down from the ridgeline	L.K. Dyall
45-3-1230	Moran's Creek	Shelter with art	Located along the spine of a sandstone ridge	L.K. Dyall
45-3-1231	Digary Creek	Shelter with deposit	Located in a sandstone outcrop on the southern side of a ridge	L.K. Dyall
45-3-1232	Wyee Creek	Shelter with art / shelter with deposit	Located on top of a narrow ridge at the head of this arm of the creek	L.K. Dyall
45-3-1233	Olney	Shelter with art	Located on the south side of a deep gully, 12 m below the ridgeline	L.K. Dyall
45-3-1276	Wyong Creek	Shelter with art / shelter with deposit		L.K. Dyall
45-3-1311	Pasadena	Open camp site		J.C. Lough
45-3-1312	Hue Hue Road	Open camp site	Located in the gutter of the road	J.C Lough
45-3-2880	Toepfers Road	Shelter with art	Located on small overhang in ridge	W.J. Bluff
45-3-2881	Toepfers Road	Shelter with art	Located on small overhang in ridge	W.J. Bluff
45-3-2889	Toepfers Road	Shelter with art	Located on small overhang in ridge	W.J. Bluff
45-3-2970	Olney 105	Axe grinding groove	Located on southern side of 4WD track	B. Welsh
45-3-3040	Myrtle Creek / Maculata Road	Axe grinding groove	Located to the west of the junction of the creek and another watercourse	B. Welsh

Site ID no	Site name	Site type	Site location	Recording & reports
45-3-3041	Myrtle Creek / Maculata Road	Axe grinding groove	Located on flat rock surfaces	B. Welsh
45-3-3042	Myrtle Creek / Maculata Road	Axe grinding groove	Located on small rock surface south east of the creek	B. Welsh
45-3-3169	J1	Open camp site	Located east of the junction of Johns Road and the Pacific Highway	M. Therin
45-3-3176	B1	Isolated find	Located on the eastern edge of an old quarry	M. Therin
45-3-3179	B11	Isolated find	Located on the edge of an eroded vehicle track	M. Therin
45-3-3180	B14	Open camp site	Located in alluvial sediment approximately 20 m from a tributary of Spring Creek	M. Therin
45-3-3181	WP1	Open camp site	Redeposited material located in area of residential rezoning	M. Therin
45-3-3183	WP3	Open camp site	Located north of the corner of Riveroak Dr and Honey Rise	M. Therin
45-3-3184	WP2	Open camp site	Located south of McPherson's Drive and west of Gavenlock Rd	M. Therin
45-3-3186	BR10	Isolated find	Located on the crest of the highest hill in the area	M. Therin
45-3-3187	BR13	Open camp site	Located on alluvial silt approximately 8 m from Spring Creek	M. Therin
45-3-3188	BR12	Isolated find	Located on a narrow walking track within 20 m of Spring Creek	M. Therin
45-3-3194	WP-4	Open camp site	Located north-north-east of the corner of Riveroak Drive and Honey Rise	M. Therin
45-7-0006	Wybung Head red oxide mine Freeman Park	Midden / Ochre quarry	Located on slopes of sand dunes	N.L. Bostock
45-7-0008	Wybung Head Frazer Park	Midden	Located on northern side of creek mouth	L.K. Dyall
45-7-0010	Bongon Flat Island	Open camp site	Located on a track from the beach where the creek tumbles down a waterfall	L.K. Dyall
45-7-0012	Flat Island	Midden	Located on top of cliff, extending northwards to creek	L.K. Dyall

Site ID no	Site name	Site type	Site location	Recording & reports
45-7-0013	Flat Island	Midden	Located northern end Moonee beach	E. Stockton
45-7-0014	Flat Island / Flat Rock	Open camp site	Located at southern end of Moonee beach	E. Stockton
45-7-0015	Flat Island / Flat Rocks	Midden	Located at southern end of Moonee beach	E. Stockton
45-7-0016	Catherine Hill Bay	Midden	Located on the beach	E. Stockton
45-7-0017	Flat Island	Midden	Located across neck of peninsula	L.K. Dyall
45-7-0071	Toukley Golf Course	Midden	Located to the west of an old sand quarry	P.A. Keane
45-7-0080	Mannering Park	Scarred tree	Located at the northern end of the Mannering Park survey area	A. Djekic & G. Happ
45-7-0082	Norah Head South	Open camp site	Located in sand dunes along the southern side of the access road to the lighthouse	J. Guthar
45-7-0084	Cabbage Tree Beach / GM2	Midden	Located to the south east of Cabbage Tree Beach	K. Sullivan
45-7-0085	Soldiers Point Midden / Nora Head	Midden	Located on Soldiers Point, overlooking Soldiers Beach	E. Stockton
45-7-0099	Norah Head / GM02	Midden	Located on headland below lighthouse	M. Dallas
45-7-0101	Norah Head / GM03	Open camp site / scarred tree	Located on headland	G. Morris
45-7-0102	Norah Head NM Site	Natural Mythological (Ritual)		
45-7-0103	Norah Head Fish Trap	Fish trap	Located at the council swimming pool at Cabbage Tree Beach	K. Sullivan
45-7-0104	Norah Head / GM04	Burial/s	Located approximately 300 m south east of Cabbage Tree Harbour	
45-7-0105	Norah Head / GM08	Midden	Located in old sand quarry	K. Sullivan & G. Morris
45-7-0106	Norah Head / GM05	Not an Aboriginal site	Located south of axe grinding grooves	K. Sullivan & G. Morris
45-7-0107	Norah Head / GM06	Water hole / well	Located at the base of a small sandstone cliff	K. Sullivan & G. Morris
45-7-0108	Norah Head / GM07	Midden	Located in a large blowout	K. Sullivan & G. Morris
45-7-0109	Norah Head / GM09	Open camp site	Located in an area that is well grassed and sheltered by large	K. Sullivan & G. Morris

Site ID no	Site name	Site type	Site location	Recording & reports
			dunes and trees	
45-7-0113	Sandy Point	Open camp site	Located on the coast north of sandy head	E. Stockton, S. McIntyre & K. Haglund
45-7-0115	Bungaree Norah	Open camp site	Located on the coast north of Norah Head	E. Stockton
45-7-0116	Norah Head 1	Open camp site	Located in sand dunes facing beach	E. Stockton & P. Vinnicombe
45-7-0118	Bungaree Norah	Open camp site	Located on coast north of Norah Head	E. Stockton
45-7-0120	Norah Head 2	Open camp site	Located close to the lighthouse at Norah Head	E. Stockton
45-7-0121	Toukley	Ochre quarry	Located in a cliff near Toukley	L. Godwin
45-7-0181	Chain Valley Bay 1	Midden	Located on the waters edge at Chain Valley Bay	L. Nelson
45-7-0207	The Hole 1	Open camp site	Located at the southern side of a flushing channel	K. Officer, K. Navin & P. Saunders
45-7-0216	Moonee Beach	Midden	Located in the dune system behind Moonee Beach	T. Bonhomme
45-7-0232	B2	Modified tree	Located at Bushells Ridge, Doyalson	M. Therin

Table 4.1: Sites listed on the DEC AHIMS database for the search area AMG Zone 56, Eastings 346,000-375,000, Northings 6315,000-6330,000.

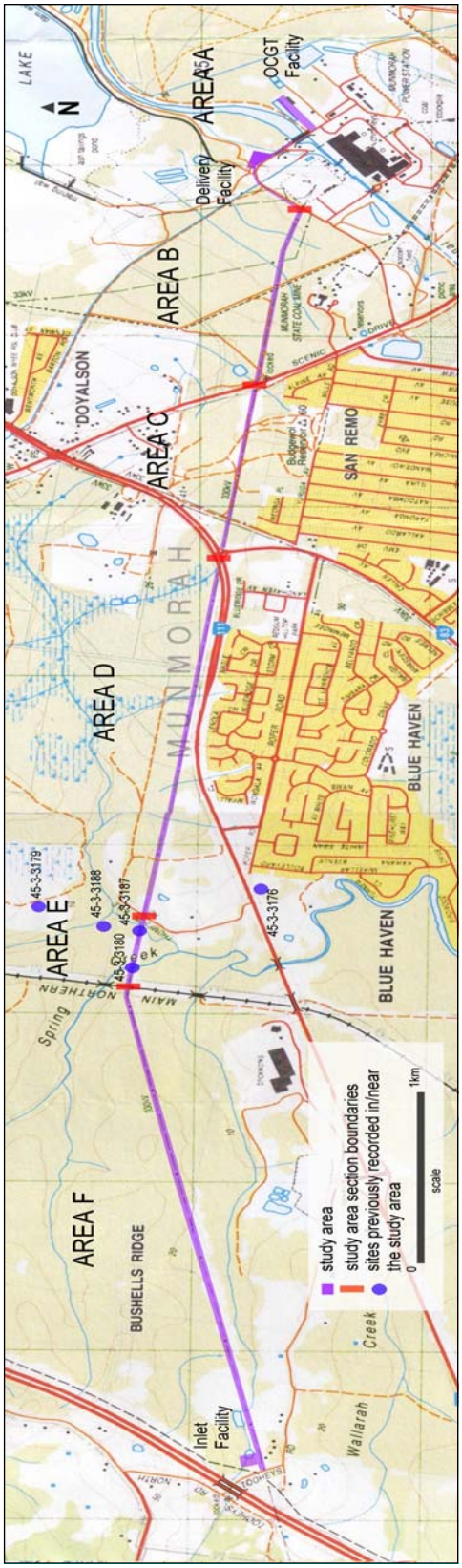


Figure 4.1: Approximate locations of Aboriginal cultural heritage sites registered on the DEC AHIMS within the study area (AMG co-ordinates: Zone 56, Eastings 346,000-375,000 Northings 6315,000-6330,000).

4.3 Archaeological Sensitivity & Site Prediction

Although it has been determined that it is not possible to provide predictive models for site distribution within the Gosford / Wyong area that will indicate the specific location of sites (Vinnicombe 1980), it is possible to predict what site types are most likely to occur within particular landscapes. Based upon previous archaeological research conducted locally, the following site predictions are given.

- *Rock Engravings*

Aboriginal rock engravings, carvings, or peckings are common in the sandstone areas of the Central Coast, which extend from the Hunter Valley to slightly south of Sydney and west of the Blue Mountains. Engravings are commonly produced using a "hammer and chisel" method, utilising a hammer and a pointed stone or bone tool. Designs are usually pecked, rather than outlined and present a solid irregular surface against the smooth surrounding rock. Figurative designs, including humans, weapons, fish, animals and birds, occur at some sites. Other are comprised of animal tracks and geometric designs which may appear abstract to the modern observer. Sites are commonly found on cliff tops, ridgelines, in creek beds and rock shelters were a suitable medium; i.e. soft sandstone outcrops, occur.

Background research has identified that the majority of engravings in the vicinity of the study area are located on outcropping sandstone or large boulders, either on rock platforms or hill crests or slopes where suitable stone is exposed. It is predicted that there is low potential for engravings to be present within the study area.

- *Axe / Hatchet Grinding Grooves*

Axe grinding or tool-sharpening grooves are found on flat areas of soft rock, such as sandstone, and are often near water holes or creek beds, which provided the necessary water for the sharpening process. From the shape of the grooves it is often possible to determine which type of tool was being made or sharpened. Axe-grinding grooves are broad and shallow, while deeper grooves often indicate where bone or wood was ground.

Given that the current study area is situated within the Narrabeen Shale landscape, it is predicted that there is low potential for axe grinding grooves to occur within the study area, although they may be present where suitable sandstone outcrops occur.

- *Occupation Sites – open campsites / stone artefact scatters, isolated finds, rock shelters & middens*

Open campsites comprise scatters of artefacts located either on the surface and/or in subsurface contexts. They may constitute the remains of hunting and gathering activities, domestic camps, or the manufacture and maintenance of stone tools. The density of artefacts may vary considerably between and across individual sites. These sites are classed as "open" that is, occurring on the land surface unprotected by rock overhangs and are sometimes referred to as "open camp sites." Artefact scatters documented in the region most commonly occur in close proximity to reliable water sources such as along watercourses and drainage lines.

Isolated finds are artefacts which occur without any associated evidence for prehistoric activity or occupation. They are generally defined as single artefacts located more than a certain distance from any other artefact. Frequently used distances are 30, 60, or 100m. The distance used depends on variables such as "background" artefact densities, land use disturbance, geomorphic processes, and research design objectives. Isolated finds can generally occur

anywhere in the landscape and may represent the random loss or deliberate discard of artefacts, or the remains of dispersed artefact scatters.

Isolated finds are known to occur in almost every landscape within the Wyong region and may be expected to occur within the study area, although their presence is often very difficult to detect due to dense vegetation and ground cover.

Rock shelters or overhangs with art and / or deposit are a dominant site type in the broader region. The study area is located on the Narrabeen Sandstone formation which suggests that although overhangs and shelters may be present within the study area, they are more likely to be located on the Hawkesbury Sandstone areas surrounding the study area.

Middens primarily contain waste materials resulting from meals of coastal resources, such as shellfish and bones, and are thus found in close proximity to sea coasts, estuaries and beside rivers and inland lakes. It is predicted that there is low potential for open midden sites to occur within the study area. This prediction is based on the results of Vinnicombe's work which noted that open middens are located in close proximity to the source of the shellfish, whilst middens located any distance from the resource source are generally associated with rock shelters. Should there be any shelters in the study area, there is potential that midden material will be associated with the shelter.

- *Burial Sites*

Aboriginal burial sites generally occur in the following areas: in caves, middens and campsites. In inland areas especially, they are likely to be found in sand dunes or other types of soft ground which were easy to dig. There is only low potential for a burial site to be present within the study area.

Broad predictive models invariably have limitations. It is possible to identify areas of high archaeological sensitivity, (i.e. large creeks, river banks, and alluvial terraces), however, it is not possible to identify areas of low archaeological sensitivity with the same certainty. This is compounded in areas of little ground surface visibility where the detection of open artefact scatters and campsites, the predominant site type in the Wyong subregion, is problematic. Regional archaeological studies of the Gosford and Wyong Shires area have generally proposed that the open coast and coastal estuarine ecotones should be regarded as archaeologically sensitive, with areas which have been developed and disturbed representing the only areas currently identifiable as areas of low archaeological sensitivity.

- *Quarry Sites*

These sites are typically exposures of a geological raw material where evidence for human collection, extraction and/or preliminary processing has survived. Typically, these involve the extraction of siliceous or fine grained igneous and meta-sedimentary rock types for the manufacture of artefacts, or the removal of ochre. The presence of quarry/extraction sites is dependent on the availability of suitable rock formations and ochre sources. Two ochre quarry sites have currently been identified in close proximity to the study area and basalt, chert and quartz outcrops are known to occur in the region.

- *Modified Trees*

Scarred trees are known to occur in almost all landscapes across New South Wales and may occur in the study area if suitable old growth timber (i.e. at least 100 years old) remains.

Scarred trees result when bark has been removed from a tree as a direct or indirect result of the manufacture of various goods and implements or the result of making foot holes in a tree

to collect food or to facilitate the removal of bark. The greatest density of scarred tree sites tend to occur within close proximity to known occupation areas generally associated with significant water sources.

Carved trees possess complex, often geometric patterns carved into the wood and have been interpreted as possessing ceremonial significance, and appear to have been used in some areas to indicate the presence of significant burial sites, initiation sites or ceremonial grounds.

5 Site Inspection

5.1 Introduction

An archaeological site inspection was conducted by Frances Scully and Sharon Lane (Heritage Concepts) with Jodi Cameron, Jason Taylor and Rodney Mackeson (DLALC) on the 13th and 14th September, 2005. All of the study area was surveyed except two areas of swamp in Area B and Area D, which were impenetrable both on foot and by vehicle and one area adjacent to the swamp in Area D which we were unable to gain access to.

For ease of discussion, the survey results are divided into sections based on road access.

5.2 Survey Results

5.2.1 Area A – Munmorah Power Station and delivery facility

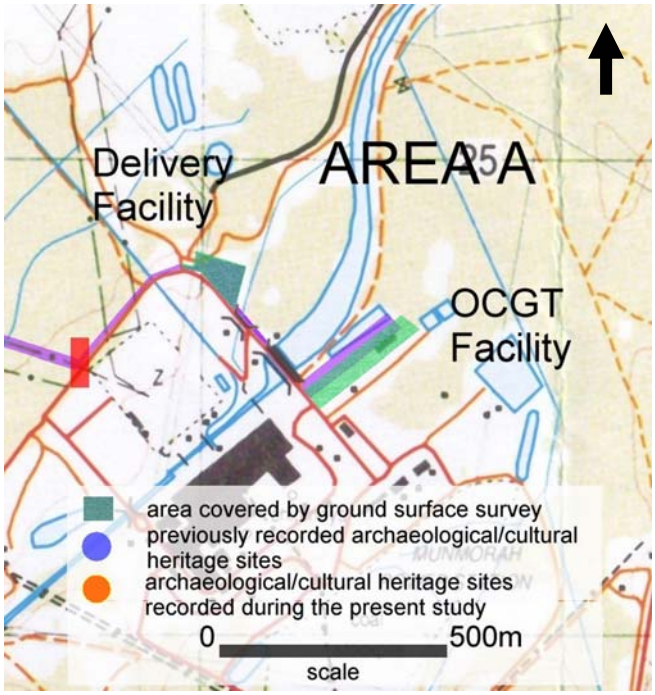


Figure 5.1: Map of Area A

The power station has been in operation since 1967 and produces electricity using both pulverised coal-fired boilers and steam-driven turbo-generators. It was built as a result of a policy to relocate major power stations to their fuel sources (www.de.com.au 21/09/05). The site of the power station encompasses a total area of 940 hectares, including undeveloped land used as a buffer zone between the power station and the surrounding residential areas of Lake Munmorah, Halekulani, Budgewoi, Buff Point, San Remo and Doyalson.

The power station campus is a heavily modified industrial area that has seen extensive ground surface disturbance since its initial construction. The OCGT peaking plant will be located in an area of the power station that was originally used as the workers compound during the construction of the existing coal-fired power station in the early 1980's. It is located directly to the east of the inlet canal that drains into Lake Munmorah (Figure 5.1) on the north eastern

side of the power station. The OCGT peaking plant will have maximum dimensions of 150 m NW/SE x 235 m SW/NE.

Currently, much of the site for the OCGT peaking plant has a concrete covering and is used either as a carpark or for mechanical equipment storage. To the south east of this, however, is an area of vegetation, containing sparse grass and tree cover. Visibility was poor here due to the heavy leaf litter on the ground surface. At least one power line easement transected this area and in various locations concrete pads were visible under the leaf litter.

Summary of results: No archaeological or cultural heritage sites were found as a result of survey in this area.

Photograph 5.1: OCGT peaking plant, facing NE

The delivery facility will be located to the north of the OCGT peaking plant within the power station campus (Figure 5.1). It will be located in an area of clearance, at a minimum distance of 100 m from the OCGT facility. The gas delivery facility will comprise of a header pipe connecting the facility to the OCGT peaking plant; an actuated isolation valve installed at the inlet to the facility; gas filtration, heating and pressure regulation equipment; over pressure protection and emergency venting systems and control and communications equipment. The total area for this facility will not exceed 100 m x 100 m. The exact position for this facility within the cleared area has not been decided on. Also, although the finished facility will not exceed 100 m x 100 m, the likelihood is that the entire ground surface will be disturbed during construction.

The entire cleared area was surveyed. Visibility was low to moderate. Vegetation consisted of close cropped grass within the clearing and pine forest surrounding it. Pine trees had previously been planted to provide both a wind and visual break. Ground surface in the clearing was more or less level. An existing pipeline through the clearing is indicative of the disturbed nature of the ground in this area.

Summary of results: No archaeological or cultural heritage sites were found as a result of survey in this area.

Photograph 5.2: Area A, the delivery facility, facing East

Within the power station, the gas pipeline will be inserted adjacent to the west side of the existing road. This area has been disturbed due to previous construction activity.

Summary of results: No archaeological or cultural heritage sites were found as a result of survey in this area.

5.2.2 Area B – Munmorah Power Station to Scenic Drive

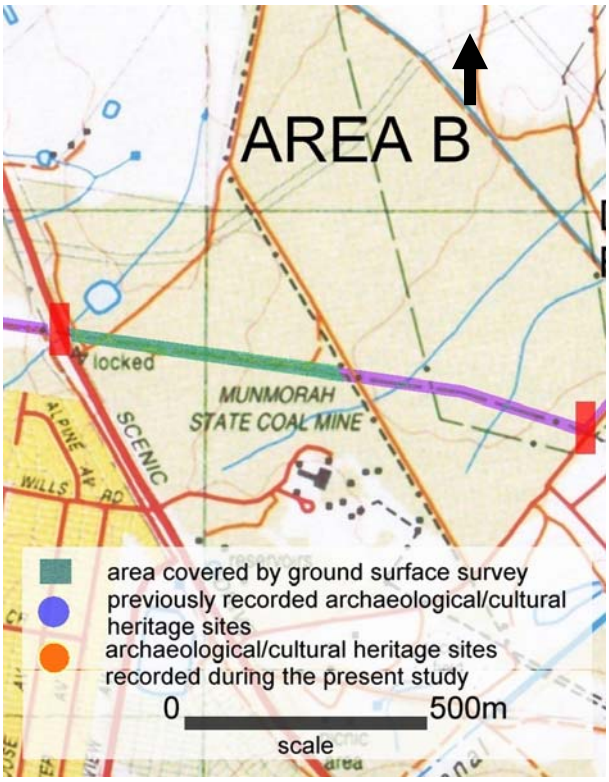


Figure 5.2: Map of Area B

No previously recorded sites were located in this area. In general, there was heavy vegetation on the ground surface throughout Area B. A track had been built up along the easement from the power station and this was followed to an area of swamp not marked on the map, but known locally as the Colongra Wetlands (Location 363399 6324439 GDA '94). At this point visibility was low. Areas of exposure showed the soil to be a light brown sand. Vegetation

varied between tree and scrub coverage and tall grasses. We were unable to traverse the swamp, either on foot or by vehicle and re-entered the study area at Scenic Drive. From the Colongra Wetlands to Scenic Drive, visibility was poor. Again, areas of exposure showed a light brown sand. The line of the easement had been largely cleared of heavy scrub and trees, but there was quite dense grass coverage, which varied in height. From the swamp, the topography rose towards Scenic Drive.

Summary of results: No archaeological or cultural heritage sites were found as a result of survey in this area.

Photograph 5.3: Area B, looking towards the power station, facing East

Photograph 5.4: An example of the vegetation in Area b, close to Scenic Drive

5.2.3 Area C- Scenic Drive to the Link Road

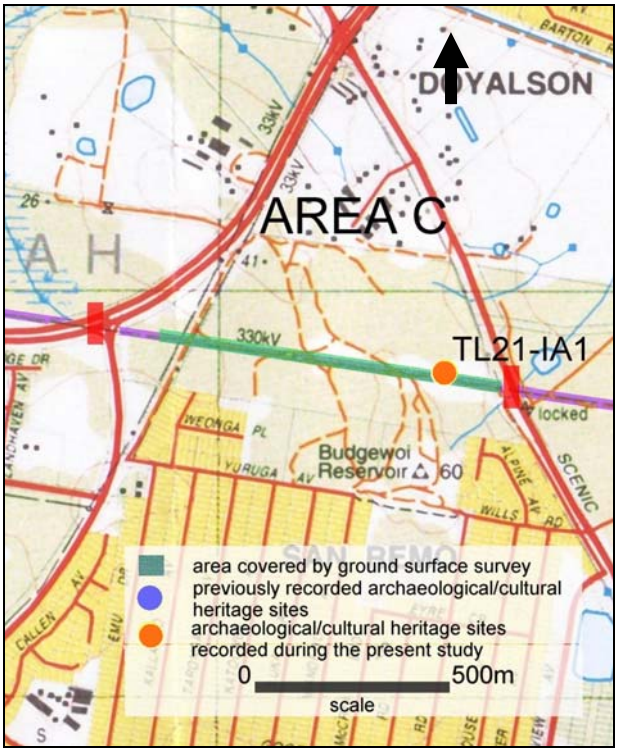


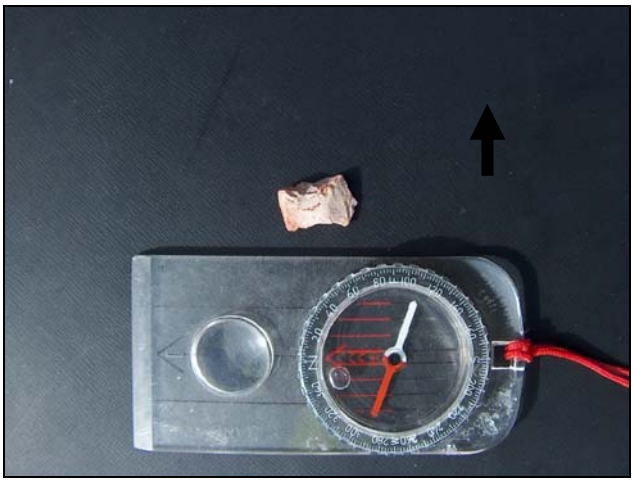
Figure 5.3: Map of Area C

The easement from Scenic Drive to the Link road, particularly around Doyalson Point and San Remo, is extensively used as a recreation area and, in places, as a dumping ground by the local population. Much of the ground surface of the area is exposed primarily as a result of trail bike riding. In most places, the exposed ground surface appears to have been disturbed by factors including surface churning by trail bikes, deliberate modification, such as is evident in Photograph 5.5 and erosion in areas lacking vegetation (Photograph 5.6). Away from these tracks, vegetation consists of areas of grass coverage, some quite high and open scrub and trees. In areas of vegetation, visibility was low, but along the tracks and in other exposed areas, visibility was good. One isolated artefact was found in this area at 362587 6324784 (GDA '94). It consisted of a silcrete fragment found on the southern edge of an eroded vehicle track within a concentration of sandstone gravel / pebble. Despite good ground surface visibility on the track and within the surrounding area no other artefacts were found. It is possible, however, that the surrounding lag deposit of surface gravel had the effect of masking other stone artefacts.

Summary of results: One isolated artefact was located in Area C.

Photograph 5.5: An example of the ground disturbance and visibility in Area C

Photograph 5.6: Location of artefact IA1 showing sandstone gravel on track and erosion gully



Photograph 5.7: Artefact IA1

5.2.4 Area D – The Link Road to Thompson Vale road

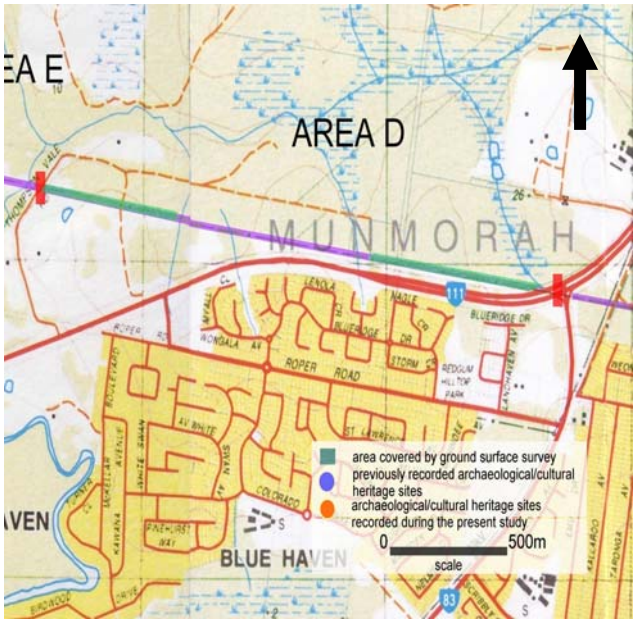


Figure 5.4: Map of Area D

It was not physically possible to survey all of Area D. Terrain and poor ground surface visibility were the main constraints. Between pylons 21TL12 and 21TL11 was an area of swamp. As with the Colongra Wetlands, the perimeter of the swamp was surveyed but we were unable to traverse the swamp, either on foot or by vehicle. We were also unable to access the area around 21TL13. Ground surface visibility was generally low in the surveyed areas and, in the main, available only as a vehicle track, which runs along the easement. Vegetation was of grass, in areas reaching approximately 70 cm in height and open scrub. Where visible, soil was a light brown sand. From the eastern edge of the swamp, the ground surface rose to pylon 21TL10. From here (Pylon 21TL10) it descended. Approximately 50 m from 21TL8 an animal bone was located (Photograph 5.10). It had quite a weathered surface and no visible markings. It is likely to be of quite recent date. No archaeological or cultural heritage sites were identified as a result of survey on the eastern side of the swamp. At the western end of Area D, east of Thompson Vale Road, ground surface vegetation consisted of short grasses and visibility was poor. Low earth marks dotted over the area suggest that there had been some disturbance to the ground surface in this area.

Summary of results: No archaeological or cultural heritage sites were identified as a result of survey.

Photograph 5.8: Looking West to the swamp in the east end of Area D

Photograph 5.9: The west end of Area D, looking East

Photograph 5.10: Animal bone found close to 21TL8 in Area D

5.2.5 Area E – Thompson Vale Road to the Main Northern Railway Line

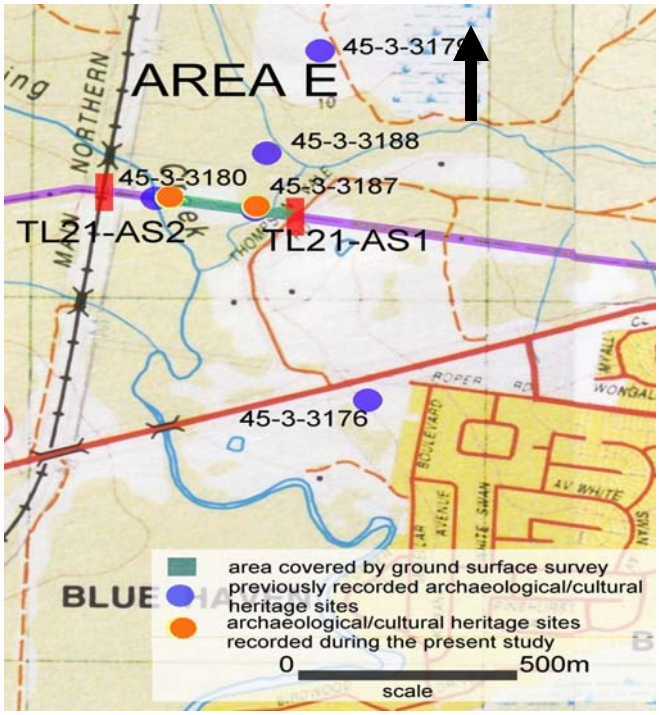


Figure 5.5: Map of Area E

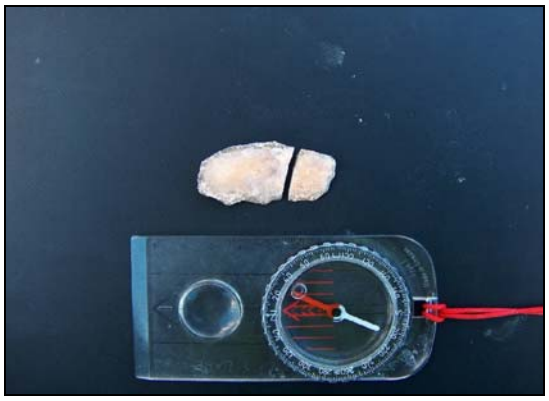
Access to Area E was from Thompson Vale Road. At Thompson Vale Road, the ground surface dipped and the easement was crossed by a tributary of Spring Creek. From here (Thompson Vale Road) to pylon 21TL15, just at the Main Northern Railway, the track surface was exposed, showing a light brown sand. Vegetation on either side consisted of tall grasses, shrub and trees. Just to the west of the tributary, a scatter of seven artefacts, AS1, was located. This is likely to be site 45-5-3187 (BR13), previously recorded by Michael Therin. The artefacts were found on the western side of a tributary of Spring Creek and immediately to the south of a wooden post and wire fenceline. The majority of the artefacts were found on eroded surfaces adjacent to the fenceline or on gently sloping land which falls to the east and south towards the creekline, although one artefact was found on a vehicle track to the west of the main concentration. One of the recorded artefacts (a flake) had been snapped in two, suggesting relatively recent damage and disturbance to the site, possibly from vehicle traffic or the construction of the fence. Land within the study area to the west and south of the main concentration of artefacts was covered in thick grasses and other vegetation, making it difficult to assess the full extent of the scatter.

A second artefact scatter, AS2, was located further along this track, underneath and northwest of pylon 21TL15. This scatter consisted of at least 27 stone artefacts and was also previously recorded as 45-3-3180 (B14) by Michael Therin. Again the artefacts were exposed on a hard, relatively flat eroded sandy-clay surface which was also scattered with sandstone pebbles or gravel.

The presence of a relatively high proportion of broken artefacts at the site, such as snapped proximal and distal flakes, suggests a high amount of disturbance to the site – most likely the result of the construction and maintenance of the power transmission pylon. All of the artefacts were located in areas of exposed and eroded ground surface and it was not possible to determine the extent to which the artefact scatter continued into the surrounding grassed areas.

Summary of results: Two artefact scatters that had previously been recorded by Michael Therin were identified within the easement in Area E.

Photograph 5.11: Location of AS1, looking East towards the creekline



Photograph 5.12: Snapped artefact from AS1

Photograph 5.13*:* Ground surface under 21TL15, the location of AS2, showing sandstone gravel

Photograph 5.14*:* 21TL15, the location of AS2, looking South

5.2.6 Area F – Main Northern Railway Line to Toohey's Road

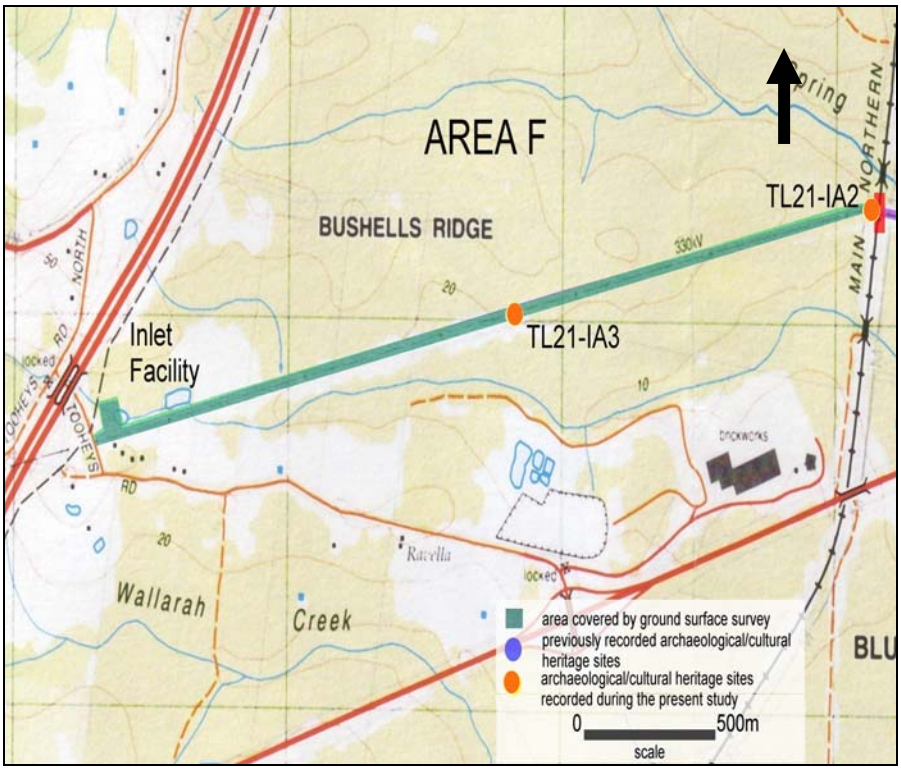


Figure 5.6: Map of Area F

Area F was located at the western end of the study area and includes the proposed inlet facility. The inlet facility will be located in a cleared area close to the intersection with Toohey's Road. The exact location of this inlet is as yet undecided, but it will not exceed an area of 100 m x 100 m. It will consist of a compressor building to house the compressor station and all other ancillary items. It is likely that the building will be 20 m x 20 m and 8 m tall. It will be a pre-cast concrete structure, designed for remote, unattended operation. As with the delivery facility, although the maximum dimensions of this structure will not exceed 100 m x 100 m, it is likely that the surrounding ground surface will be disturbed during construction. All of the cleared area was surveyed. Visibility was moderate to good. Vegetation consisted of grass coverage, well cropped, with areas of exposure. Exposure showed the soil to be a light brown sand. This cleared area also contained a dam, likely to be of relatively recent construction. No archaeological or cultural heritage sites were found as a result of survey in the area of the proposed inlet facility.

Continuing through the study area from Toohey's Road, the ground was low-lying and marshy, though at the time of the survey, water levels were low, which increased visibility. Vegetative cover in these areas was of marsh grass interspersed with exposed areas. From here (Toohey's Road) to the Main Northern Railway Line there is a track along the easement. In the low-lying areas, this track has been built up to avoid the marsh. As the ground surface rose, the vegetation changed to become open scrub. Vegetation cover became thicker, although the track was clear throughout. Visibility was moderate to good. One isolated artefact (IA3) was located in this section of the easement, at the following location: 357842 6325014 (GDA '94). It was a single flake of indurated mudstone found sitting on the hard, eroded track surface. Land in this location slopes to the south and west. The track surface consisted of hard eroded sandy clay scattered with sandstone pebbles or gravel. Thick

vegetation on either side of the track surface decreased the ground surface visibility in these areas.

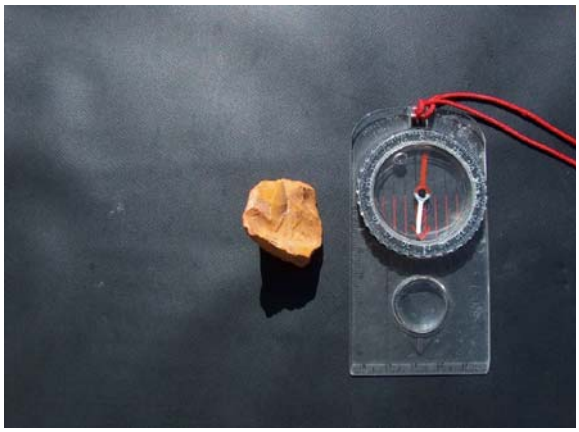
At the entrance to the eastern end of Area F, by the railway line, there was considerable ground surface disturbance. This area is locally used for trail bike riding. Underneath pylon 21TL16, an isolated artefact (IA2) was located at 359091 6325303 (GDA '94) and consisted of a large flake of mudstone. Ground surface consisted of flat eroded sandy clay scattered with a lag deposit of sandstone gravel / pebbles. Despite high ground surface visibility in the surrounding area, mainly the result of ground surface disturbance, no other artefacts were found.

Summary of results: Two isolated artefacts were located in Area F.

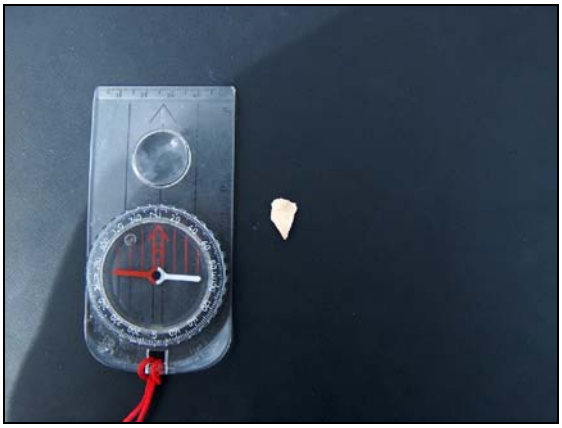
Photograph 5.15*:* Looking East from Toohey's Road

Photograph 5.16: Eastern end of Area F, at the railway line, showing trail bike disturbance

Photograph 5.17: Location of IA2 at eastern end of Area F



Photograph 5.18: IA2, Area F



Photograph 5.19*:* IA3, Area F

5.3 Artefact Catalogue

The following table lists the artefacts identified during the survey. In total, three isolated artefacts (one fragment and two flakes) and two artefact scatters were recorded.

Site	Artefact type	Raw material	L (mm)	W (mm)	T (mm)	Maximum dimension (mm)
IA1	Fragment	Silcrete				21.2
IA2	Flake	Mudstone	27.2	37.8	14.9	40.0
IA3	Flake	Porc?	11.3	8.3	2.4	15.2
AS1	Proximal flake	All mudstone / tuff				27.4
	Fragment					27.7
	Flake		33.1	26.9	5.6	34.0
	Scraper? (appears to be retouched on distal end, but obscured)		25.1	23.3	11.5	31.4
	Flake (snapped into two halves)		40.6	22.0	6.6	44.9
	Proximal flake					16.7
	Flake		24.8	22.9	11.2	33.1
AS2	Proximal flake	All mudstone / tuff				11.3
	Split flake					15.2
	Distal flake					11.9
	Split flake					9.0
	Fragment					11.4
	Fragment					25.1
	Proximal flake					13.1
	Flake		28.3	26.0	19.7	46.8
	Proximal flake				18.9	

Site	Artefact type	Raw material	L (mm)	W (mm)	T (mm)	Maximum dimension (mm)
	Flake		20.4	28.2	6.6	38.9
	Distal flake					9.9
	Proximal flake					18.0
	Fragment					14.7
	Proximal flake					20.0
	Split flake					41.5
	Fragment					15.1
	Fragment					10.3
	Flake		18.8	26.0	8.0	28.2
	Distal tool (straight edge, stepped scraper)					39.7
	Proximal flake					14.0
	Blade core (bidirectional)					36.7
	Flake		35.2	15.9	6.0	37.5
	Fragment					15.1
	Proximal flake					27.2
	Fragment					30.0
	Flake		25.2	43.5	15.1	47.5
	Distal flake					20.9

Table 5.1: Catalogue of artefacts recorded during the survey

6 Assessment of the Archaeological Resource

6.1 Known archaeological sites and associated PADs

Three (3) isolated artefacts and two (2) artefact scatters were found as a result of this survey. Both of the artefact scatters have been previously recorded by Michael Therin.

Site	Site type	Location	AHIMS no
IA1	Isolated find	362587 6324784 (GDA '94)	
IA2	Isolated find	359091 6325303 (GDA '94)	
IA3	Isolated find	357842 6325014 (GDA '94)	
AS1	Artefact Scatter	359520 6325244 to 359484 6325246 (GDA '94)	45-5-3187
AS2	Artefact Scatter	359294 6325268 to 359289 6325284 (GDA '94)	45-3-3180

Table 6.1: Location of artefacts located during the survey

Due to the generally poor ground surface visibility surrounding sites IA3, AS1 and AS2, it was not possible to determine their full extents during the survey and whether artefacts associated with them exist in adjacent grassed / vegetated areas. As a precautionary management measure Potential Archaeological Deposits (PADs) have therefore been identified for each of these areas.

6.2 Other areas of PAD identified as a result of survey

The environment within the easement has been modified and although not landscaped, it is unlikely that any of it is undisturbed. In certain locations, recreational use of the easement has caused considerable intrusion to the surface. In these areas, it may be unlikely that Aboriginal archaeological deposits survive intact on the surface. However, with the exception of the power station and the locations of the pylons, there would appear to be little sub-surface impact to the study area, therefore, the sub-surface integrity of the study area is likely to be good.

Wetlands / swamps and their marginal areas generally have high potential to retain and preserve archaeological deposits. Traditionally, wetlands were important resource areas for hunting and gathering foodstuffs. They were likely to be frequented by local groups and as such, it is likely that occupational debris is preserved within them. At the site of Wyrie Swamp in South Australia, for example, seven wooden boomerangs, several hard wood double-pointed objects and a barbed wooden spear head were found in association with stone scrapers dating to approximately 10,000 years ago (Jones 1998:114). It is unusual that no archaeological deposits were identified in these areas during this survey. It is likely that poor ground surface visibility and other activities along the easement have contributed to this. However, ground disturbance works in these areas may uncover archaeological items. These areas have therefore been identified as PADs.

6.2 Aboriginal archaeological potential and sensitivity of the study area

The Aboriginal archaeological potential and sensitivity of the study area is outlined in the following table:

Area	Archaeological potential and sensitivity
Area A	Nil to low
Area B	Low to moderate
Area C	Low to moderate
Area D	Moderate to high
Area E	High
Area F	Low to moderate

Table 6.2: Archaeological potential and sensitivity of the study area

6.3 Summary of identified areas of PAD in the study area

The following table lists the areas where PADs have been identified in the Study Area

PAD	Area	Reason
IA1	Area C	Isolated find
IA2	Area F	Isolated find
IA3	Area F	Isolated find
AS1	Area E	Artefact Scatter
AS2	Area E	Artefact Scatter
Colongra Wetland	Area B	Wetland
Swamp	Area D	Wetland

Table 6.3: Areas of PAD in the study area

7 Assessment of Cultural Significance

7.1 Introduction to the assessment process

An assessment of significance seeks to understand and establish the importance or value that a place, site, or item may have to the community at large. The concept of cultural significance is intrinsically connected to the physical fabric of the item or place, its location, setting and relationship with other items in its surrounds.

The assessment of cultural significance is ideally a holistic approach that draws upon the response these factors evoke from the community. The criteria of evaluating cultural heritage value are generally applied to sites, places or items that have tangible historic structures or relics visible at the site, or where there is general understanding of the extent of the historic resources.

Archaeological sites require a different method of evaluation because of the nature of the heritage resource and because the degree to which it can contribute to our understanding of history cannot be fully comprehended at the outset. Therefore, what is subject to evaluation is the significance of the 'potential' of the site to reveal information about the past that needs to be assessed when determining the cultural significance of the archaeological resource. Archaeological deposits can also offer different types of information that is not always available through any other source and the contribution they can make to our understanding of a place of past human activities may also be of cultural heritage significance. Despite these differences the same general set of criteria are used to assess cultural heritage value of different types of heritage resources.

The Australia ICOMOS *Charter for the conservation of places of cultural significance* (the Burra Charter) was formulated in 1979 and most recently revised in 1999, and is the standard adopted by most heritage practitioners in Australia. The Burra Charter divides significance into various groups or categories for the purpose of assessment. They are: Aesthetic, Historical, Scientific/Technical, Social, and Other.

7.2 Criteria for the assessment of Aboriginal cultural heritage

The following assessment criteria are based on the Australia ICOMOS *Charter for the conservation of places of cultural significance* (the Burra Charter). These criteria have been adapted by the NSW DEC to address Aboriginal archaeological & cultural heritage values. It is important to note, however, that the determination of Aboriginal cultural heritage values can not adequately be conducted without the input of the relevant Aboriginal community groups.

Aboriginal Heritage Values based on the Australian ICOMOS Charter –
Social value (sometimes termed *Aboriginal value*) refers to the spiritual, traditional, historical or contemporary associations and attachments which the place or area has for the present-day Aboriginal community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods, or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed. These aspects of heritage significance can only be determined through consultative processes with one or more Aboriginal communities.
Historic value refers to the associations of a place with a person, event, phase, or activity of importance to the history of an Aboriginal community. Historic places may or may not have physical evidence of their historical importance (such as structures, planted vegetation or landscape modifications). Gaining a sufficient understanding of this aspect of significance will often require the collection of oral histories

and archival or documentary research, as well as field documentation. These places may have 'shared' historic values with other (non-Aboriginal) communities. Places of post-contact Aboriginal history have generally been poorly recognised in investigations of Aboriginal heritage, and the Aboriginal involvement and contribution to important regional historical themes is often missing from accepted historical narratives.
Scientific value refers to the importance of a landscape, area, place, or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place, or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.
Aesthetic value refers to the sensory, scenic, architectural, and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.

Table 7.1: Criteria for the assessment of Aboriginal cultural heritage

These aspects of the heritage significance of a place or object are commonly inter-related. Because all assessments of heritage values occur within a social and historical context, all potential heritage values will have a social or Aboriginal community heritage component.

7.3 Cultural Heritage Values of the Study Area

Scientific Value

The identified Aboriginal cultural heritage items identified within the study area possess scientific value through their ability to provide information about lithic technologies and raw material sources. The location of the sites will also add to the growing knowledge of land use and occupation strategies in the Wyong area.

Aboriginal /Social Heritage Value

It is not the place of the consultant to provide information regarding the social, historic or aesthetic value of the Aboriginal cultural objects and places within the study area. Such information can only be provided by the local Aboriginal community. The following information has been provided by Darkinjung Local Aboriginal Land Council regarding the likely use and role of the area in the past:

> The study area was an area used by traditional Aboriginal people for living and hunting in. There have been some archaeological studies done in the area that support this fact. It is known among the present local Aboriginal community of sites that are situated around the area.
>
> The area previous to white settlement would have been rich in food sources and equipment and tool making materials.
>
> (DLALC Report See Appendix A)

8 Statement of Heritage Impact

8.1 Requirements of a Statement of Heritage Impact

The objective of a Statement of Heritage Impact (SoHI) is to evaluate and explain how the proposed development or rehabilitation works will affect the value of the heritage item and/or place. The SoHI needs to address how the heritage value of the item/place is to be conserved or maintained, or preferably enhanced by the proposed works.

8.2 Proposed works

The OCGT peaking plant will be located within the grounds of the Munmorah Power Station and is designed to operate as a peak-load plant, i.e., it will supply electricity at short notice during periods of peak power demand.

The proposed development involves the construction of:

- ☑ An open cycle gas turbine (OCGT) peaking plant; and
- ☑ An underground lateral gas pipeline to connect the OCGT to the Horsley Park-Hexham natural gas transmission main.

Power from the OCGT peaking plant will enter the grid both by the use of the existing TransGrid substation (located near the proposed site) and the existing overhead powerlines.

The OCGT peaking plant will comprise the following:

- Four gas turbines with a combined total net power output range of approximately 600MW. These turbines will be capable of running on a primary fuel of natural gas and a backup fuel of distillate gas when the supply of natural gas is interrupted or if the peak demand period extends beyond the nominated gas supply period; and
- Ancillary plant items including distillate fuel and demineralised water storages, a gas compressor and an evaporative inlet air cooling unit.

The lateral gas pipeline will:

- Connect the OCGT peaking plant with the existing Horsley Park-Hexham pipeline;
- Extend for a length of approximately 7 km; and
- Be routed along the existing 330 kV electricity transmission corridor (21tl) currently under TransGrid management.

8.3 Predicted Impact

Two previously identified cultural heritage places (45-5-3187, 45-5-3180) or items occur within the study area and these were located during the survey. Three isolated artefacts were also identified during as a result of this study (IA1, IA2, IA3).

The study area has previously been subject to disturbance in the form of clearance and the erection of pylons along the route of the easement and the construction of the power station.

The construction of and subsequent modifications to the power station are likely to have removed or destroyed Aboriginal archaeological deposits in this area. Therefore, it is unlikely that construction works for the OCGT peaking plant will have an impact on Aboriginal archaeological deposits. Construction of the delivery facility may have an impact on any Aboriginal archaeological deposits found within that area.

The erection of pylons may have disturbed and had some impact on Aboriginal archaeological deposits, but not removed or destroyed them. The proposed gas pipeline will have a maximum easement of 20 m and will be inserted in the south side of the existing TransGrid easement. The actual pipe will be about 1 m in diameter. Construction of the pipeline will involve both tunnelling and open excavation. The areas of open excavation are likely to have an extensive impact on both known and potential PADs where they are located within the gas pipeline easement. Construction traffic may also impact on the integrity of surface scatters along the route of the pipeline. Ground surface disturbance works in the swamps and swamp marginal areas have a high potential to uncover sub-surface Aboriginal archaeological deposits.

The actual operations of the proposed gas turbine facility does not present any heritage constraints.

9 Heritage Management Recommendations

9.1 Introduction

The archaeological assessment of the area of proposed works associated with the proposed gas turbine facility at Munmorah Power Station has been based on a review of heritage registers, relevant documentation and site inspection. It has been determined that two previously identified sites have been recorded directly within the current study area (45-5-3187, 45-5-3180) and a further three isolated artefacts were identified during the current site inspection (IA1, IA2 & IA3). It is predicted that the proposed works will involve the disturbance of soil deposits, but these occur within areas that have been previously subject to disturbance and in the case of the power station, extensively so. It is likely that construction activities at the power station have served to disturb or destroy any Aboriginal archaeological resources. It is likely that past activity along the existing easement has served to compromise the integrity of the Aboriginal archaeological resource but have not completely removed it.

9.2 Recommendations

The following recommendations are made in relation to the proposed gas turbine facility at Munmorah Power Station. Impacts to Aboriginal cultural heritage should be minimised and/or mitigated wherever possible and the following recommendations have been prepared with this in mind.

Recommendation 1

Sites IA1, IA2 and IA3 will be registered on the Aboriginal Heritage Information Management System (AHIMS) database. Site cards will be submitted to the Department of Environment and Conservation (DEC) with information and site descriptions so they can be entered onto the AHIMS database.

Sites AS1 and AS2 correlate to registered Aboriginal sites 45-5-3187 and 45-3-3180 respectively. New site cards with updated information and site descriptions will also be lodged with DEC.

Recommendation 2

It is recommended that the PADs surrounding AS1 and AS2 be subject to preliminary archaeological test excavations. These test excavations will need to be carried out under the auspices of a Section 87 Preliminary Research Permit (PRP). The S87 permit will need to be accompanied by a research design written by a qualified archaeologist in conjunction with input from Darkinjung Local Aboriginal Land Council. No ground disturbance at sites AS1 and AS2 may occur until the S87 permit is issued.

Explanation of process:

Based on the results of the preliminary archaeological test excavation (S87PRP), a Section 90 Consent permit will need to be lodged with DEC. A Section 90 Consent is a multi faceted permit that allows the applicant to seek approval to destroy / disturb a site. The level of disturbance and the type of S90 Consent permit required is hinged on the results of the S87 PRP.

Types of Section 90 Consent permits include:

Consent to Destroy;

Consent to Destroy with Salvage;

Consent to Destroy with Surface Collection;

Care and Control permit for any artefactual remains collected as part of the S90 activities.

The S90 Consent permit will need to be accompanied by a research design prepared by a qualified archaeologist with input from the identified Aboriginal stakeholder groups.

Under the new Interim Aboriginal consultation guidelines, the relevant Aboriginal stakeholders must be provided the opportunity to review the draft research design and provide input into the proposed methodology for the test excavation.

Recommendation 3

It is recommended that all workers and contractors are briefed on the potential of uncovering archaeological deposits around wetlands/swamps and their marginal areas prior to works commencing. This briefing can be included as part of a general 'toolbox' or induction for the overall project.

Explanation of process:

Traditionally, wetlands were important resource areas for hunting and gathering foodstuffs. They were likely to be frequented by local groups and as such, it is likely that occupational debris is preserved within them. At the site of Wyrie Swamp in South Australia, for example, seven wooden boomerangs, several hard wood double-pointed objects and a barbed wooden spear head were found in association with stone scrapers dating to approximately 10,000 years ago (Jones 1998:114).

Wetlands / swamps and their marginal areas generally have high potential to retain and preserve archaeological deposits.. It is unusual that no archaeological deposits were identified in these areas during this survey. It is likely that poor ground surface visibility and other activities along the easement have contributed to this. However, ground disturbance works in these areas may uncover archaeological items. These areas have therefore been identified as PADs

Recommendation 4

It is recommended that a nominated Aboriginal Cultural Officer from the Darkinjung Local Aboriginal Land Council is notified in advance of the dates of commencement of the proposed works in order to undertake cultural surveillance of initial earth works.

Explanation:

The Darkinjung Local Aboriginal Land Council have specifically requested that they be alerted of and allowed to attend ground disturbance works in order to watch for any unanticipated archaeological material that may be uncovered within the works area.

Recommendation 5

It is recommended that in the event that Aboriginal cultural fabric or archaeological deposits are encountered, works must cease immediately and an archaeologist and DLALC Cultural Officer contacted in order to make an assessment of the 'chance' find (as required by the *NSW National Parks and Wildlife Act 1974)*. The archaeologist will need to consult with the NSW DEC and the relevant local Aboriginal groups (Darkinjung Local Aboriginal Land Council) to seek direction on the most appropriate course of action to mitigate the 'chance' find.

10 References

Secondary Sources –

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Appendices

Appendix A: Correspondence received from the Darkinjung Local Aboriginal Land Council (DLALC)

Aboriginal Heritage survey

For

Delta Power Proposed Gas Turbine Facility

And

Pipeline Route

Introduction

The Darkinjung Local Aboriginal Land Council was contacted by Frances Scully archaeologist for Heritage Concepts to accompany her on an Aboriginal heritage impact assessment of the proposed gas turbine facility and gathering pipe to the Lake Munmorah power station.

This survey is in accordance with the Environmental Planning Act (EPA) 1979 and the Wyong Shire Council's requirements on land prior to development taking place.

Methodology

The survey of the proposed pipeline was carried out on the **13th and 14th of September** ***2005*** by Francis Scully and Sharon Lane archaeologist with Heritage Concepts and Jodi Cameron Sites, Jason Taylor and Rodney Mackeson site officers for the DLALC.

The survey was carried out on foot by way of visual inspection. Areas targeted were those of the easement area under the transgrid lines.

Aim

The aim of the survey is to determine if any sites of significance are located within the boundaries of the property to be assessed.

Sites of significance include:

- Cave and shelter (which may also contain art work and or artefact deposits)
- Middens
- Scar and Marked Trees
- Artefact scatter
- Open campsites
- Burial sites
- Rock engravings

- Grinding grooves
- Mythological importance

Site Location

The proposed gas turbine facility will be located with in the grounds of the Lake Munmorah Power Station.

The proposed route for the gas pipeline will follow 7 km of the Trans grid electrical lines easement from Wyee/Bushells Ridge area to the Lake Munmorah Power Station at San Remo.

The area the pipeline is proposed for will start at Tooheys Rd adjacent the F3 freeway and travels in N/E, S/W direction to the Lake Munmorah power station, which is located off Scenic Rd on the way to Budgewoi.

Area Description

Low rise ridges with swampy marsh land in between, dry schelopyll forest consisting of scribbly, angophora costa, and rough bark angophora, acacia, Pultencea egg and bacon, native grasses, herbs, paper bark, tea tree.

Aboriginal Occupation

The study area was an area used by traditional Aboriginal people for living and hunting in. There have been some archaeological studies done in the area that support this fact. It is known among the present local Aboriginal community of sites that are situated around the area.

The area previous to white settlement would have been rich in food sources and equipment and tool making materials.

Site Findings

Proposed gas turbine facility

The survey was carried out by visual inspection on foot.

The buildings are to be located within the grounds of the power station.

The location for the turbine facility will encompass an area that is used as a holding or storage ground and also an old unused asphalted car park area; this area is east of the current buildings. The entire footprint of the proposed new building also encompasses an area that has natural regrowth of paper bark, shrubs and grasses and appears to be once used as a coal storing area.

Although a tree with markings similar to a scar tree was found I am doubtful that the tree is scarred from Aboriginal use. The area has been used at one time as a storing

area and also at one time had buildings and machinery located on it. No other markings or artefacts were found within the new proposed building foot print area.

Gas Turbine Cooling Facility

The other area is located north east of the main buildings and is within a fenced area. The area the footprint of the building is to encompass is a manicured lawn that is maintained as it under power lines and also has pipe lines under it that go to the Vales Point Power Station. There is a dirt road that leads to the power stations ash dam. No artefact scatter or sites were located at this area.

Trans grid Easement line

The survey was carried out by visual inspection on foot.

The Tran grid easement is seven km long and of varying vegetation and in various states. The easement area is maintained by Trans grid so although natural vegetation is present it is manicured so as not to interfere with the

lines and towers. Much of the easement passes through private property and is in the same condition as the properties. That is if the easement passes through a paddock area that is what the easement area is like.

Two tower areas where unable to be accessed either on foot or by vehicle because of the swampy nature of the terrain.

Two isolated finds where located in the section between the F3 freeway and the railway line. These consisted of flaked pieces of mudstone and chert, one piece was found under the tower closest to the railway line the other piece a kilometre or so down the track.

On the Eastern side of the rail line in the area between the rail and Thompson Vale Rd quite a significant artefact scatter was located.

The areas yielded around 20 or so flakes, some of them core pieces. A large portion of the scatters was found under and around tower.

Recommendations

Due to a significant find around the tower I would like to recommend further investigation before any works start on the pipeline.

That the area around the tower be fenced off so as to keep it safe from trail bike, car and pedestrian use.

That any unrecorded sites or artefacts be recorded.

That the land council have a site officer present in any recording or investigation works.

That the areas that were unable to be surveyed (due to lack of access) on the day be revisited and surveyed before any pipeline works proceed.

This report was written and prepared by Jodi Cameron. Should you have any queries in regards to this report please do not hesitate to contact me.

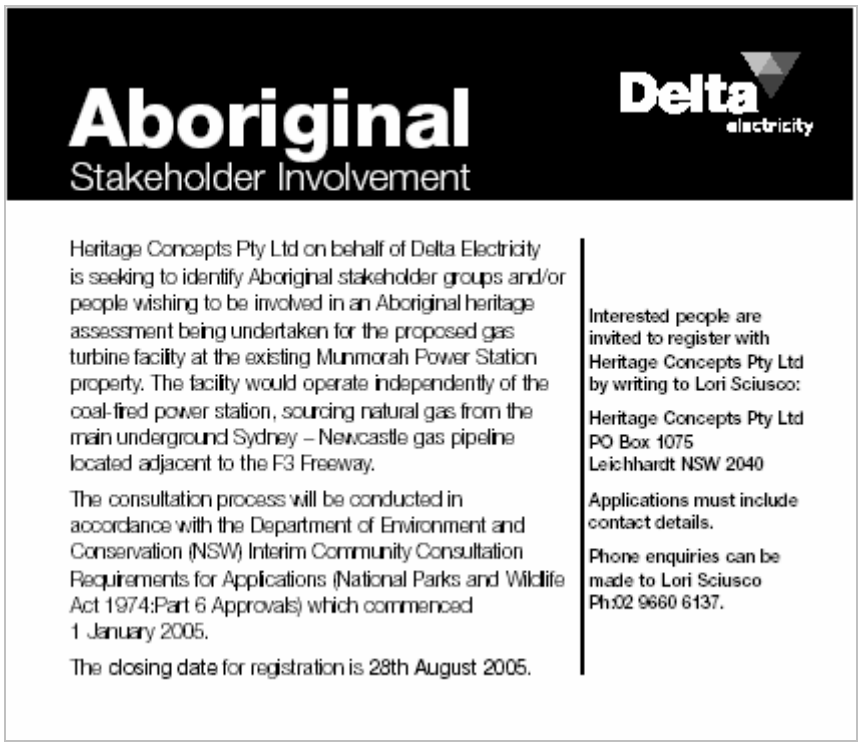
Regards

Jodi Cameron

Cultural Heritage Environmental Officer

Darkinjung Local Aboriginal Land Council

Appendix B: Stakeholder advertisement for this project



Aboriginal
Stakeholder Involvement

Delta electricity

Heritage Concepts Pty Ltd on behalf of Delta Electricity is seeking to identify Aboriginal stakeholder groups and/or people wishing to be involved in an Aboriginal heritage assessment being undertaken for the proposed gas turbine facility at the existing Munmorah Power Station property. The facility would operate independently of the coal-fired power station, sourcing natural gas from the main underground Sydney – Newcastle gas pipeline located adjacent to the F3 Freeway.

The consultation process will be conducted in accordance with the Department of Environment and Conservation (NSW) Interim Community Consultation Requirements for Applications (National Parks and Wildlife Act 1974:Part 6 Approvals) which commenced 1 January 2005.

The closing date for registration is 28th August 2005.

Interested people are invited to register with Heritage Concepts Pty Ltd by writing to Lori Sciusco:

Heritage Concepts Pty Ltd
PO Box 1075
Leichhardt NSW 2040

Applications must include contact details.

Phone enquiries can be made to Lori Sciusco Ph:02 9660 6137.