Attachment 2.5

Aboriginal Heritage Preliminary Assessment

Glenfield Waste Disposal

Environmental Property Services Pty Ltd

4 August 2012

AHMS

ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

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PROPONENT	Environmental Property Services Pty Ltd
PROJECT NAME	Glenfield Waste Disposal
REAL PROPERTY DESCRIPTION	Lot 3, DP 736881; Lot 9, DP 1155962; Lot 3, DP 735524; Lot 1, DP 113201; Lot 2, DP 333578
DATE	4 August 2014

AHMS INTERNAL REVIEW/SIGN OFF				
WRITTEN BY	DATE	VERSION	REVIEWED	APPROVED
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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDICES

Glossary

Aboriginal Cultural Heritage Assessment	A document developed to assess the archaeological and cultural values of an area, generally required as part of an Environmental Assessment (EA).
Aboriginal Heritage Impact Permit (AHIP)	The statutory instrument that the Director General of the Office of Environment and Heritage (OEH) (formerly the Department of Environment, Climate Change and Water (DECCW)) issues under Section 90 of the National Parks and Wildlife Act 1974 to allow the investigation (when not in accordance with certain guidelines), impact and/or destruction of Aboriginal objects. AHIPs are not required for a project subject to Part 3A of the Environmental Planning and Assessment Act 1979 or State Significant Major Developments subject to Part 4 of the Act.
Aboriginal object	A statutory term defined under the National Parks and Wildlife Act 1974 as, 'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.
Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales	A series of guidelines developed by DECCW (now OEH) that prescribe the structure and content of certain Aboriginal Cultural Heritage Assessments and associated archaeological investigations/excavations. The Code of Practice applies to non-State Significant projects subject to Parts 4 and 5 of the Environmental Planning and Assessment Act, 1979.
Department of Environment, Climate Change and Water (DECCW)	Now known as the Office of Environment and Heritage (OEH).
Department of Planning and Infrastructure	A NSW government department that, among other things, is the assessing authority for State Significant developments subject to Part 3A and 4 of the Environmental Planning and Assessment Act 1979.
Director General's Requirements (DGRs)	Project specific requirements of the Director General, Department of Planning and Infrastructure (DoPI), for State Significant development under Part 3A (now superseded) or Part 4.1 of the EP&A Act.
Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales	A series of guidelines developed by DECCW (now OEH). These guidelines prescribe the structure and content of a two stage process to determine whether Aboriginal objects and/or areas of archaeological interest are present within a subject area. The results of a due diligence assessment can find that an Aboriginal Cultural Heritage Assessment may be subsequently required.
Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation , July 2005	Requirements for Aboriginal heritage assessments for projects subject to Part 3A of the Environmental Planning and Assessment Act, 1979. The Guidelines include site assessment and Aboriginal community consultation process and are now also used for Part 4.1 State Significant developments.

National Parks and Wildlife Act 1974	Legislation that protects Aboriginal cultural heritage in NSW. Part 6 of the Act outlines the protection afforded to and offences relating to disturbance of Aboriginal objects. The Act is administered by the OEH.
Office of Environment and Heritage (OEH)	Formerly the Department of Environment, Climate Change and Water (DECCW). A State government agency that manages and regulates Aboriginal cultural heritage under the National Parks and Wildlife Act, 1974.
Proponent	A corporate entity, Government agency or an individual in the private sector that proposes to undertake a development project. The proponent for this project is L.A. Kennett Enterprises Pty Ltd.

Abbreviations

ACHA	Aboriginal Cultural Heritage Assessment
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHMS	Archaeological and Heritage Management Solutions Pty Ltd
BP	Before present (AD 1950)
CHL	Commonwealth Heritage List
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change and Water (now OEH)
DGRs	Director General's Requirements.
DP	Deposited Plan
DPI	Department of Planning and Industry
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LTO	Land Titles Office
NHL	National Heritage List
NPW Act	National Parks and Wildlife Act 1974
OEH	Office of Environment and Heritage (formerly DECCW)
PAD	Potential Archaeological Deposit
PEA	Preliminary Environmental Assessment
SSD	State Significant Development

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- Georgie Kennett, L.A. Kennett Enterprises Pty Ltd.
- Simon Duffy and Meaghan MacDonald, Environmental Property Services.
- Glenda Chalker, Cubbitch Barta Native Title Claimants Aboriginal Corporation.
- Elwyn Brown and Neil Sampson, Tharawal Local Aboriginal Land Council.
- Scott Franks and Margaret Crawford, Tocomwall.
- Celestine Everingham and Gordon Morton, Darug Aboriginal Cultural Heritage Assessments.
- Leanne Watson and Alyse Mervin, Darug Custodian Aboriginal Corporation.
- Gordon Workman, Darug Land Observations.
- Des Dyer, Darug Aboriginal Landcare Inc.
- Peter Falk, Peter Falk Consultancy.

EXECUTIVE SUMMARY

Background

- In mid-2012 Archaeological and Heritage Management Solutions (AHMS), was commissioned by Environmental Property Services Pty Ltd for L.A. Kennett Enterprises Pty Ltd to undertake an Aboriginal Heritage Assessment of the southern portion of the Glenfield Waste Disposal site, Glenfield, NSW. The assessment was to form two roles: 1) to provide information to inform a proposed re-zoning of the subject site from rural to industrial; and 2) to provide information to assist with the development of a proposed State Significant Development application for a recycling facility within the subject site. This report forms the basis for (1), and has been revised to include additional information obtained through (2);

- This report was undertaken in accordance with the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*, (DEC, 2005), and the *Code of Practice for Archaeological Investigations of Aboriginal Objects in New South Wales* (DECCW, 2010), and *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECCW, 2010) as specific best practice standards and processes for Aboriginal heritage assessment in NSW;

- Aboriginal consultation was undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (April 2010). The Registered Aboriginal Parties for the project are the Tharawal Local Aboriginal Land Council, Cubbitch Barta Native Title Claimants Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments, Darug Aboriginal Landcare, Darug Custodian Aboriginal Corporation, Darug Land Observations, Peter Falk Consultancy, and Tocomwall.

Results

- Most of the subject area is heavily disturbed and/or previously developed, and the potential for preservation of archaeological materials is low. However, two areas appear to be less disturbed: an area of bushland in the western half of the subject area; and an alluvial terrace adjacent to a minor tributary of the Georges River, in the south-eastern corner of the subject area.

- Four archaeological sites were identified within the subject area:

    - Glenfield 1 (#45-5-3531): a registered site located on a track currently in use in association with the ongoing railway expansion. It is considered likely that this site is destroyed.

    - GWD 3: an isolated artefact.

    - GWD 4: an isolated artefact.

    - GWD 2: a potential archaeological deposit located on a large alluvial terrace on the bank of the Georges River, encompassing a minor tributary.

- Two further sites were initially identified, but following further investigation have been subsequently rejected as of Aboriginal origin. These were:

    - Glenfield ST (#45-5-2428): a registered site consisting of a scarred tree. It is considered that the scar is of natural rather than cultural origin.

- GWD 1: a scarred tree. It is considered that this scar is of natural rather than cultural origin.

- Responses from the Aboriginal community supported the findings and recommendations of earlier versions of this report, and provided no specific cultural values to the Aboriginal objects/sites identified through the assessment. The area was considered to have been significant to Aboriginal people in the past given the proximity of Georges River –an important resource – and recommendations on signage outlining the Aboriginal history of the area were proposed.

Recommendations

- The following recommendations are made:

  - If the boundaries of the subject area are revised to include areas not addressed in the assessment, assessment of these additional areas should be undertaken in order to manage the potential Aboriginal heritage impact.

  - Kennett Enterprises should advise all relevant personnel and contractors involved in activities within the subject area of the relevant heritage issues and legislative requirements, and the recommendations of the current assessment.

  - In the event that previously unidentified Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) are discovered within the subject area, all work in the vicinity of the find should cease, and Kennett Enterprises should determine the subsequent course of action in consultation with a heritage professional, the Registered Aboriginal Parties and the relevant State government agency.

  - If human skeletal material less than 100 years old is discovered, the Coroners Act 2009 requires that all works should cease and the NSW Police and the NSW Coroner's Office should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the National Parks and Wildlife Act 1974 and should not be disturbed. Therefore when skeletal remains are found and are suspected to be an Aboriginal burial site, an appropriately skilled archaeologist or physical anthropologist should be contacted to determine if the remains are Aboriginal objects. Should skeletal remains prove to be archaeological the RAPs should be notified. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the Aboriginal and Torres Strait Islander Heritage Protection Act 1984.

  - Based on the findings of this study, there are no Aboriginal heritage issues that indicate that the re-zoning of the subject site from rural to industrial should not proceed.

  - Aboriginal Heritage Information Management System (AHIMS) Site cards for the two isolated objects, GWD 3 and GWD 4, should be completed and lodged with the AHIMS registrar. [Completed]

  - An AHIMS site card for the potential archaeological deposit GWD 2 should be completed and lodged with the AHIMS registrar. [Completed]

  - Following advice from an arborist, neither Glenfield ST 1 (#45-6-2428) nor GWD 1 are considered scarred trees of cultural origin. A modified AHIMS site card reflecting these findings and explaining the outcomes of this study should be lodged with the AHIMS

registrar; specific request should be made for the re-classification of Glenfield ST 1 (#45-6-2428) to the category 'not a site' in the AHIMS system. [Completed]

- It is recommended that prior to any impact from proposed development, further assessment and characterisation is undertaken of the identified Aboriginal objects/sites. Should they prove to be Aboriginal objects/sites as defined by the *National Parks and Wildlife Act 1974*, appropriate assessments and permits under this Act would be required prior to their disturbance.

- In accordance with Aboriginal community responses, consideration should be given to developing signage on the Aboriginal history of the subject area following the completion of the development.

- A copy of the final version of the assessment should be provided to each of the registered Aboriginal parties, listed above. [Completed]

- A copy of the final assessment should be lodged with the AHIMS registrar in accordance with relevant guidelines. [Completed]

1 INTRODUCTION

1.1 Proponent Details

This report has been prepared by Archaeological & Heritage Management Solutions (AHMS) for Environmental Property Services (EPS) on behalf of the proponent, L.A. Kennett Enterprises Pty Ltd (**Table 1**).

Table 1. Proponent Contact Details.

Proponent	Archaeological Advisor
Environmental Property Services Level 1, 19 Stockton Street, Nelson Bay NSW 2315 Contact Person: Simon Duffy T. 02 4981 1600 E: simonduffy@enviroproperty.com.au	Archaeological & Heritage Management Solutions Pty Ltd 2/729 Elizabeth St, Waterloo NSW 2017 Contact Person: Alan Williams T. 02 9555 4000 F. 02 9555 7005 M.0408 203 180 E: awilliams@ahms.com.au

1.2 Purpose of the Assessment

This report has been prepared by Archaeological & Heritage Management Solutions Pty Ltd (AHMS) for EPS to present the findings of a Preliminary Aboriginal Heritage Assessment of the Glenfield Waste Disposal, Glenfield, NSW (hereafter 'subject area'). The Kennett Group is proposing to re-zone the subject area from 1(a) rural to industrial.

The report also includes additional information and tasks that were undertaken as part of a new recycling facility within the subject area being assessed concurrently under Part 4 (Division 4.1) of the *Environmental Planning & Assessment Act 1979*. Additional tasks included more detailed Aboriginal consultation, and further investigation of a number of potential scarred trees identified within the subject area.

This report provides a study of the Aboriginal heritage constraints and opportunities within the subject area to inform the re-zoning. This report was undertaken in broad accordance *with Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005) as well as the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, April 2011), *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, April 2010), and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, September 2010).

1.3 Subject Area

The study area comprises the southern portion of the Glenfield Waste Disposal site, Glenfield, NSW (**Figure 1**). The site is broadly constrained to the north by the East Hills railway line (which is within

the subject area), to the east by the Georges River, to the west by the Southwest railway line and to the south by Cambridge Avenue (**Figure 2**). However, the transmission line immediately south of Cambridge Avenue is also considered as part of this study.

1.4 Proposed Development & Approval Context

The Glenfield Waste Disposal site is currently zoned rural, however given the industrial nature of the site and the current developments in the area (including the SIMTA site, and the upgrade of the Southwest rail link), the Kennett Group proposes to re-zone the site to industrial.

1.5 Report Aims and Objectives

The principle aims of the preliminary assessment are to:

- Outline the statutory requirements relevant to the subject area with regard to Aboriginal cultural heritage;
- Carry out background research to identify known Aboriginal objects, sites and places, and to identify the potential for any unknown objects and places of significance;
- Undertake Aboriginal Community Consultation in accordance with the OEH's Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010;
- Carry out a survey of the subject area to rediscover and assess known items, identify previously unrecorded items, and assess the Aboriginal archaeological potential of the subject area;
- Develop preliminary mapping of the known and potential Aboriginal cultural heritage sites in the subject area;
- Assess the archaeological (scientific) significance of any Aboriginal sites or objects that may be impacted by the proposed development;
- Identify any possible constraints to the proposed development;
- Assess the potential for direct and indirect impact to Aboriginal cultural heritage; and
- Identify and recommend measures to mitigate any potential adverse heritage impacts.

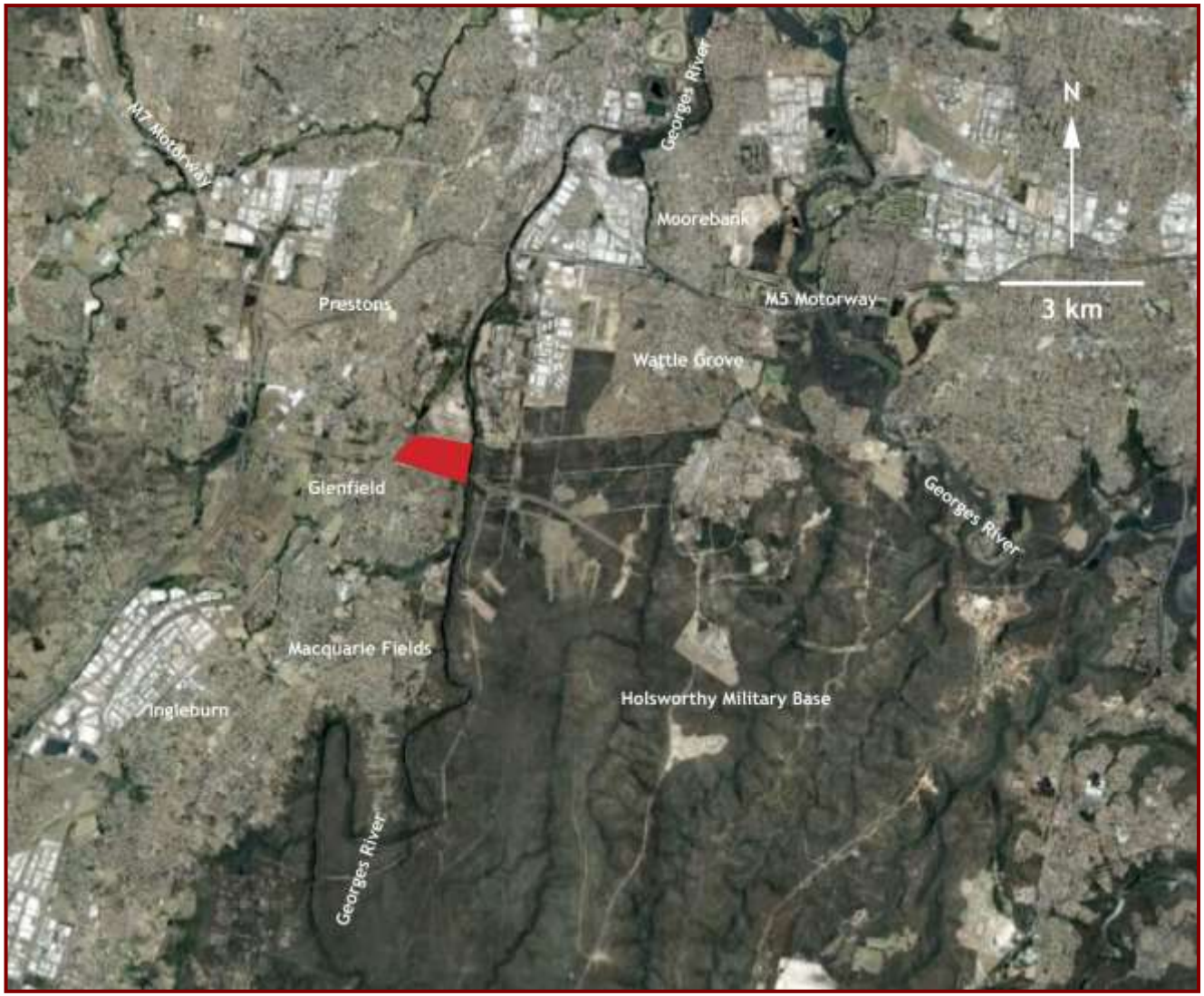

Figure 1 Location of Subject Area.

Figure 2 ***The subject area.***

1.6 Limitations

This report is based on existing and publically available environmental and archaeological information, reports about the subject area, and relevant site visits. It did not include any independent verification of the results or interpretations of externally sourced reports (except where the site inspection and field survey indicated inconsistencies). This report includes some predictions about the probability of subsurface archaeological materials occurring in certain landforms/landscapes of the subject area. The predictions were based on surface indications noted during the field investigation, and environmental context. It is acknowledged, however, that sub-surface materials may survive in landform/landscape contexts despite surface and environmental indicators that may suggest that they do not. The converse also applies.

The Aboriginal Heritage Information Management System (AHIMS) information was provided to AHMS by OEH. Information in the archaeological assessment report reflects the scope and the accuracy of the AHIMS site data, which in some instances is limited.

1.7 Investigator and Contributors

This report was written by Alan Williams, B.Sc., M.Sc., MAACAI, Senior Archaeologist, AHMS. Lisa Newell, Associate Director, AHMS reviewed and edited the original report and provided statutory and mitigation action input.

2 STATUTORY CONTEXT

2.1 Commonwealth Legislation

2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act, 1984* (Commonwealth) was enacted at a Federal level to preserve and protect areas (particularly sacred sites) and objects of particular significance to Aboriginal Australians from damage or desecration. Steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10). This can include the preclusion of development.

As well as providing protection to areas, it can also protect objects by Declaration, in particular Aboriginal skeletal remains (Section 12). Although this is a Federal Act, it can be invoked on a State level if the State is unwilling or unable to provide protection for such sites or objects.

No Aboriginal sites or places within the subject area are currently subject to a Declaration.

2.1.2 Environment Protection & Biodiversity Conservation Act 1999

The *Environment Protection & Biodiversity Conservation Act, 1999* (Commonwealth) provides for the protection of natural and cultural heritage places. The Act establishes (amongst other things) a National Heritage List (NHL) and a Commonwealth Heritage List (CHL). Places on the NHL are of natural or cultural significance at a national level and can be in public or private ownership. The CHL is limited to places owned or occupied by the Commonwealth which are of heritage significance for certain specified reasons.

Places listed on the NHL are considered to be of State and local heritage value, even if State or local various heritage lists do not specifically include them.

The heritage values of places on the NHL or the CHL are protected under the terms of the EPBC Act. The Act requires that the Minister administering the EPBC Act assess any action which has, will have, or is likely to have, a significant impact on the heritage values of a listed place. The approval (or rejection) follows the referral of the matter by the relevant agency's Minister.

No Aboriginal sites or places within the subject area are currently listed on the NHL or CHL.

2.1.3 Native Title Act 1993

The *Native Title Act, 1993* (Commonwealth) provides recognition and protection for native title. The Act established the National Native Title Tribunal to administer land claims by Aboriginal people. The Act also provides for Indigenous Land Use Agreements, which allow native title claimants and/or holders control over the use and management of affected land and waters.

A search of the National Native Title Tribunal Registers was undertaken on 22 May 2012, and returned the following results in the subject area:

Register Type	NNTT Reference Numbers
National Native Title Register	Nil
Register of Native Title Claims	Nil

Unregistered Claimant Applications	Nil
Register of Indigenous Land Use Agreements	Nil

2.2 NSW State Legislation

2.2.1 Environmental Planning & Assessment Act 1979

The *Environmental Planning and Assessment Act, 1979* (EP&A Act) requires that environmental impacts are considered in land-use planning, including impacts on Indigenous and non-Indigenous heritage. Various planning instruments prepared under the Act identify permissible land use and development constraints.

Where Project approval is to be determined under Part 4 (Division 4.1) of the Act, further approvals under the *National Parks & Wildlife Act, 1974* which protects Aboriginal cultural heritage in NSW are not required. In those instances, management of Aboriginal heritage follows the applicable Aboriginal assessment guidelines (the Guidelines For Aboriginal Cultural Heritage Impact Assessment and Community Consultation, July 2005) and any relevant statement of commitments included in the Part 3A Development Approval.

It should be noted that the legislation has recently been modified, with Part 3A being modified and re-created as Part 4 (Division 4.1). Therefore, the guidelines above relate to the now defunct Part 3A process, rather than the new process. They are currently the latest guidelines available, but they may be modified as Part 4 (Division 4.1.) becomes more established.

2.2.2 National Parks & Wildlife Act 1974

The *National Parks & Wildlife Act, 1974* (NPW Act) provides blanket protection for Aboriginal objects (material evidence of indigenous occupation) and Aboriginal places (areas of cultural significance to the Aboriginal community) across NSW. An Aboriginal object is defined as:

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

An Aboriginal place is any place declared to be an Aboriginal place by the Minister for Environment & Heritage, under Section 84 of the NPW Act.

One declared Aboriginal Place is located near the subject area. Collingwood Precinct is located approximately 1.5 kilometres to the north of the subject area, and is very unlikely to be impacted by the proposal.

The provisions of the NPW Act that require various approvals or permits to disturb or discover Aboriginal deposits, objects and places are not applicable to Part 4 (Division 4.1) Projects.

2.2.3 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act, 1983* allows for the transfer of ownership to an Aboriginal Land Council of vacant Crown land not required for an essential purpose or for residential land. These lands are then managed and maintained by the local Aboriginal Land Council.

No places within the subject area are currently subject to Aboriginal Land Claims.

3 ABORIGINAL COMMUNITY CONSULTATION

3.1 General

Due to short timeframes, an initial process of informal Aboriginal community consultation was undertaken as part of the original Aboriginal Heritage Preliminary Assessment (AHMS, May 2012). This consisted of consultation with two groups known to have an interest in Aboriginal cultural heritage in the region: Tharawal Local Aboriginal Land Council (LALC) and Cubbitch Barta Native Title Claimants Aboriginal Corporation. A site visit was undertaken with representatives of the two groups.

Further Aboriginal community consultation was implemented in accordance with OEH's guidelines (*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*) as part of the proposed recycling facility within the subject area. This consultation process also explored the re-zoning proposal.

The 2010 guidelines have six broad phases:

- Pre-notification – identification of the Aboriginal parties by contacting various State government agencies.
- Notification – contacting identified Aboriginal parties and advertising in the local print media for interested Aboriginal parties.
- Presentation of Project – advising the Registered Aboriginal Parties (RAPs) of the project, which phase may involve meetings and/or site visits.
- Methodology – providing the RAPs with the proposed field methodology and information on obtaining cultural knowledge.
- Impacts and Mitigation Options – discussion of potential impacts to heritage and appropriate mitigation options before developing the report.
- Report review – review of the final report.

The consultation process has two aims. The first is to consult with knowledge holders to identify cultural places and values that may be affected by the project. The second is to obtain input on the proposed assessment methodology, and comment on the assessment report and management recommendations.

3.2 Consultation Process

A consultation log and all pertinent information sent to, and received by the registered Aboriginal parties is included in **Appendix 2**.

3.2.1 Pre-Notification

The initial stage of the formal consultation process is intended to identify Aboriginal people and organisations who may hold cultural knowledge relevant to determining the significance of Aboriginal

objects and places within the subject area. The following organisations were contacted with a request for information:

- OEH;
- Tharawal Local Aboriginal Land Council;
- Office of the Registrar, Aboriginal Land Rights Act, 1983;
- National Native Title Tribunal;
- NTSCorp;
- Campbelltown City Council; and
- Sydney Metropolitan Catchment Management Authority.

The following groups and individuals were identified as potential stakeholders:

- Cubbitch Barta Native Title Claimants Aboriginal Corporation;
- Darug Aboriginal Cultural Heritage Assessments;
- Darug Aboriginal Landcare Inc;
- Darug Custodian Aboriginal Corporation;
- Darug Land Observations;
- Darug Tribal Aboriginal Corporation;
- Gandangara Local Aboriginal Land Council;
- Gunjeewong Cultural Heritage Aboriginal Corporation;
- Peter Falk Consultancy;
- Scott Franks; and
- Tharawal Local Aboriginal Land Council (LALC).

3.2.2 Notification and Registration of Interest

The identified Aboriginal organisations and individuals were notified of the project on 1 June 2012, and invited to register an interest. The information provided included a brief description of the project and the proposed assessment, and contact details for both the proponent and archaeological consultant. In addition, an advertisement was placed in the *Campbelltown Macarthur Advertiser* on 6 June 2012, containing notification of the project, and an invitation to register an interest.

The following Aboriginal organisations registered an interest in the project:

- Tharawal LALC;

- Cubbitch Barta Native Title Claimants Aboriginal Corporation (CBNTCAC);
- Darug Aboriginal Cultural Heritage Assessments;
- Darug Aboriginal Landcare Inc;
- Darug Custodian Aboriginal Corporation;
- Darug Land Observations;
- Peter Falk Consultancy; and
- Tocomwall.

As Gandangara LALC was identified as a potential stakeholder in the pre-notification stage, initial correspondence was sent out to this group. However, Gandangara LALC did not register an interest, and it was determined that the subject area is entirely within the boundaries of Tharawal LALC.

In accordance with Section 4.1.6 of the guidelines, details of the Registered Aboriginal Parties were provided to OEH and Tharawal LALC on 18 June 2012.

3.2.3 Presentation of Information/Methodology

In accordance with Sections 4.2 and 4.3 of the OEH guidelines, a document detailing the proposed assessment methodology was sent to the RAPs for comment on 22 June 2012. This document included a detailed description of the proposed development; the contents and findings of the preliminary assessment; and the contents, tasks and activities proposed for this assessment. The document also sought information from the RAPs in regard to how they wished to be consulted, how they wished cultural information to be managed, and other relevant matters.

All responses received have been included in **Appendix 2**. In general, the responses supported the proposed methodology and assessment approach.

3.2.4 Field Investigations

Two site visits were undertaken. The first, undertaken as part of the re-zoning assessment, took place on 18 May 2012 and involved representatives of Tharawal LALC (Neil Sampson) and Cubbitch Barta NTCAC (Glenda Chalker).

The second site visit was undertaken on 25 July 2012, and was attended by representatives of Darug Aboriginal Cultural Heritage Assessments (DACHA), Darug Custodian Aboriginal Corporation (Alyce Mervin), Darug Land Observations (Gordon Workman) and Tocomwall (Margaret Crawford). This site visit similarly encompassed the entire re-zoning area, including the areas south of Cambridge Avenue.

A representative of Darug Aboriginal Landcare was not able to participate in the survey, as their relevant professional insurances were not in place. However, a meeting was held with a representative (Des Dyer) after the site visit, to discuss the results. No representative of Peter Falk Consultancy was available for the site visit.

3.2.5 Review of Recommendations and Report

Under Section 4.3.6 of the OEH 2010 guidelines, potential heritage management options require discussion and/or development with the RAPs. These were discussed in some detail throughout, and at the completion of, the field investigations. Any sites identified were discussed in relation to expected and preferred outcomes, and recommendations presented in this report have been based on these discussions.

The RAPs had an opportunity to review the original preliminary assessment report as part of the presentation of information and methodology documentation (see **Section 3.2.3**). In addition, a large assessment associated with the recycling facility was also provided to the RAPs on the 16 November 2012, and a period of 28 days provided for comment. This report was similar in findings and recommendations of the preliminary assessment. Four of the RAPs provided comments on the report (**Appendix 2**), all of which were supportive of the findings and recommendations. The only further recommendation was that DCAC sought the inclusion of signage on the Aboriginal history of the area following the development. This recommendation was included as part of the report's final recommendations.

4 ETHNOGRAPHIC INFORMATION

4.1 General

This section presents a summary of Aboriginal life at contact, as recorded by early European settlers in documents, maps, plans, images and ethnographic records. By studying these sources, we can reconstruct aspects of traditional Aboriginal lifestyle and economy. Although such accounts are fragmentary and present a biased European view of Aboriginal culture, they provide an important insight about traditional Aboriginal use and occupation of the land.

The Sydney Basin was occupied and used by Aboriginal people for thousands of years before European settlement. Within the Sydney Basin (which includes the current subject area), creeks, floodplains, swamps and woodlands provided Aborigines with rich and varied resource zones and occupation areas. Aboriginal sites across the Sydney Basin provide tangible evidence and an on-going link with the long history of Aboriginal use and occupation of this area.

4.2 The Traditional Owners

The Dharawal (also spelt Tharawal) language group are the traditional owners of the subject area, which stretches from Botany Bay South to Jervis Bay and inland to Picton and Campbelltown. This area is bounded by the traditional land of the Darug to the north and Gandangara to the west.

There is considerable ongoing debate about the nature, territory and range of pre-contact Aboriginal language groups of the greater Sydney region. These debates have arisen largely because by the time colonial diarists, missionaries and proto-anthropologists began making detailed records of Aboriginal people in the late 19th Century; pre-European Aboriginal groups had been broken up and reconfigured by European settlement activity. Sydney archaeologist Val Attenbrow (2002:34-45) has cautioned:

> *'Any boundaries mapped today for (these) languages or dialects can only be indicative at best. This is not only because of an apparent lack of detail about such boundaries in the historical documents, but because boundaries between language groups are not always precise lines'.*

In general, resource and land ownership was focused on extended family groups or clans. These groups are sometimes called local clans, territorial clans or local descent groups. A number of clans would often travel together in a larger group. Group borders were generally physical characteristics of the landscape such as waterways or the limits of a particular resource. Clans also shared spiritual affiliations, often a common dreaming ancestor, history, knowledge and dialect.

Ethnohistoric sources indicate the clan that occupied the modern day Liverpool area may have been the Gahbrogal (Attenbrow 2002:23-25), who lived along the Georges River. (Collins 1798 [1975:462]).

4.3 Subsistence

Early observers indicate that the subsistence and economy of Aboriginal groups depended largely on the environment in which they lived. The differences in available food resources between coast and hinterland influenced the diet and subsistence patterns of the groups living in each zone. The current subject area is in hinterland along the Georges River.

Inland population densities were assessed by early settlers as being lower than those on the coast. The relative scarcity of resources in the hinterland and the greater work required to procure terrestrial foods through hunting meant that the hinterland was more thinly populated than the coast (Attenbrow 2002:17).

During a trip along the Hawkesbury-Nepean during 1791, Watkin Tench wrote that hinterland people primarily subsisted on small animals and roots, probably yams. (Tench 1793 [1979]:122). However, fish, shellfish and birds were also collected from resource rich swamps and lagoons (**Error! eference source not found.**) (Attenbrow, 2002:88). Important plants and animals were also found in wetlands, providing medicines, fibres, vitamin and food sources.

Figure 3 'Aborigines Hunting Waterbirds' (Lycett 1830).

Kangaroos, wallabies, possums, koalas, bandicoots, dingoes, wombats, echidnas, fruit bats (flying foxes) and other smaller mammals were amongst the wide range of land animals that inhabited the Sydney region and were available to both coastal and hinterland people. Most Australian land animals are not migratory and therefore their seasonal availability and abundance do not vary markedly (Attenbrow 2002:70). The diet also included honey produced by native bees, as well as ants and their eggs. Many foods were harvested by tree climbing. Birds and tree dwelling mammals could be captured, and birds eggs and honey could be collected in this way (**Error! Reference source not ound.**) (Tench 1793 [1979]:126).

Open woodland areas were grazing habitat for macropods, and formed an important part of the economy of the Aborigines living on the Cumberland Plain, and were hunted with the aid of deliberately lit fires (Barrallier, 1802 [1975]: 2-3) (**Error! Reference source not found.**) or by mbushing them (Mathews in Havard, 1943c:237).

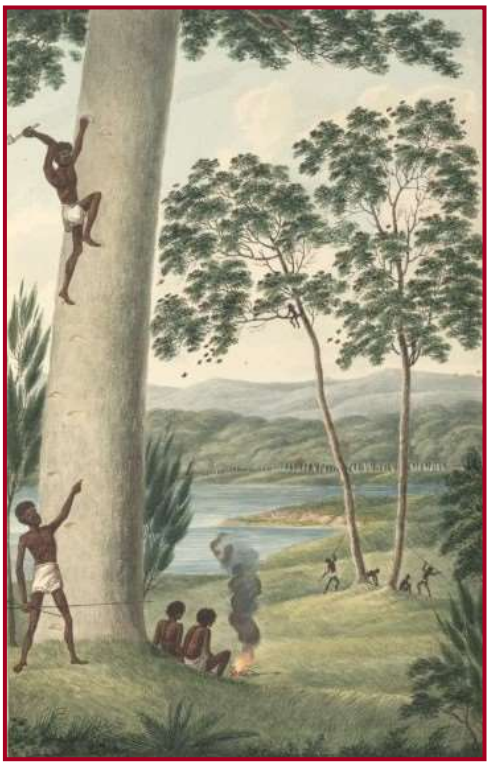

Figure 4 'Aborigines climbing a tree, with two Aborigines sitting beside a fire, others spearing birds' (Lycett, 1830).

Figure 5 'Aborigines using fire to hunt kangaroo' (Lycett, 1830).

Plant management practices similar to those reported in northern Australia were also conducted in the Sydney area. For instance, there is good evidence that Aborigines practiced fire-stick farming in and around Sydney (Hunter 1793 [2006:74-75]).

Plant management also enabled Aboriginal groups to broaden their range of food sources. Tench provides an interesting account of 'a poor convict' trying to eat a poisonous yam (probably Dioscorea bulbifera) and getting violently sick. Tench had seen Aborigines digging this same yam and concluded that they have a way of preparing the roots before they eat them 'which renders these last an innocent food' (Tench 1789 [1979]:83).Such plant management and processing practices were an important part of the economies of Aboriginal groups.

4.4 Shelters

Aboriginal groups in the Sydney Basin lived in bark huts and rockshelters formed from natural sandstone overhangs (**Error! Reference source not found.**). Tench described how native huts were onstructed by laying pieces of bark together in the form of an 'oven'. The end result consisted of a low shelter, which was opened at one end and sufficient to accommodate one person lying down (Tench 1789 [1979]:81).

Figure 6 'A family of Aborigines taking shelter during a storm' (Lycett, 1830).

The rockshelters referred to by Tench are abundant throughout sandstone country represented within the subject area. These shelters, especially those located close to water sources, such as those along the Georges River and Peter Meadows Creek, provided valuable shelters for Aboriginal people.

4.5 Weapons and Equipment

Many different tools and weapons were used to obtain food and raw materials, carry small items, make equipment, and for defensive and offensive purposes. These included fishing and hunting spears, spear-throwers, fishing hooks and lines, stone hatchets, shields, clubs, digging sticks, baskets, net bags and other containers, as well as canoes, animal traps, torches, small adzes and scrapers, awls, stones for pounding and beating plant foods and raw materials, stone wedges and fire. In addition, unmodified shells and stones were used opportunistically on some occasions as cutting or adzing tools and missiles. Most tools and weapons were highly portable and also multi-purpose (Attenbrow 2002:85).

Collins pointed out that the spears of the hinterland groups were distinguishable from those of the coast people as they were armed with bits of stone in place of broken oyster shell. Amongst the hinterland groups, stone was hafted into the end of the spear thrower instead of shell (Collins, 1798 [1975:122]).

Tools used for such tasks as cutting/incising, adzing, 'scraping', and beating/pounding were made of stone, bone and shell, and historical accounts indicate that the latter two materials were used for these tasks both in the hinterland and along the coast (Attenbrow, 2002:92).

The archaeological evidence of tools and equipment used in the Sydney region is limited to the more durable implement parts such as bone, shell and stone. These items are not always identifiable as a

component of a specific historically described implement, and there are also other artefacts that are not described in the historical accounts (Attenbrow 2002:86).

Aboriginal stone artefacts are an important source of archaeological information because stone is preserved for long periods of time whereas organic materials such as bone, shell, wood and plant fibres decay. Stone artefacts provide valuable information about technology, economy, cultural change through time and settlement patterning. Stone has also been used for 'relative' dating of sites where direct methods such as Carbon dating cannot be applied.

The main source locations for stone materials in the Sydney region are gravel beds and palaeo-channels associated with the Nepean-Hawkesbury and antecedent river systems and their tributaries, conglomerate pebbles in the Hawkesbury sandstone, and volcanic formations. The western half of the Sydney region appears to have a greater number and wider distribution of source locations as well a greater range of stone types suitable for making stone tools than the coastal zone. Knowledge of source locations for suitable materials for tool manufacture is of great importance in determining movements, and trade and exchange patterns of the people who inhabited the sites at which artefacts are found (Attenbrow 2002:43).

Temporal changes in stone materials used may have been associated with changes in the range of tools made (the introduction and later disappearance of Bondi points for instance) or in the way stone tools were made (increased use of the bipolar technique, for example). New subsistence methods or changes in conditions of access to raw materials sources (due to cultural factors such as changes in group alliances or group boundaries that may have affected trade and exchange) are also likely reasons (Attenbrow 2002:121).

Bipolar technique is argued to have been adopted under circumstances where there is a need to gain maximum flakes by reducing cores to their minimum flakeable size. Such circumstances include raw material scarcity. Decreased mobility is also claimed to be associated with an increased use of the bipolar technique (Attenbrow 2002:122).

Research has shown that silcrete is naturally relatively widely distributed in the Sydney region and is also present, albeit in lesser abundance, in the coastal zones and hinterland. On the Western Cumberland Plain, where sources of raw material are more common and more widespread than along the coast, the distance between source and manufacturing/use sites is usually much shorter. Within this part of the hinterland many clans would have had sources within their country (Attenbrow 2002:123).

4.6 Contact History

The decrease in population after British colonisation is well documented. The traditional life of the local people was broken through the course of the early 19th century. The impact of smallpox and influenza decimated the Aboriginal population. There was an outbreak of influenza in 1820 which killed large numbers of people in the Liverpool districts (Leah 1984).

Early European settlement of traditional hunting lands deprived Aboriginal groups of access to food sources, and camping and ceremonial sites. People who survived outbreaks of disease and massacres were forced to live in marginal areas, integrate with European settlers or resist (Liston 1988). Resistance by Aboriginal groups was often met with retaliatory action by white settlers and the colonial administration.

Factors including disease, dislocation and violence led to the demise of traditional lifestyles and a decrease in the Aboriginal population, particularly in and around the early centres of colonial settlement in Sydney, Parramatta and Liverpool.

5 ARCHAEOLOGICAL CONTEXT

5.1 General

This section discusses the regional and local archaeological context within which the subject area is situated. For the purposes of determining settlement and site location patterns, archaeologists examine regional and local trends in the distribution of known sites in relation to environment and topography. This provides evidence about economic and social systems in the past and also assists archaeologists in predicting likely site types, site locations and the nature of the archaeological resource in any given area.

5.2 Regional Context

The subject area falls within the Cumberland Plain region. The archaeology of the region has been well documented through a large number of academic studies, regional management studies and impact assessment investigations over the past 30 years.

5.2.1 Early Occupation

Aboriginal occupation in the region dates back well into the Pleistocene period (i.e. before 10,000 years ago). This evidence comes from radiocarbon dates retrieved from excavated sites at Cranebrook Terrace (41,700 years before present [BP]), Shaw's Creek K2 (14,700 BP), and George & Charles St Parramatta (c.25,000 – 30,000 BP) (Jo McDonald Cultural Heritage Management, 2005; Kohen et al., 1984; Nanson et al., 1987). Other sites include Burrill Lake and Bass Point on the south coast with dates >15,000, and Loggers Shelter and Tempe House, the latter a hearth on Cooks River, both dating to early Holocene (5-10,000 years BP) (Attenbrow, 1987; Bowdler, 1976; Lampert, 1971; Jo McDonald Cultural Heritage Management, 2006). More recently, AHMS has recently obtained ages of between 12,000 – 15,000 years BP for PT12, an artefact scatter within a sand dune overlooking Hawkesbury River in Pitt Town (AHMS, 2010). The dating of Cranebrook Terrace is currently under review (Attenbrow, 2002), so at this time the George and Charles Street site is considered as the oldest reliable date for Aboriginal occupation in the Sydney region, although these dates similarly have interpretation issues.

The early occupation sites dating to the late Pleistocene/early Holocene have been found in deep stratified rockshelter deposits and within alluvial deposits, particularly on the margins of large rivers such as the Hawkesbury-Nepean and Parramatta Rivers. Drawing on this evidence, McDonald has recently argued that early occupation of the Sydney basin was focused on these primary river systems and characterised by a high degree of ‘residential mobility’ between a small number of sites (McDonald, 2005). However, the survivability and taphonomic loss of older sites in such a heavily urbanised environment must also be considered.

5.2.2 Intensification During the Holocene

The vast majority of dated sites in the Sydney region are less than 5000 years old (35 out of a total of 48 dated sites) (Attenbrow, 2002). It has been argued that this is a result of increased populations and 'intensification' of cultural activity during this period. The prevalence of sites dating to the last 5000 years may also be a result of the last significant rise in sea level, approximately 7000 years ago

(Sloss et al. 2007). The sea level rise would have submerged many of the older sites along the coastal fringe and forced Aboriginal groups westward to the current coastline.

In an attempt to better understand changes in use and occupation during the Holocene period, Val Attenbrow undertook a detailed study of the Upper Mangrove Creek catchment to the north of Sydney (Attenbrow, 2006). Attenbrow's study found significant changes in site patterning during the Holocene. She concluded that population was unlikely to have changed, but the use of sites, most notably in the last 2000 years did. This increased use of sites appeared in the archaeological record as increasing population.

Holdaway et al. (2008), similarly suggest that populations did not increase in the late Holocene, but the changes seen in the archaeological record reflect taphonomic change. Conversely, Smith et al. (2008) and Williams et al. (2010), both suggest that populations were in fact larger in the last 2000 years than any preceding period. Using radiocarbon data and regional studies, they demonstrate that there is an increasing use of sites in all locations at this time, which cannot be explained by movement of people across the landscape, but rather points to increasing numbers of people using more of the landscape.

This issue is still widely contested in archaeological literature, but whatever the reason, archaeological sites within the Sydney Basin are dominated by late Holocene sites.

5.2.3 Regional Site Patterns

More than 4,500 sites have been recorded and registered with the OEH Aboriginal Heritage Information Management System (AHIMS) for Sydney, reflecting both the wealth of archaeology in the region and the number of archaeological investigations undertaken.

The dominant site types in the Sydney region (in the 15 - 20 per cent frequency range) are rock shelters with midden deposit, rock shelters with art, rock art engravings and open artefact scatters (Attenbrow, 2002). Site types in the 5 - 15 per cent range include rock shelters with artefacts, grinding grooves and open middens (Attenbrow, 2002). The distribution, density and size of sites are largely dependent on environmental context. For instance, middens are found in close proximity to marine, estuarine and less often, freshwater bodies. Rock shelters are only found in areas of exposed sandstone escarpment and grinding grooves are found on areas of exposed flat bedded sandstone near a source of water.

A study of the regional archaeology of the Cumberland Plain by Kohen made a number of findings about site location patterns in the Sydney area. The study demonstrated that proximity to water was an important factor in site patterning. Kohen found that 65 per cent of open artefact scatter sites were located within 100 meters of permanent fresh water (Kohen, 1986). Only 8 per cent of sites were found more than 500 meters away from permanent fresh water. In short, Kohen argued that open artefact scatters are larger, more complex and more densely clustered along permanent creek and river lines. Kohen's study also found that Silcrete (51 %) and Chert (34 %) are the most common raw materials used to manufacture stone artefacts. Other raw materials include quartz, basalt and quartzite.

Although the patterns described above have been generally supported by subsequent investigations, Kohen's study was limited by a reliance on surface evidence. Extensive excavation across the Cumberland Plain has since shown that areas with no surface evidence often contain sub-surface deposits buried beneath current ground surfaces. This is a critical consideration in aggrading soil landscapes, such as those commonly found across the Cumberland Plain. In a 1997 study of the Cumberland Plain, McDonald (1997) found that:

- 17 out of 61 excavated sites had no surface artefacts before excavation.
- The ratio of recorded surface to excavated material was 1:25.
- None of the excavated sites could be properly characterised on the basis of surface evidence. In short, surface evidence (or the absence of surface evidence) does not necessarily indicate the potential, nature or density of sub-surface material.

The results of McDonald's study clearly highlight the limitations of surface survey in identifying archaeological deposits in this landscape. The study also shows the importance of test excavation in establishing the nature and density of archaeological material on the Cumberland Plain.

McDonald has undertaken over 20 years of consulting archaeology in the Cumberland Plain, and like Kohen has developed predictive models for the distribution of Aboriginal objects. In a recent publication, White & McDonald (2010:29) summarised this model as follows:

> '*Topographic and stream order variables correlate with artefact density and distribution. High artefact density concentrations may have resulted from large number of artefact discard activities and/or from intensive stone flaking. Highest artefact densities occur on terraces and lower slopes associated with 4th and 2nd order streams, especially 50 – 100 meters from 4th order streams. Upper slopes have sparse discontinuous artefact distributions but artefacts are still found in these landscape settings'.*

5.2.4 Stone Artefacts

Aboriginal stone artefacts are an important source of archaeological information because stone is preserved for long periods of time whereas organic materials such as bone, shell, wood and plant fibres decay. Stone artefacts provide valuable information about technology, economy, cultural change through time and settlement patterning. Stone has also been used for 'relative' dating of sites where direct methods such as radiocarbon dating cannot be applied. A technological sequence for stone artefacts for the region was first described in the late 1940s by Fred McCarthy and has since been refined by various authors. Currently, the most widely accepted typological sequence is known as the 'Eastern Regional Sequence' (Hiscock & Attenbrow, 1998; 2002). The ERS phases are as follows:

- Capertian – is distinguished by large uniface pebble tools, core tools, horsehoof cores, scrapers and hammerstones. Backed artefacts occasionally present. Generally dates to before 5,000 years BP.
- Early Bondaian – Aspects of the Capertian assemblage continue, but backed artefacts and ground-edged artefacts increase. Artefacts during this period were predominantly made from fine-grained silicious stone such as silcrete and tuff. Generally dated from 5000 BP to 2800 years BP.
- Middle Bondaian – Characterised by backed artefacts, particularly Bondi Points and ground-edged artefacts. Artefacts made from silicious materials, however quartz becomes more frequent. Generally dated from 2800 - 1600 BP.
- Late Bondaian – characterised by bipolar technology, eloueras, ground-edged artefacts, and bone and shell artefacts. Bondi points are virtually absent and artefacts are predominantly made from Quartz. Generally dated from 1600 BP to contact.

5.2.5 Local Context

Archaeological studies have been undertaken in the vicinity of Glenfield since the early 1980s. The earliest investigations were focussed on Lucas Heights during the development of a waste disposal facility. Studies by Silcox, Brayshaw, Attenbrow & Negerevich, Koettig and McDonald recorded extensive numbers of sites in the vicinity of Bardens and Mill Creeks, located some 10 -15 kilometres to the south-east of the subject area (Silcox, 1980; Brayshaw, 1982; Attenbrow & Negerevich, 1981; Koettig & McDonald, 1984). These sites were predominantly rockshelters containing art and/or deposits. Studies that have been carried out in close proximity to the subject area are shown **in Figure 7**.

Investigations carried out at a number of the sites indicate that initial occupation of this area commenced relatively late in the Holocene period, that is, less than 3000 years ago and continued until close to the time of European arrival. Cultural material present in excavated deposits reflects a predominantly 'inland' economy with minimal exploitation of estuarine resources (Navin Officer Heritage Consultants 1997: 4-45).

Similar findings occurred on surveys undertaken in Wedderburn (20 kilometres south of the subject site) by Smith & Crew and Sefton - an investigation of Yeoman's Estate located eight sites, including five rockshelters, two grinding grooves and a culturally modified tree (Smith & Crew, 1988, 1989; Smith, 1991; Sefton, 1981, 1982, 1986, 1987, 1990).

On the nearby Cumberland Plain, studies by Koettig and Hughes, and Boot at East Hills-Glenfield Railway and Wattle Grove, respectively, revealed several artefact scatters (#45-5-0889, #45-5-0890, #45-5-0891, #45-5-0892,#45-5-0972, #45-5-2355, #45-5-2369 (Koettig & Hughes, 1983; Boot, 1990, 1992, 1993, 1994a, 1994b).

Of note was an extensive study of the Holsworthy Military Area (immediately south of the subject site) as a possible location for the second Sydney airport in the late 1990's. Navin Officer built on extensive studies already undertaken of the military area by the Sydney Prehistory Group and Australian Museum Business Services. Before the field investigations, some 295 sites were documented (Navin Officer Heritage Consultants 1997: 4-57).

At the completion of the field inspections, Navin Officer documented over 800 archaeological sites in the Holsworthy Military Area. These sites were almost exclusively constrained to the deeply incised creek valleys and ravines running through the military area, and were comprised of isolated finds (n=37), artefact scatters (n=19), culturally modified trees (n=48), grinding grooves (n=185), open engraving sites (n=15), open sites and grinding grooves and engravings (n=10), rock shelters (n=659) (Navin Officer Heritage Consultants 1997: 5-14).

In 2002, Jim Kelton carried out an archaeological assessment of a proposed sewerage transfer from the Hoxton Park Release Area to the Liverpool Sewerage Treatment Plant (STP) (Central West Archaeology and Heritage Services, 2002). The development involved laying 7 kilometres of pipeline between the two locations using trenching and tunnelling methods. No Aboriginal sites or objects were located during the field survey. Two PADs, however, were identified adjacent to the corridor: on the northern and southern banks of Cabramatta Creek, Hoxton Park (adjacent to the Hinchinbrook Creek junction) and the northern bank and adjacent alluvial terrace of the second crossing of Cabramatta Creek (approximately 400 meters east of the Hinchinbrook Creek junction). It was recommended that archaeological monitoring of development works be carried out in these two areas.

More recently, studies by Cultural Heritage Connections, AHMS, AMBS and Mary Dallas have been undertaken in the vicinity of the subject area. Cultural Heritage Connections undertook a preliminary assessment of the proposed Southern Sydney Freight Line situated just west of the Georges River. This assessment, running from Macarthur to Ingleburn identified 17 archaeological sites in close proximity to the subject area. These sites were predominantly artefact scatters (n=10), culturally

modified trees (n=5) and a potential archaeological deposit (Cultural Heritage Connections, 2006). No sites were recorded within the study area.

A further study by AMBS on the Glenfield railway station was undertaken in 2008. Part of the AMBS investigation for the station encompassed the northwestern part of the subject site. The survey identified two sites, an isolated object on a track between the railway track and the subject site; and a scarred tree located in the western quadrant of the subject site; and an area of potential sensitivity was also observed (**Figure 8**).

Mary Dallas undertook an assessment of a proposed housing subdivision in south Casula – just north and west of the subject area on the west side of the Georges River (Mary Dallas, 1988). The study identified two artefact scatters and three culturally modified trees on a series of spurs overlooking Glenfield Creek (#45-5-0720, #45-5-0721, #45-5-0722, #45-5-0723, #45-5-0724).

In 2001, Steele and Dallas undertook an assessment of the Moorebank Defence area (Steele & Dallas, 2001) to the northwest of the study area. The study indicated that the defence area had been completely impacted by the past activities, and that no Aboriginal sites were, or were likely to be present. A follow up study was undertaken by AHMS in 2012 on the Moorebank Defence area, as part of the Sydney Intermodal Terminal Alliance (SIMTA) development. This study investigated both the defence site, and a proposed railway that ran along the northern edge of the Eastern Hills railway line (and included then northern portion of the Glenfield Waste Disposal). The assessment concurred with Steele & Dallas (2001), but did highlight several areas of archaeological interest in the bushland surrounding the Georges River (**Figure 9**).

5.2.6 AHIMS Search Results

A search of the Aboriginal Heritage Information Management System (AHIMS) database, maintained by OEH, was carried out on 11 May 2012.

This search identified 96 sites in an area of some 10 km2 centred on the subject site. Seven of these sites occur within 1 km of the study area. The 96 sites were composed of 40 (42%) artefact scatters, three (3%) shelters with art, six (6%) scarred trees, five (5%) isolated objects and 42 (44%) unidentified (**Figure 10**). Several further isolated finds and three PADs were also identified by AHMS 2012 study of the nearby SIMTA site (**Figure 9**), which have not yet been listed on the AHIMS database.[1]

In general, these sites are focussed in south Casula, Wattle Grove and Holsworthy Military Area. The sites to the west (#45-5-0720, #45-5-0721, #45-5-0722, #45-5-0723, #45-5-0724) were identified by Mary Dallas during an assessment of a proposed sub-division. Sites to the east were predominantly identified by Dr. Phil Boot as part of the assessment works for the suburb of Wattle Grove. Those within Holsworthy Military Area were most likely identified as part of Navin Officer's extensive study of the area in 1997.

Seven sites are located in, or within 1,000 metres of, the subject area. Of most relevance are two sites located within the study area - Glenfield 1 (#45-5-3531) and Glenfield ST (#45-6-2428), an isolated object and culturally modified tree respectively. Both sites are located in the northwest quadrant of the study area. The two sites were recorded by AMBS in 2008 as part of the Glenfield station study (Section 5.2.5).

[1] Note: due to some sites retaining multiple site types (for example a rockshelter with a grinding groove), the total number of AHIMS entries may not reflect the actual number of sites types recorded.

The isolated object was a piece of heat-shattered silcrete on a track near the railway. It could not be relocated as part of the site visit, but is considered probably destroyed following the extensive development of this area as a result of the Glenfield Station and Southwest Freight line developments.

The scarred tree was identified in a similar area near the East Hills railway line. The site was relocated as part of this study. The tree identified is very young, probably less than 50 years old, and combined with the irregular scar on the tree is unlikely to be of cultural origin in AHMS' opinion. A similar view was held by the representatives of the Registered Aboriginal Parties. However, a review of the AMBS report indicates that this scarred tree was originally recorded by Anthony English several years previously. Given its original identification may have occurred prior to the widespread use of hand held GPS, it is considered that Anthony English may have been referring to another scarred tree found some 100 m northeast of AMBS' find (see Section 8.1), but that the spatial recording of the tree may have been poor historically. Further analysis of this other tree, similarly, considered it to be of natural origin (Section 8.3.1).

5.3 Summary

In summary, studies in the local area have revealed extensive occupation by prehistoric populations. Excavations of rock shelters in Lucas Heights indicate that this occupation probably occurred in the late Holocene (<3000 years ago) during a period of significant change in prehistoric populations. This change most likely involved population intensification, a greater reliance on these areas, and/or perhaps the loss of coastal resources through sea level rise. Within the Hawkesbury sandstone country, sites are almost exclusively rock shelters or grinding grooves, all located in deeply incised valleys or ravines. Within the subject area and the surrounding Cumberland Plain, archaeological sites are dominated by artefact scatters, culturally modified trees and potential archaeological deposits. Studies within the local area and including the subject area identified the presence and/or potential for such site types to occur.

Figure 7 ***Map of locations of heritage assessments near the subject area (outlined in red). 1 – Dallas (1988); 2- Dallas (2006); 3- Steele and Dallas (2001); 4- Central West Archaeology and Heritage Services (2002); 5- Boot (1990, 1992, 1993, 1994a, 1994b); 6- Navin Officer (1997); 7- Cultural Heritage Connections (2006); 8 – AHMS (2012); 9 – AMBS (2008).***

Figure 8 ***Map showing the scarred tree and zones of archaeological sensitivity identified by AMBS in 2008 within the subject area (source: AMBS, 2008).***

Figure 9 ***Map showing archaeological findings of AHMS 2012 study of the SIMTA site. Isolated artefacts (shown by numbers) and potential archaeological deposits (PADs) are presented. Area 1 (shaded blue) along the western edge of Georges River was identified by Aboriginal participants as an area of cultural interest. (Source: AHMS, 2012).***

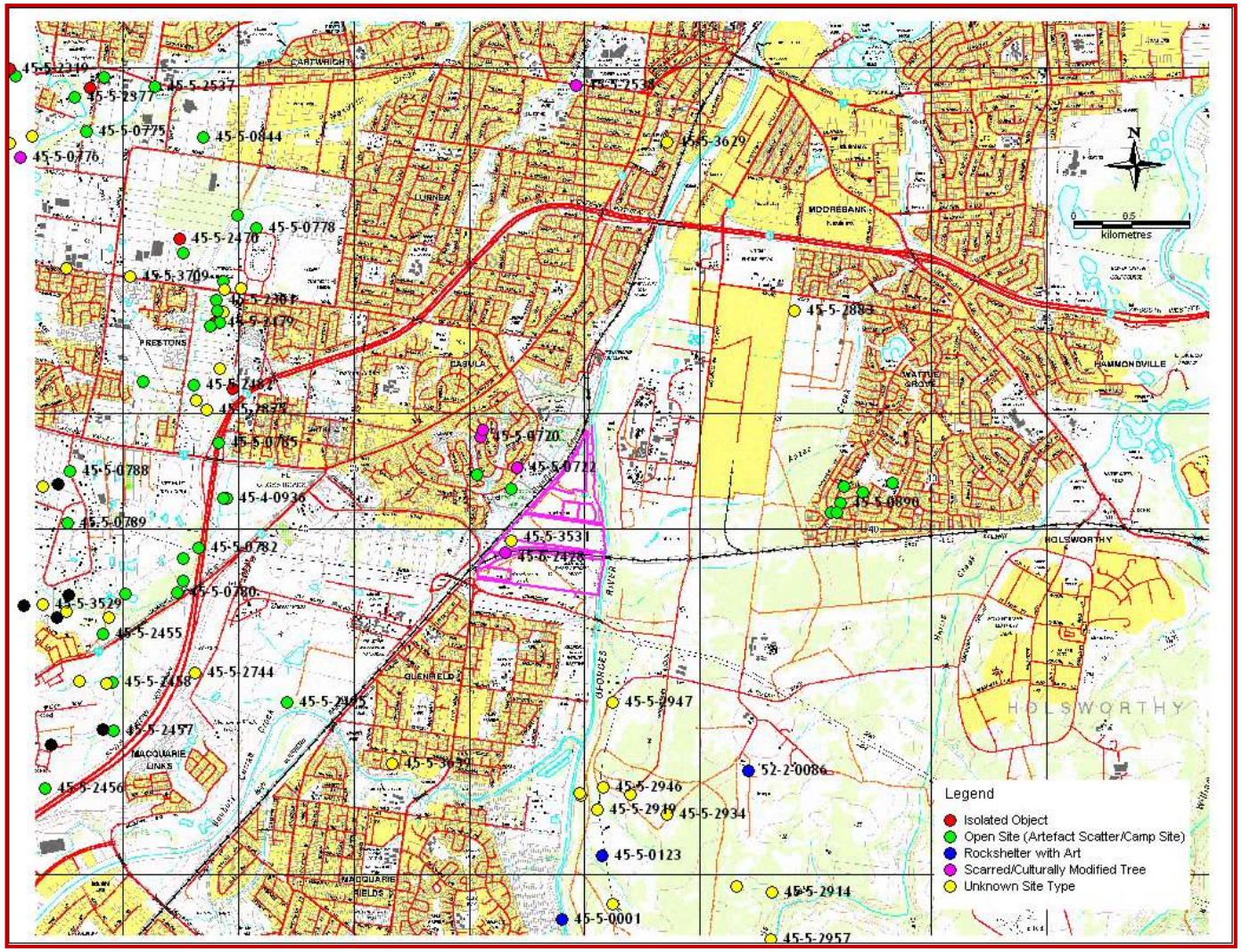

Figure 10 Map of archaeological sites previously recorded in the Glenfield Waste Disposal site (purple outline) and documented in OEH's AHIMS database.

6 LANDSCAPE CONTEXT

Environmental and landscape characteristics contribute to the availability of natural resources. In turn, landscape characteristics and available natural resources influence land use. Ultimately, these affect the types of archaeological sites that may exist in a given area. A determination of the past environmental context is essential to develop accurate models of cultural activity, site distribution patterns and the archaeological potential of any given area. The environmental context of the subject area is discussed below.

6.1 Landscape Characteristics

The subject area is situated adjacent the Georges River, a significant fresh water and food resource during prehistoric occupation. Fluvially derived sediments would have created a landscape that may have resembled a series of sloping river terraces, however, recent urban activities have heavily modified the landscape. Specifically, the Glenfield Waste Disposal has led to extensive earthworks across most of the subject site.

Based on aerial photographs, the subject site appears to have been originally composed of a low hill to the west, gently sloping down towards the Georges River in the east. A minor tributary running primarily along the western side of the railway line, also ran through the centre of the waste disposal site prior to the East Hills railway line. Topography varies between 16 and 22 meters AHD, and the entire site is above the 1 in 100 year flood line. Historical information suggests that the original vegetation would have been open, most likely Cumberland Plains Woodland, given its preference for the Ashfield Formation geology of the subject area. At present, vegetation on much of the subject area is limited to grassed areas between extensive modifications and other structures, although relatively undisturbed bushland is present in the south and western parts of the subject site, and running along the edge of Georges River. While this bushland appeared young visually, historical photographs suggest it is at least 80 years of age.

6.2 Geology and Soils

The subject site is located immediately north of Holsworthy Barracks (Liverpool Military Area), which is located on the Woronora Ramp geological feature that forms part of the south side of the Sydney Basin. The Woronora Ramp gradually rises from the Cumberland Plain in the north and terminates at the Woronora plateau to the south of the subject area.

Based on Department of Mineral Resources 1:100,000 Geological Series Sheets of Wollongong - Port Hacking and Penrith, the general area contains Mesozoic and Cainozoic geology. The former includes Hawkesbury Sandstone, Mittagong Formation and Ashfield Shale, while the latter includes Pliocene clayey quartzose sands and Quaternary alluvial deposits. Given the northern part of the waste disposal is subject to sand extraction, it is presumed that the subject site is part of the Ashfield Formation.

More recent Quaternary deposits, specifically those of Pleistocene and Holocene age, have high potential for both natural and anthropogenic information. The Georges River, Williams Creek and Harris Creek all contain evidence of Quaternary deposits, although presence of these deposits within the subject site is yet to be specifically demonstrated.

The 1:100,000 Penrith Soil Landscape Series Sheet 9030 indicates that the subject site includes soils from the Berkshire Park Soil Group (Bannerman and Hazelton, 1990). These are characterised as shallow clayey sand soils with frequent ironstone pisoliths, and are typically found on low rises and terraces of the Hawkesbury/Nepean river systems. In some area, Luddenham Soil Landscape may also occur (Bannerman and Hazelton, 1990:63). These are characterised by loams overlying clays, and dark prairie topsoils, and some sandy clays and sandy loams, on undulating low hills overlying Wianamatta Group Shales.

6.3 Vegetation

The natural vegetation of a landscape is an important consideration in an Aboriginal cultural heritage assessment because it provides an indication of the natural resources once available to Aboriginal people. Bark from trees could be stripped to make canoes, shields and other items. The vegetation itself could provide food resources, such as edible plants, and also habitats for animals, such as possums and birds, which could be hunted.

The original vegetation associated with the Berkshire Park Soil Landscape within the Sydney region is open forest. Species would have typically included broad-leaved ironbark (Eucalyptus fibrosa), narrow-leave apple (Angophora bakeri) and scribbly gum (E. Sclerophylla) and paperbarks (Melaleuca sp.) (Bannerman & Hazelton 1990: 75-77). A study of the nearby SIMTA site also identified the presence of Sugar Gum (Eucalyptus cladocalyx), Forest Red Gum (E. tereticornis), Scribbly Gum (E. sclerophylla) and native grasses, including Kangaroo Grass (Themeda australis), Sand Couch (Cynodon dactylon) and Danthonia sp. (LesryK Environmental Consultants, 2000 cit. AHMS, 2012).

The Luddenham Soil Landscape originally supported wet sclerophyll forest (Bannerman & Hazelton 1990:63).

Following the site visit, it was evident that most of the study area comprised of low-lying grasses intermixed with heavily modified landscapes (such as areas of landfill, tracks or structures). The transmission line to the south was also dominated by low grasses. However, the south and western quadrants of the subject site did appear to have an open woodland dominated by broad-leaved ironbark (E. fibrosa) and scribbly gum (E. Sclerophylla), with occasional forest red gum (E. tereticornis). While the appearance of this woodland was relatively young, historical photographs suggest that the woodland has been present on the site for at least 80 years. This type of woodland was also present on the tributary at the eastern end of the transmission line.

Vegetation on the Georges River was not observed in detail due to access issues, but appeared to be characterised as a dense woodland including broad-leaved ironbark (E. fibrosa), scribbly gum (E. Sclerophylla), and forest red gum (E. tereticornis). Dense bushes of exotic species (such as lantana) were also present.

6.4 Previous Land Use and Disturbance

A review of historical photographs of the region since 1930 show that significant impact has occurred to several parts of the subject site (**Figures 11 - 17**). Early photographs suggest that impacts between 1930-1960 were relatively minor – the eastern quadrant of the study area was used primarily for agriculture, while the western quadrant was untouched bushland. The house still present in the

western quadrant is present by 1950 (**Figure 12**). Some suggestion that the tributary had been modified, as well as the installation of a large dam was also present through this period. The transmission line to the south was also bushland with some impacts through the earlier alignment of Cambridge Avenue in this area.

From 1960, more significant activities begin to occur. In the 1960 and 1974 photographs, sand or other quarrying extraction is evident in several parts of the northern portion of the waste disposal site, and these extend into the east quadrants of the subject site (**Figures 13** and **14**). The dam in the western quadrant is more substantive, and bushland has been removed from most of the eastern quadrant, as well as most of the transmission line.

By 1982, most of the eastern quadrant of the subject site is undergoing extensive earthworks (**Figure 15**). This is probably the earliest beginnings of the land fill that is still ongoing today. Cambridge Avenue has been re-aligned to its current location by this time. This photograph is one of the clearest to demonstrate the first order tributary running from the south into the eastern quadrant of the transmission line – indicating the tributary is not a later landscape modification.

Photographs from 1994, 2002 and present day, all show continuing development in the region. By this time the Eastern Hills railway has gone through the site, and further extensions of the landfill have occurred (**Figures 16** and **17**). The bushland in the western quadrant is still relatively untouched, although frequent tracks and roads have been put through them.

The transmission line to the south was not evident in any of the historical photographs and suggest development since 2002, it is unclear the level of impact this installation would have had on the soil profile in this region.

In summary, the eastern and northern quadrants of the subject site appear heavily impacted by past extraction and landfill activities (**Figure 18**). The western quadrant appears to have received far less impacts historically, but tracks, structures and dams are still present throughout. With the exception of vegetation clearance and the installation of transmission pylons, the transmission line appears to have been less disturbed than other parts of the site. Along with small parts of the bushland in the west of the subject site, the tributary located in the eastern quadrant of the transmission line appears to be the most undisturbed part of the site.

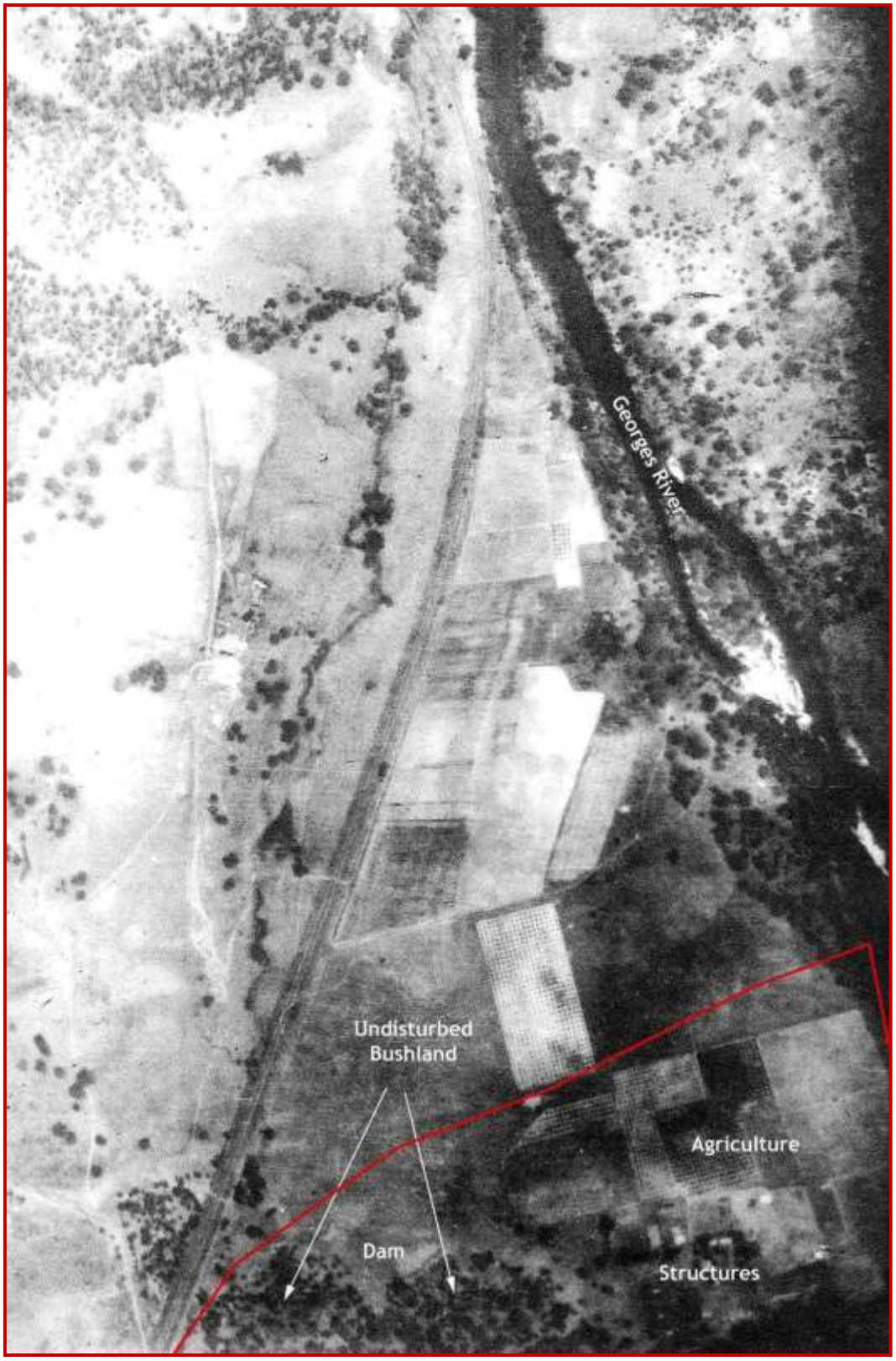

Figure 11 ***Historical aerial photograph of the subject area from 1930. While only capturing a small part of the subject area, it does show the undisturbed bushland in the southern and western quadrants, and the agricultural practices in the eastern quadrant (source: Land & Property Information Services).***

Figure 12 ***Historical aerial photograph of the subject area from 1951. One of the original tributaries running through the site is evident, as is the extensive agriculture in the eastern quadrant. With the exception of a structure, the western quadrant is relatively undisturbed (source: Land & Property Information Services).***

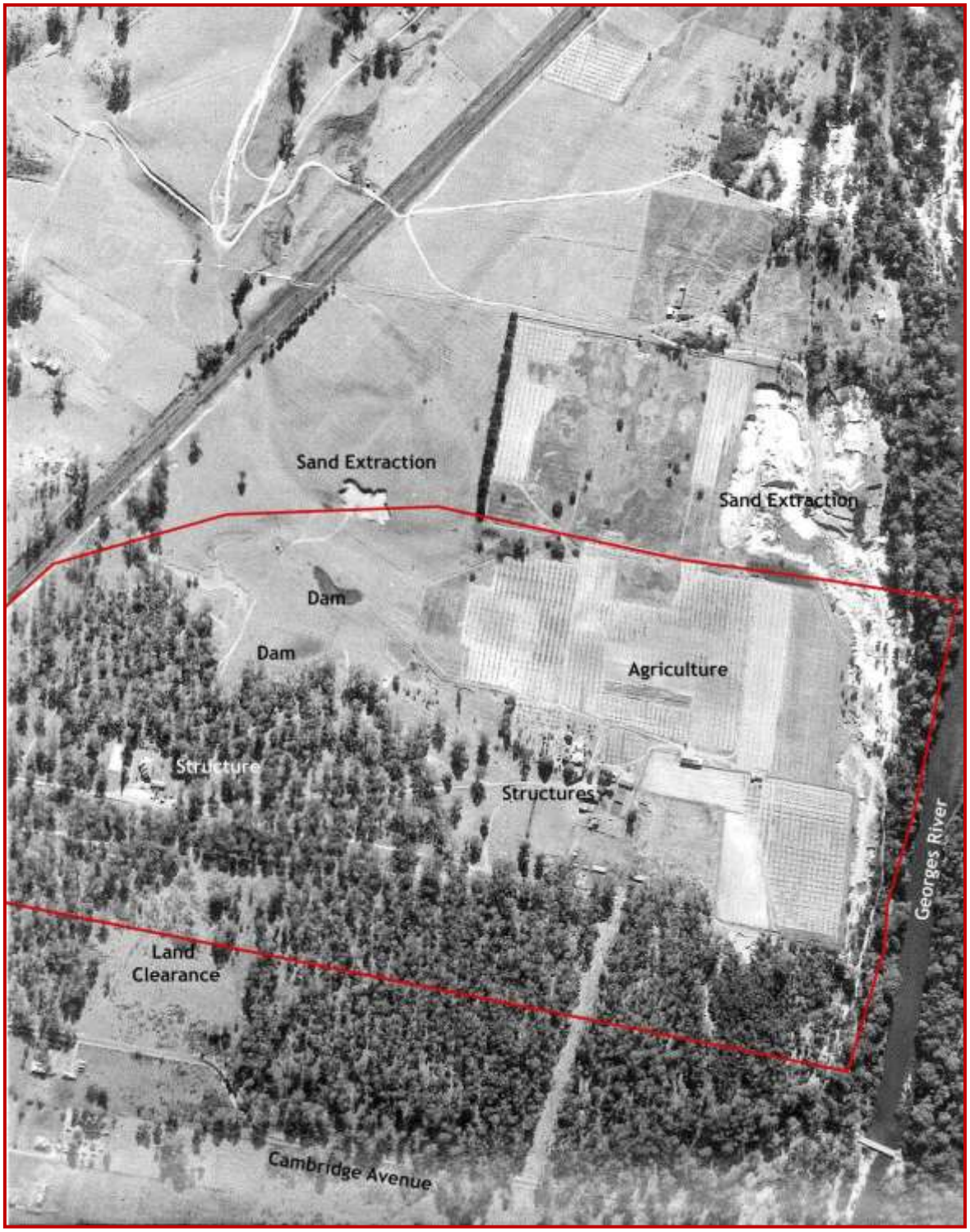

Figure 13 ***Historical aerial photograph of the subject area from 1961. By this time, extraction along the river's edge is occurring, as well as modifications to the north quadrant of the subject area. Some clearance is also occurring on the transmission line. Note the different alignment of Cambridge Avenue – this previous alignment would have impacted GWD 2 discussed in Section 8.1 (source: Land & Property Information Services).***

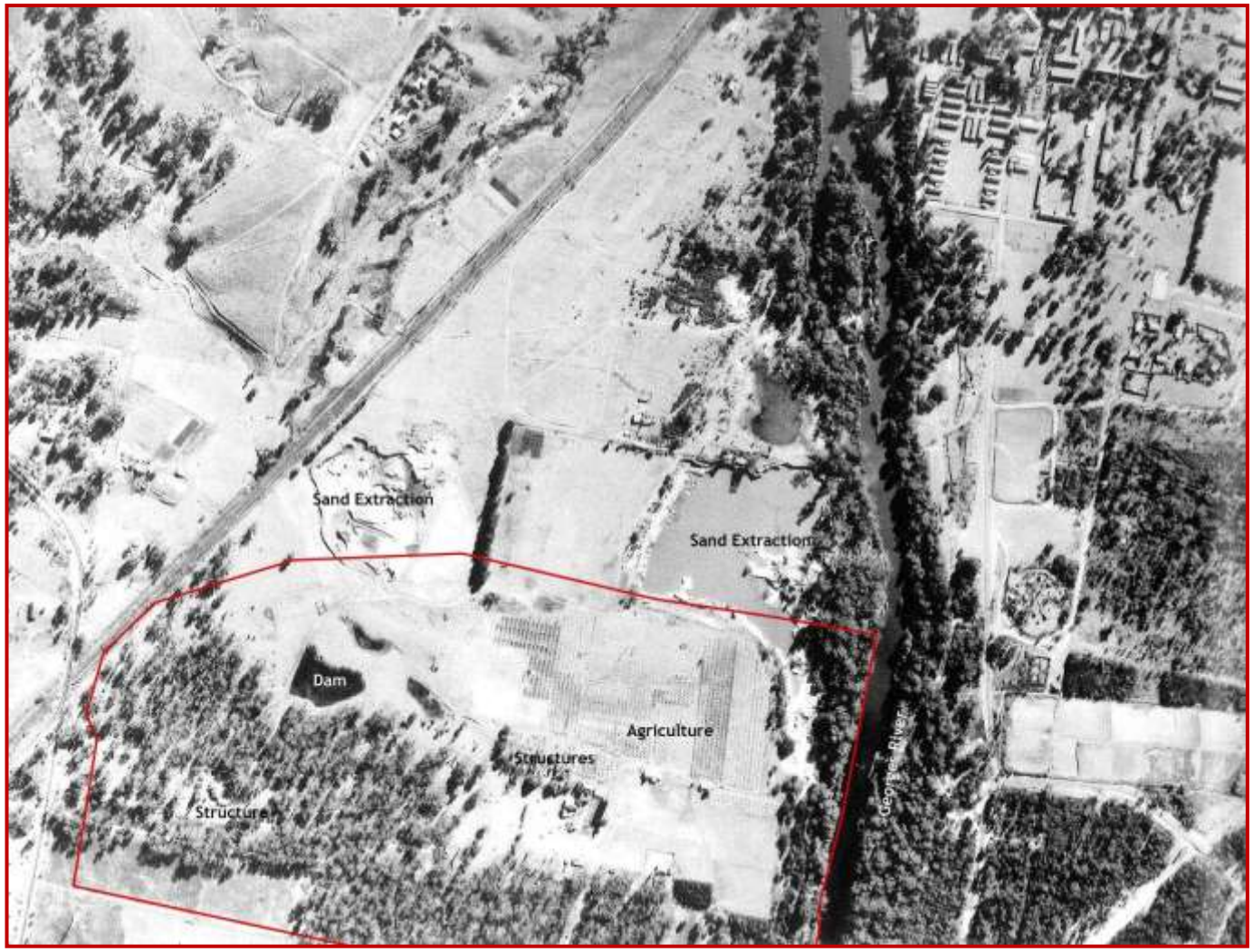

Figure 14 ***Historical aerial photograph of the subject area from 1970. Extensive quarrying and/or sand extraction has now encroached on much of the northern quadrants of the subject area. The dam and surrounding area in the northwest have also been expanded. The west and southwest quadrants still appear relatively undisturbed (source: Land & Property Information Services).***

Figure 15 ***Historical aerial photograph of the subject area from 1982. Sand extraction and/or landfill has now extensively impacted the north and eastern quadrants of the subject area. The transmission line to the south has been cleared. Several earthworks in the northern and parts of the western quadrant may relate to the East Hills railway constructed during this period (source: Land & Property Information Services).***

Figure 16 ***Historical aerial photography of the subject area from 1994. The subject area has largely reached its current appearance by this stage, with extensive landfill in the east, and sand extraction to the north. Note the East Hills railway is now constructed. The western and southern bushland still appears relatively undisturbed, as do parts of the small tributary located in the southeast corner of the subject area (east end of the transmission line) (source: Land & Property Information Services).***

Figure 17 ***Historical aerial photography of the subject area from 2002. Few changes are different from 1994 – the landfill operations and sand extraction are more formalised, but impacts remain largely the same for the purpose of this study (source: Land & Property Information Services).***

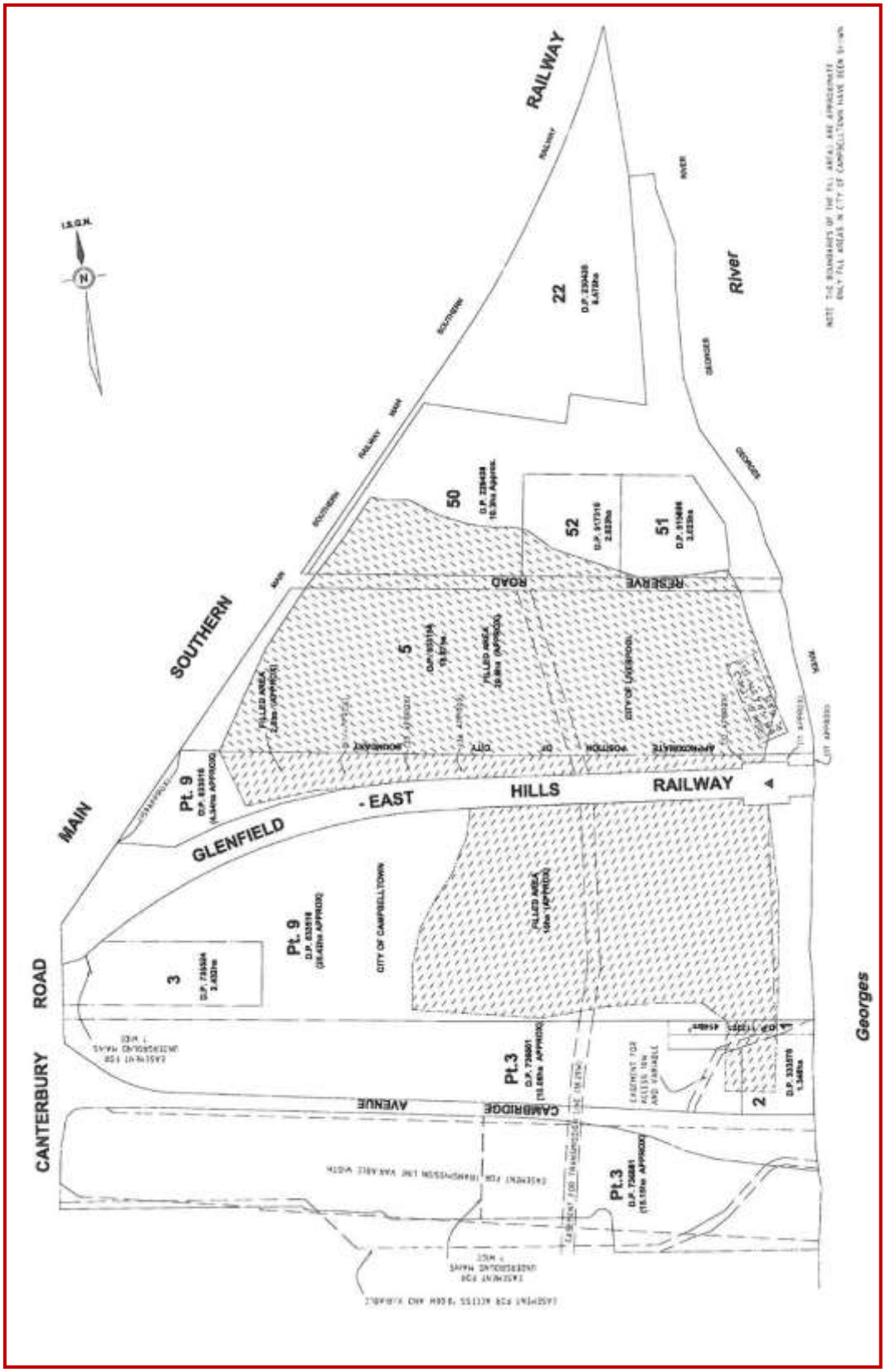

Figure 18 Map showing the current extent of landfill (hatched) within the subject area.

7 REGIONAL CHARACTER

This section provides a synthesis of the archaeological and environmental information for the subject site to identify key issues and develop predictions in relation to the presence of Aboriginal objects.

7.1 Archaeology

Based on the regional and local archaeological context of Glenfield, a number of conclusions can be reached regarding the Aboriginal archaeological potential of the subject area.

It is apparent that Aboriginal people have occupied and utilised the region within the Sydney Basin for a considerable period of time, certainly throughout the Holocene (10,000 years ago to present). Some evidence also points to occupation in the late Pleistocene (10,000 - 50,000 years ago). Archaeological studies pertaining to the region suggest that site distribution is characterised by proximity to permanent water sources, and landform types such as lower slopes, river terraces and alluvial flats. Importantly, sites are generally found above the flood zone, especially in the south-west of Sydney where the upper catchments of several large rivers are located.

The subject area is primarily situated above the flood zone associated with the Georges River and two other minor tributaries (one of which is no longer evident). Therefore, it is considered an ideal location for archaeological material to occur based on regional patterns.

Archaeologically, the local area is characterised by two very different types of land use strategy in the past. In the Hawkesbury sandstone country, most evident in the Holsworthy Military Area to the south of the subject site, archaeological sites are dominated by rock shelters and grinding grooves. These sites are generally constrained to the valley floors and ravines where sandstone caves and overhangs occur. These types of sites are extensive in the local area with the military area retaining over 600 rock shelters. On the surrounding Cumberland Plain, encompassing Liverpool, Moorebank, and the subject area, sites were generally artefact scatters, isolated finds, culturally modified trees and/or potential archaeological deposits. Studies both to the east and west of the subject area have identified the presence of artefact scatters and culturally modified trees in close proximity to the subject area.

7.2 Existing Disturbance

While the regional and local archaeological records suggest high potential for archaeological material within the subject area, the past land use history indicates significant disturbance has occurred reducing the likelihood of any such sites surviving.

Historical aerial photographs show that the subject area underwent significant ground disturbance and earthworks since the 1970s through to the present day, and included the levelling, cutting and filling of large sections of ground for sand extraction and/or landfill use. While the area of highest potential would have been in the vicinity of the two creeks and the banks of Georges River, historical photographs show that these areas (with the possible exception of the transmission line) have been subject to extensive earthworks.

Only two areas appear to have been only minimally disturbed in the past, a section of bushland in the western quadrant of the subject site, and a tributary (and surrounding landform) in the eastern

quadrant of the transmission line. In relation to the bushland, several structures, trees and a large dam are present suggesting some impacts have occurred through the area.

A section of bushland to the south of the subject site also appeared to be relatively undisturbed based on the historical photography, but site inspection (Section 6.4) demonstrated that extensive ground disturbance (from heavy machinery) had occurred.

It is acknowledged that fluvial sand beds and terraces have been excavated elsewhere in the Sydney basin and revealed artefacts at considerable depth. AHMS personnel have investigated other sites in Sydney where the fill was placed directly over the top of the original soil profile, and it was possible to re-expose and re-investigate the original deposits, but these were generally small sites (<3,000 m2).[2] However, the level of disturbance in many of parts of the study area (such as the sand extraction) precludes the possibility of deep deposits occurring. Further, given the industrial scale and depth of the fill across the site, it is considered unlikely that an intact A and A2 soil profile would be present in most areas.

7.3 Site Predictions

A review of the archaeology of the region suggests that the subject site would have high potential for Aboriginal objects/sites to occur. The location of the subject site adjacent Georges River, above the flood zone, and in close proximity to two tributaries all increase the likelihood of the region being used by Aboriginal people in the past.

However, a review of the historical land use of the study area demonstrates that several parts of the subject site have experienced significant modification – most likely leading to the destruction of any Aboriginal objects/sites that may have been present. Specifically, the use of the subject site for both sand extraction and as a landfill, have led to the complete destruction of large parts of the eastern, northern and southern quadrants of the site.

Only two areas within the subject area appear to have both potential for Aboriginal objects/sites to occur and have not been extensively impacted: 1) the bushland in the western quadrant of the study area; and 2) the tributary in the eastern quadrant of the transmission line (**Figure 19**).

Historical photographs suggest that the bushland in the western quadrant of the subject site has been present since before 1930, although several minor impacts (e.g. tracks) have occurred throughout. This bushland would have been within 200 m of a former tributary (which has now been completely destroyed by the East Hills railway) and therefore is of archaeological interest.

The tributary to the east of the transmission line, similarly, reveals limited to no impact since the 1930s, although it must be acknowledged that a transmission line has been installed in this area since 2002.This tributary joins, and is in close proximity to Georges River (<200 m), and therefore has high potential for Aboriginal objects/sites to occur.

Based on the above observations and combining evidence drawn from our understanding of settlement patterning, geotechnical investigation and assessment of site disturbance, the subject area is characterised in accordance with the following classes of archaeological sensitivity (**Figure 19**):

[2] AHMS has undertaken numerous excavations in the region. In many cases, an intact soil profile (comprised of A and A2 horizons) were found beneath varying levels (generally <50 cm) of introduced fill.

- High Archaeological Sensitivity: These areas appear to be relatively undisturbed, and are likely to be above the 100 year flood-level. They are located close to fresh water on river and creek flats, and river terraces, all of which are landforms considered to have Aboriginal archaeological potential. Soil consistent with the original soil profile in the area was identified in these areas.

- Low Archaeological Sensitivity: All areas that have been previously impacted by historical footings/foundations and/or more recent development, including quarrying/sand mining, construction of the East Hills Rail Line. These areas are considered to be significantly disturbed and unlikely to retain any in situ Aboriginal archaeological deposits

.

Figure 19 ***Map of archaeological sensitivity based on the background review. Areas shaded in red are considered highly disturbed and retain little potential for Aboriginal objects to occur.***

8 SITE INSPECTION

8.1 Background

Two site inspections were undertaken; the first on 18 May 2012, to inform the preliminary assessment (AHMS, May 2012); and the second on 25 July 2012 for the proposed recycling facility. Both site visits investigated the entire subject area. The participants were as follows:

18 May 2012	25 July 2012
Simon Duffy, EPS	Simon Duffy, EPS
Meaghan MacDonald, EPS	Alan Williams, AHMS
Alan Williams, AHMS	Fenella Atkinson, AHMS
Neil Sampson, Tharawal LALC	Gordon Morton, DACHA
Glenda Chalker, Cubbitch Barta NTCAC	Alyse Mervin, DCAC
	Gordon Workman, DLO
	Margaret Crawford, Tocomwall

A meeting on site was also undertaken with Des Dyer (Darug Aboriginal Landcare Inc) on 25 July 2012.

The site inspections focussed on re-locating previously recorded Aboriginal sites and areas where low disturbance had occurred. These areas were primarily located along the southern and western quadrants of the subject site, and the transmission line south of Cambridge Avenue. The proposed development footprint of the recycling facility was also inspected.

A cursory inspection was undertaken of areas in the eastern and northern quadrant of the subject site, but these areas contained a current landfill operation and the East Hills railway line, and were clearly heavily disturbed to significant depths.

8.2 General Results

The southern and western quadrants of the subject area were characterised as undulating slopes covered by an open woodland of scribbly gums and rough leaved ironbarks, and occasional forest red gums (**Plates 1-4**). Ground cover was composed of a dense knee-high grass, which significantly reduced visibility. Ground exposures were, however, frequent and demonstrated a texture contrast soil across much of the subject site. In many areas, only the truncated subsoil remained suggesting both land clearance and soil erosion in the past (**Plate 3**).

Despite the open woodland extending into the southern quadrant of the subject area, the site inspection indicated that extensive earthworks and/or clearing had occurred through the trees (**Plate 3**). All

exposures revealed deeply incised vehicle and heavy machinery tracks, which had significantly impacted the soil profile throughout. Further, the landfill and earthwork modifications to the north of the subject site have led to hydrological changes in parts of the woodland in the form of numerous swampy and boggy areas.

To the west, the subject area appears far less disturbed, trees are generally older in appearance and the soil profile is largely intact where visible (**Plate 4**). From a landform perspective, this area is the highest point on the site and slopes down to the East Hills railway to the north and west (**Plate 5**). However, no indication of the original tributary known to run through this area was evident. Visibility in this area was again low due to dense grass cover.

The transmission line was characterised as a long gentle slope rising from the west and dropping to Georges River in the east (**Plates 6** and **7**). Vegetation had been cleared leaving only a dense grassland beneath two large transmission lines. Exposures were readily apparent around the transmission pylons (although probably disturbed) an indicated a shallow texture contrast soil. Towards the east end of the transmission line, a vegetated tributary was present on a terrace overlooking the Georges River. While some disturbance was exhibited (most notably the old Cambridge Road alignment), it was in general undisturbed, and had good potential for Aboriginal sites/objects to occur.

The site inspections re-located one of the two previously recorded sites in the subject area, and identified four further sites. These are outlined in **Section 8.3**.

Plate 1 ***The southern quadrant of the subject area, looking west. While the area initially appeared undisturbed, several activities (such as the structures shown here) have impacted this area.***

Plate 2 ***The southern quadrant of the subject area, looking west. This area was characterised by open woodland of stringybark gum and rough leaved ironbarks. Visibility was poor.***

Plate 3 ***The southern quadrant of the subject area, looking west. While the area initially appeared undisturbed, several activities (such as the heavy machinery tracks shown here) have impacted this area.***

Plate 4 ***The western quadrant of the subject area, looking north. This area was characterised as open woodland and had only minor impacts such as the road shown here. This area forms the likely location of the proposed recycling facility.***

Plate 5 ***The western quadrant of the subject area, looking northwest. This area shows the dam evident in several of the historical photographs, and was probably part of a minor tributary running toward Georges River. The southwest railway line is also visible in the background.***

Plate 6 ***The transmission line forming the southern portion of the subject area, looking east. The transmission line shows that the subject area originally was a large gently sloping hill running up from Glenfield, and down towards Georges River.***

Plate 7 ***The transmission line forming the southern portion of the subject area, looking west.***

8.3 Aboriginal Objects/Sites

As outlined in **Section 5.2.6,** two Aboriginal sites had been previously recorded within the subject area (**Figure 20**):

- Glenfield 1 (#45-5-3531), an isolated object; and
- Glenfield ST (#45-6-2428), a scarred tree.

An additional four sites were identified during the site inspections (**Figure 20**):

- GWD 1, a scarred tree;
- GWD 2, a potential archaeological deposit;
- GWD 3, an isolated object; and
- GWD 4, an isolated object.

It is considered likely that the scarred tree identified during the site inspection (GWD 1) is the tree initially recorded by Anthony English, and later erroneously located and recorded as Glenfield ST (#45-6-2428). To avoid confusion, the two unique identifiers (GWD 1 and Glenfield ST) have been retained. Subsequent analysis (**Section 8.3.1**) has demonstrated that neither of these sites are likely to be of cultural origin.

Glenfield 1 (#45-5-3531) – Isolated Object

MGA Zone 56 306252E, 6239702N

This site has an isolated piece of heat-shattered silcrete located on an access track in the northwest quadrant of the subject site. The access track is currently being used by the Southwest Freight railway line and/or Glenfield railway station upgrades and experiences heavy vehicle traffic. While access could not be obtained (due to the construction) at time of site inspection, it is considered highly likely that this site has been destroyed through these activities.

Glenfield ST (#45-6-2428) – Scarred Tree

MGA Zone 56 306217E, 6239617N

This site has a scarred tree recorded by AMBS in 2008 based on an earlier recording of the site by Anthony English. The site is located on top of the hill in the western quadrant of the subject site, immediately west of the house in this location.

The scar appears to be on a very thin (and probably relatively young) scribbly gum. It is a long twisted scar running from the ground to about 1.5 m up the tree (**Plate 8**). There was no evidence of axe marks or tree healing. It is AHMS' opinion and that of the Aboriginal stakeholders that this was not a culturally modified tree, it is believed that Anthony English may have been referring to the site we now identify as GWD 1, rather than the tree identified here by AMBS.

This site is considered to be of natural, rather than cultural origin. See **Section 8.3.1** for further discussion.

GWD 1 – Scarred Tree

MGA Zone 56 – 306386E, 6239638N

This site has a scarred tree located some 70 m north of the house in the northwest quadrant of the subject site. The tree had the appearance of a red forest gum of some age with a girth of 320 cm (**Plates 9** and **10**). The scar was located on the western side of the tree and was 110 x 35 cm in size. The scar was oval in shape and demonstrated evidence of bark healing around the edges. However, the base of the scar was close to the ground and due to tree rot, it is unclear if the base of the scar was intact or open at the base – if the latter the potential for the scar to be of cultural origins is significantly reduced. It is recommended that an arborist investigates this tree further before formal identification of this site.

It is believed that this may be the scarred tree Anthony English originally recorded, rather than Glenfield ST as it is currently assigned.

Representatives of DLO and DACHA both raised doubts about this scarred tree being of cultural origin.

This site is considered to be of natural, rather than cultural origin. See **Section 8.3.1** for further discussion.

GWD 2 – Potential Archaeological Deposit

MGA Zone 56 – 306730E, 6239318N; 306702E, 6239190N; 307109E, 6239189N; 307084E, 6239099N

This site consisted of a large undulating terrace feature (some 400 x 100 m in size) encompassing a tributary and the edge of Georges River at the eastern end of the transmission line (**Plates 11** and **12**). This area was identified based on its proximity to Georges River and its confluence to the minor tributary, and the general lack of disturbance in this part of the subject site.

For ease of management this site has been recorded as a large rectangle, but it is acknowledged parts of this area have been impacted through the former Cambridge Avenue alignment and the transmission lines. In addition, the areas closet to Georges River could not be accessed, so their potential and/or disturbance could not be accurately determined.

GWD 3 – Isolated Object

MGA Zone 56 – 306870E, 6239382N

This site consisted of a silcrete flake located some 50 m south of the main site office of the subject area (**Plate 13**). It was located on a heavily disturbed soil profile (generally only truncated clay subsoils being present) within an open woodland not far from the main subject site entrance.

The silcrete flake was of relatively early reduction; had a faceted platform; one large dorsal scar as well as some primary cortex (suggesting an outcropping, rather than fluvial origin); distal shape; and hinged termination (**Plate 14**). Despite relatively good visibility in this location no further objects were identified.

GWD 4 – Isolated Object

MGA Zone 56 – 306780E, 6239378N

This site consisted of a broken silcrete flake in close proximity to GWD 3. It was located within a very small old stockyard some 100 m southwest of the main site office of the subject area (**Plate 15**). The area was heavily disturbed by both animals historically and more recently by heavy-vehicled tracks.

Only the distal end of the artefact was found. It was of early reduction stage; had one large dorsal scar as well as some primary cortex (suggesting an outcropping, rather than fluvial origin); parallel shape; and feathered termination (**Plate 16**).

8.3.1 Scarred Tree Investigation

Due to uncertainty regarding the antiquity and cultural origins of two scarred trees identified during the field investigations (**Sections 8.2** and **8.3**), AHMS recommended that an arborist be engaged to further investigate whether or not the scars were produced by Aboriginal traditional practices. EPS subsequently engaged Urban Tree Management (UTM) to investigate whether the scars where of cultural/human or natural origin.

UTM's assessment is presented in **Appendix 3**. In summary, the assessment indicates that both trees were likely to be between 75-100 years old, and that the scars were likely to be between 25-50 years in age. Given the cultural practise of scarring trees largely ceased in the Sydney Basin area in the 19th Century (i.e. >100 years ago), it suggests that the scars on these trees are not of Aboriginal origin (Long, 2005).

The assessment further defined the nature of the impacts required to produce the scars, which in both cases was considered a form of impact (such as a vehicle strike), as well as damage from borers and a steel cable in the case of #45-5-2428.

Subsequently, this assessment considers both Glenfield ST 1 (#45-5-2428) and GWD 1 to be of non-Aboriginal origin, and require no further consideration in this assessment. However, due to one of the trees already being listed on the OEH AHIMS database, recommendations below have been made to remove the tree from this system.

Figure 20 Map of archaeological sites within the subject area.

Plate 8 ***Glenfield ST (#45-5-2428), looking north. This scarred tree was recently recorded by AMBS in 2008, and may relate to an earlier recording by Anthony English in this general vicinity. Subsequent investigations indicate that the scar is likely to be of natural origins.***

Plate 9 ***GWD 1, a possible scarred tree, looking east. This tree was located some 50 m north of the house structure in the western quadrant of the subject site. Glenda Chalker poses for scale. Subsequent investigations indicate that the scar is likely to be of natural origins.***

Plate 10 ***GWD 1, a possible scarred tree, looking east. Subsequent investigations indicate that the scar is likely to be of natural origin***

Plate 11 ***GWD 2, a potential archaeological deposit, looking east along the transmission line. The tree-line represents part of a minor tributary that runs into the Georges River, and appears relatively undisturbed since the 1930s.***

Plate 12 ***GWD 2, a potential archaeological deposit, looking west. The creek line is shown to the left of the photograph.***

Plate 13 ***GWD 3, an isolated object (shown by the white card on the ground), looking northwest towards the maintenance sheds in the southern portion of the subject area.***

Plate 14 ***GWD 3, an isolated object – ventral surface.***

Plate 15 ***GWD 4, an isolated object (shown by the white card on the floor), looking north towards the maintenance sheds in the southern portion of the subject area.***

Plate 16 ***GWD 4, an isolated object – ventral surface.***

8.4 Summary

The study area was investigated on two different occasions, once for the preliminary assessment and once as part of the proposed recycling facility. Ultimately, the investigations included two archaeologists and six Aboriginal sites officers inspecting the entire subject area. While vegetation coverage was dense in some areas, the investigations concluded that large parts of the subject area were heavily disturbed by existing and previous land use (**Figure 19**), most notably a significant portion of the site was an active landfill, and a railway had been constructed (with extensive impacts) along most of the northern edge. South of Cambridge Avenue, a large transmission line and residential development had also resulted in localised impacts. In areas where impacts were not readily apparent (**Figure 19**), the site was characterised by a texture contrast soil, which consisted of two layers - an upper topsoil unit that will contain any cultural and archaeological material (if present), and a lower clay unit that generally pre-dates the colonisation of Australia (and is therefore archaeologically sterile). It was found that frequently, the upper unit was truncated or absent, and therefore the potential for cultural materials was considered very low - nil. This included heavily wooded areas that were initially thought to be undisturbed, but on inspection were found to be relatively recent re-growth (confirmed by the Arborist's report (**Appendix 3**)) and similarly often exhibited truncated soil profiles.

Overall, six archaeological and possible archaeological sites were identified, composed of two 'scarred trees' (see below), three isolated Aboriginal objects, and one potential archaeological deposit (**Figure 20**). It was considered that no other areas exhibited or had the potential to contain cultural or archaeological materials. Of these sites, the two scarred trees were subsequently identified as natural features, leaving four sites. All findings were agreed with by the Aboriginal stakeholders in their comments on the report (see **Appendix 2**).

9 SIGNIFICANCE ASSESSMENT

9.1 General

The heritage significance of Aboriginal archaeological sites can be assessed using the four criteria outlined in the Burra Charter; aesthetic, historic, scientific, and social or spiritual (Australia ICOMOS, 1999).

9.2 Social or Spiritual Significance

This criterion concerns the relationship and importance of sites to the contemporary Aboriginal community. Aspects of cultural significance include people's traditional and contemporary links with a given site or landscape as well as an overall concern by Aboriginal people for sites and their continued protection. Aboriginal cultural values may partially reflect or follow on from archaeological values, historic values, aesthetic values or be tied to values associated with the natural environment - all elements that are discussed above - it is of fundamental importance that they be expressed directly by representatives of the Aboriginal community.

Unmodified natural features in the landscape can signify sacred sites or places of significance. As such, they are archaeologically invisible and can only be identified with the aid of Aboriginal interpretation. If such sites are known, they hold particular cultural significance to contemporary Aboriginal people. Furthermore, sites of significance are not restricted to the period prior to contact with Europeans. Often events related to the contact period, and at times to the period since European settlement, may be important to the local Aboriginal communities. If these events relate to a specific place in the landscape, then that place (i.e. the site) may become sacred or highly significant to the local Aboriginal communities.

Responses from the Aboriginal community following the distribution of a draft version of this report indicated that the subject area would have been important to Darug people due to the proximity of the Georges River (**Appendix 2**). However, they acknowledge that the recent extraction activities have removed any material evidence of such activities. No specific cultural values were assigned to any of the sites identified through this project.

9.3 Scientific Significance

9.3.1 General

The structuring of the process used to assess scientific significance has been outlined by Bowdler (e.g. 1981), and includes the consideration of a number of related issues: research potential, or the ability to address timely and significant research questions; the rareness and/or representativeness of a site; and its integrity.

For the purpose of this assessment, four Aboriginal sites were considered: Glenfield 1, and GWD 2-4 inclusive. Neither of the scarred trees, which proved to be natural are considered.

9.3.2 Research Potential

Research potential is defined as 'the ability to address timely and significant research questions'. The issue of 'timeliness' is critical and surrounds much of the discussion of the mutability of significance that has followed the development of archaeological significance assessment since it essentially began in Australia in the early 1980s (e.g. Bowdler 1981, Sullivan and Bowdler 1984, Smith 1996, Brown 2008, Brown 2011). Essentially, the research questions of today are not the same ones that would have been asked one or ten years ago or which are likely to be asked in one or ten years from now. Critically, for example, there are far fewer 'big' questions that can be asked of Cumberland sub-bioregion open sites and the typology or distribution of the artefacts of which they comprise following some three decades of development-related survey and excavation. Meanwhile, important questions about technological change through the last 5,000 years remain open (because very few sites have yet been investigated (and dated) that are deep, undisturbed and stratified); as do questions about the earliest settlement of the region sometime between 35,000 and 40,000 years ago (because stratified sites of this antiquity only occur in some very limited geomorphic contexts).

It has regularly been commented that the assessment of research potential undertaken by archaeologists (i.e. excluding that provided by the Aboriginal community) can often have the illusion of objectivity that is not matched by greater scrutiny (e.g. Smith 1996, Godwin 2011). Questions are asked: Can the site contribute knowledge that no other resource or site can and/or is the knowledge (unique or otherwise) that a site can contribute relevant to general or specific questions about Aboriginal (pre)history? (paraphrased and adapted to an Aboriginal context from Heritage Branch 2009:8). But while these are questions that can be answered with yes or no or scores from one to ten, Smith has made the point that 'a cultural resource does not have value, but is given value through the process of significance assessment' (1996:67). It is therefore important who gives that value; and then regardless of who that is, that it is well justified and provided sufficient context by the level of investigation and comparative analysis (or other clear understanding of regional archaeology).

In relation to the subject area, only GWD 2 on the edge of Georges River is considered likely to contain material evidence that could be used to address important research questions. Sites in this location are typically large in size and reflect multiple phases of occupation, and have the potential to further understanding of the occupation and use of one of the larger rivers in the region by Aboriginal people. The possibility of the presence of stratigraphic deposits, and hence the potential to derive chronological information from the evidence, is considered likely.

9.3.3 Rareness and Representativeness

The comparative rarity of a site is a consideration in assessing scientific significance. A certain site type may be 'one of a kind' in one area, but very common in another. Artefacts of a particular type may be common in one area, but outside the known distribution in another. The area set when assessing rareness can be considered at various scales - anything from the limits of the subject area itself to the entire country. This geographic extent, when then populated with the known and unknown sites within it can be considered as the 'datum' against which any particular site can be measured (see Godwin 2011 and subsequent comments). An appropriate middle ground, in the greater Sydney region and for the type of heritage management being addressed here, has been proposed to be the subregions mapped within the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell 1995; see Brown 2010a for discussion in a heritage management context). Within IBRA mapping, the subject area is within the Cumberland sub-bioregion.

Within the Cumberland sub-bioregion, 'rareness' is an uncommon contributor to archaeological significance for open lithic sites; it being an area where such sites (with similar artefact types and raw materials) are widespread to the point of being almost ubiquitous. Only a few particular types of open

lithic sites (such as deep, undisturbed and well-stratified ones) could be considered rare in this context.

In one definition provided by Bowdler, representativeness 'is the degree to which sites in the investigated (perhaps threatened) area are representative of sites known elsewhere and where they might be better protected' (1981:128). In this sense, the more representative that a site is (i.e. the more it is of a type well represented elsewhere), the less it would generally be considered to be a matter of conservation priority. Rareness and representativeness are therefore in most cases inseparable and are to some extent simply different ways of looking at the same thing; 'rareness' being slightly more quantitative compared to a more qualitative approach with 'representativeness'.

Within current development consent processes, the assessment of rareness and representatives is perhaps the core outcome of Aboriginal cultural heritage assessment; and it can be posited as a simple question: 'is this a site that can be lost for the sake of development or is it one that must be conserved?'. It is perhaps only with the addition of other significance criteria that we can introduce the nuances of more detailed consideration of the options of active conservation planning, avoidance of harm, minimisation of harm, mitigation of harm or unrestricted permission to harm.

None of the previously recorded sites within the subject area can be considered rare, since they are primarily disturbed isolated finds; these site types are well represented across the Cumberland Plain. However, GWD 2 on the bank of Georges River has the potential to contain extensive and/or old cultural materials - both are features which are less common in the region, although found elsewhere along the creek.

9.3.4 Site Integrity and Disturbance

The integrity of a site is also a consideration in determining scientific significance. While disturbance of a topsoil deposit containing artefacts does not entirely diminish research value, it may limit the types of questions that may be addressed. A heavily cultivated paddock may be unsuited to addressing research questions of small-scale site structure, but it may still be suitable for answering more general questions of implement distribution in a region and raw material logistics.

While site integrity/disturbance is rarely formally included separately within the framework of heritage significance assessment, it arguably should be because it affects all other facets of significance in different ways. For example, if a reasonably defined open artefact site has been partially destroyed, the effect on representatives might be high when other comparable sites remain intact; but research potential may remain unaffected for the purposes of addressing regional implement and raw material distribution.

In relation to the subject area, few of the identified sites, or areas adjacent to Georges River are without disturbance from historical development and land use. Several of the sites could not be re-located due to the level of existing disturbance, and a number of them must be considered to have low integrity. However, the potential for undisturbed sub-surface deposits at GWD 2 is considered moderate.

9.4 Aesthetic Significance

This criterion refers to aspects of sensory perception. The guidelines to the Burra Charter note that assessment may include consideration of the form, scale, colour, texture and material of the item or place, as well as sounds and smells. With regard to pre-contact Aboriginal cultural heritage sites, the

placement within the landscape would be considered under this criterion. Individual artefacts, sites and site features may also have aesthetic significance.

Many of the Aboriginal objects/sites within the subject area are located in a context without remarkable landscape setting, and cannot be considered to retain aesthetic values. GWD 2, however, is situated on the banks of the Georges River - one of the few permanent and large creeks in this region - its proximity and location contribute to the understanding of the Aboriginal cultural heritage significance of the subject area, and can be considered to retain aesthetic values.

9.5 Historic Significance

The guidelines to the Burra Charter include the following discussion of historic significance:

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

In relation to Aboriginal cultural heritage, many post-contact places and sites would have historic value. Pre-contact places and items may also be significant according to this criterion, although the association with historic figures, events, phases or activities may be more difficult to establish. Places of historic significance may include sacred or ceremonial sites, and archaeological sites with evidence of technological developments.

The assessment of the subject area, and discussions with the Registered Aboriginal Parties did not result in the identification of any historic values for the subject area.

9.6 Conclusion

The study area has been subject to widespread disturbance, through clearing of the vegetation, creation and use of vehicle tracks, and the grazing of stock. Although this disturbance does not appear to have included deep excavation over any large area, it has resulted in frequent erosion.

Within the subject area, four Aboriginal sites were identified three isolated objects (Glenfield 1, GWD 3 and 4), and a potential archaeological deposit (GWD 2).

Glenfield 1 was identified as an isolated object, which could not be relocated as part of this assessment. While the object indicates the historical presence of Aboriginal people in the subject area in the past, it can provide little further information and is considered of low significance.

In relation to GWD 2 - a PAD on the banks of Georges River - it is considered likely to contain material evidence that could be used to address important research questions. Sites in this type of location are typically large in size and reflect multiple phases of occupation, and have the potential to further understanding of the occupation and use of one of the larger rivers in the region by Aboriginal people. The possibility of the presence of stratigraphic deposits, and hence the potential to derive chronological information from the evidence, is considered moderate.

The presence of the isolated objects, GWD 3 and GWD 4, in this area indicates that the historical disturbance has not resulted in the complete removal of archaeological evidence of the past

Aboriginal occupation of the area. There may be further surface artefacts present within the subject area. However, the archaeological context of GWD 3 and GWD 4, and any further artefacts present in this area, has been destroyed, meaning that the object has little research potential.

To assess each site individually against the above criteria, a series of questions and answers have been used to explore the site's significance, before making an overall ranking (Table 14). These questions have been adapted for application in an Aboriginal cultural heritage context from the NSW Heritage Branch Department of Planning (2009) *Assessing for Significance for Historical Archaeological Sites and 'Relics'*. These were prepared in association with legislative reform in 2009 leading to greater consideration of significance values and Burra Charter principles to archaeological sites, much as also occurred with changes to Aboriginal heritage management codes and guidelines in 2010. The questions are as follows:

a) Cultural/Social values: Does the site have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons? (noting that with Aboriginal heritage, the cultural group involved is pre-identified within the Aboriginal community through the community consultation process).

b) Historic values: Is the site important to the cultural or natural history of the local area and/or region and/or state?

c) Aesthetic values: Is the site important in demonstrating aesthetic characteristics in the local area and/or region and/or state?

d) Scientific values: Does the site have potential to yield information that will contribute to an understanding of the cultural or natural history of the local area and/or region and/or state?

e) Research potential: Does the evidence suggest any potential to contribute to an understanding of the area and/or region and/or state's natural and cultural history?

f) Representativeness: How much variability (outside and/or inside the site) exists, what is already conserved, how much connectivity is there?

g) Rarity: Is the site important in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practised? Is it in danger of being lost or of exceptional interest?

h) Education potential: Does the site contain teaching sites or sites that might have teaching potential?

Table 2: ***Scientific significance assessment of known sites and areas of potential in the subject area, based on criteria in the Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW.***

Site	AHIMS number	Site Type	Significance Values									Overall Site Significance[1]
			Cultural/social	Historic	Aesthetic	Scientific	Research Potential	Representativeness	Rarity	Integrity	Education potential	
Glenfield 1	45-5-3531	Isolated Object	None provided	No	No	No	No	High	No	Poor	No	Low
GWD 2	45-5-0312	PAD	Yes	No	Some	Yes	Yes	High	Some	Moderate	Some	Moderate
GWD 3	45-5-0313	Isolated Object	None provided	No	No	No	No	High	No	Poor	No	Low
GWD 4	45-5-0360	Isolated Object	None provided	No	No	No	No	High	No	Poor	No	Low

[1] This field provides the overall significance of the site based on the answers to the specific significance criterions outlined elsewhere in the table.

10 CONCLUSIONS & RECOMMENDATIONS

10.1 The Archaeological Resource

The subject area is located on the banks of Georges River. Historically, it would have been a low gentle hill sloping down towards the river, and encompassed two first order tributaries. Since the 1970s, the subject area has been used for sand extraction and landfill, and these activities have significantly impacted several areas of the site.

Based on regional data, archaeological deposits in this area are likely to be constrained to artefact scatters, isolated finds, scarred trees and/or potential archaeological deposits. When overlaying archaeological potential with areas of known disturbance, only two parts of the subject area are considered to have potential for the presence of Aboriginal objects/sites: an area of unmodified woodland in the western quadrant of the subject area; and the alluvial terrace on the eastern edge of the transmission line.

A review of the archaeological record and a site inspection has confirmed the contextual assumptions. The sites identified within the subject area are as follows (see **Figure 20**):

- Glenfield 1 (#45-5-3531), an isolated object. It is considered probable that this site has been destroyed since the registration was lodged.
- GWD 2, a potential archaeological deposit.
- GWD 3, an isolated object.
- GWD 4, an isolated object.

Two further sites were initially identified, but have subsequently been re-classified as of natural origin (**Section 8.3.1**). These were:

- Glenfield ST (#45-6-2428), a scarred tree.
- GWD 1, a scarred tree.

The footprint of the proposed development consists of a disturbed area of low archaeological potential, but does include the sites GWD 3 and GWD 4.

10.2 Subject Site Management

The findings of this assessment indicate that there are no reasons to object to the proposed rezoning on Aboriginal heritage grounds. This is because the level of impact on potential Aboriginal objects/sites would be negligible at re-zoning stage. GWD 2, a moderately significant PAD, is proposed to be re-zoned *RE1 Public Recreation, SP2 Road and Infrastructure (Car Park)* and *SP2 Future Transport Corridor* by Campbelltown City Council. These zonings would not result in significantly deep (if any) impacts to the under-lying deposits. Further investigation of GWD 2 may be required to firmly identify its scientific and cultural values as part of any development application for the GWD 2 area. Therefore, while additional characterisation of the deposit is desirable, the level of

impact from the re-zoning would be negligible and such investigation could occur at the development stage.

Should potential impacts to GWD 3 and 4, an Aboriginal Heritage Impact Permit and associated documentation would need to be lodged with Office of Environment & Heritage for consideration prior to any development. No further action is considered necessary for Glenfield ST1 and GWD 1, since both sites were identified as scarred trees, but subsequently determined to be non-cultural.

Responses from the RAPs provided agreement and support of the findings and recommendations outlined here. The only additional recommendation made by the RAPs was the inclusion of signage on the Aboriginal history of the region following the completion of the development (**Appendix 2**). This recommendation has been considered as part of the report's recommendations (**Section 10.3**).

10.3 Conclusions and Recommendations

- If the boundaries of the subject area are revised to include areas not addressed in the assessment, assessment of these additional areas should be undertaken in order to manage the potential Aboriginal heritage impact.

- Kennett Enterprises should advise all relevant personnel and contractors involved in activities within the subject area of the relevant heritage issues and legislative requirements, and the recommendations of the current assessment.

- In the event that previously unidentified Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) are discovered within the subject area, all work in the vicinity of the find should cease, and Kennett Enterprises should determine the subsequent course of action in consultation with a heritage professional, the Registered Aboriginal Parties and the relevant State government agency.

- If human skeletal material less than 100 years old is discovered, the Coroners Act 2009 requires that all works should cease and the NSW Police and the NSW Coroner's Office should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the National Parks and Wildlife Act 1974 and should not be disturbed. Therefore when skeletal remains are found and are suspected to be an Aboriginal burial site, an appropriately skilled archaeologist or physical anthropologist should be contacted to determine if the remains are Aboriginal objects. Should skeletal remains prove to be archaeological the RAPs should be notified. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the Aboriginal and Torres Strait Islander Heritage Protection Act 1984.

- Based on the findings of this study, there are no Aboriginal heritage issues that indicate that the re-zoning of the subject site from rural to industrial should not proceed;

- Aboriginal Heritage Information Management System (AHIMS) Site cards for the two isolated objects, GWD 3 and GWD 4, should be completed and lodged with the AHIMS registrar. [Completed]

- An AHIMS site card for the potential archaeological deposit GWD 2 should be completed and lodged with the AHIMS registrar. [Completed]

- Following advice from an arborist, neither Glenfield ST 1 (#45-6-2428) nor GWD 1 are considered scarred trees of cultural origin. A modified AHIMS site card reflecting these findings and explaining the outcomes of this study should be lodged with the AHIMS registrar; specific request should be made for the re-classification of Glenfield ST 1 (#45-6-2428) to the category 'not a site' in the AHIMS system. [Completed]

- It is recommended that prior to any impact from proposed development, further assessment and characterisation is undertaken of the identified Aboriginal objects/sites. Should they prove to be Aboriginal objects/sites as defined by the *National Parks and Wildlife Act 1974*, appropriate assessments and permits under this Act would be required prior to their disturbance

- In accordance with Aboriginal community responses, consideration should be given to developing signage on the Aboriginal history of the subject area following the completion of the development.

- A copy of the final version of the assessment should be provided to each of the registered Aboriginal parties, listed above. [Completed]

- A copy of the final assessment should be lodged with the AHIMS registrar in accordance with relevant guidelines. [Completed]

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APPENDIX 1: AHIMS DATA

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref Number : Glenfield2

Client Service ID : 69786

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2537	HPR-OS-1	AGD	56	303150	6243640	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
Contact		Recorders	Robynne Mills					Permits	1431	
45-5-2538	HPR-ST-1	AGD	56	306810	6243650	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	98443
Contact		Recorders	Robynne Mills					Permits		
45-5-2495	MFH 2	AGD	56	304300	6238300	Open site	Valid	Artefact : -	Open Camp Site	
Contact		Recorders	Mary Dallas Consulting Archaeologists					Permits		
45-5-2479	IF 1 (isolated find)	AGD	56	303680	6241600	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
Contact		Recorders	Elizabeth White					Permits		
45-5-2481	Maxwells Creek 11 (MC11)	AGD	56	303720	6241600	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
Contact		Recorders	Elizabeth White					Permits	1398	
45-5-2482	Maxwells Creek 10 (MC10)	AGD	56	303490	6241050	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
Contact		Recorders	Elizabeth White					Permits	1564	
45-5-2483	Maxwells Creek 9 (MC9)	AGD	56	303050	6241080	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
Contact		Recorders	Elizabeth White					Permits		
45-5-2469	IF1	AGD	56	303830	6241020	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443
Contact		Recorders	Helen Brayshaw					Permits	1398	
45-5-2470	IF2	AGD	56	303370	6242320	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
Contact		Recorders	Helen Brayshaw					Permits		
45-5-2471	IF3	AGD	56	302590	6243630	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
Contact		Recorders	Helen Brayshaw					Permits	1398,1564	
45-4-0936	Crossroad 1	AGD	56	303780	6240070	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
Contact		Recorders	Kerry Navin,Mr.Kelvin Officer					Permits	987	
45-4-0937	Crossroad 2	AGD	56	303750	6240070	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
Contact		Recorders	Kerry Navin,Mr.Kelvin Officer					Permits	986	
45-5-2455	DD1	AGD	56	302700	6238890	Open site	Valid	Artefact : -	Open Camp Site	98739

Report generated by AHIMS Web Service on 11/05/2012 for Oliver Brown for the following area at Datum :GDA, Zone : 56, Eastings : 302000 - 310000, Northings : 6236000 - 6244000 with a Buffer of 0 meters.Additional Info : GIS shapefile, zone 56 GDA94 please. Number of Aboriginal sites and Aboriginal objects found is 96

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref Number : Glenfield2

Client Service ID : 69786

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists					**Permits**		
45-5-2456	DD 2	AGD	56	302200	6237550	Open site	Valid	Artefact : -	Open Camp Site	98739
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists					**Permits**		
45-5-2457	DD 3	AGD	56	302800	6238050	Open site	Valid	Artefact : 3	Open Camp Site	98739,102184
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists,Australian Museum Business Services (AMB					**Permits**		
45-5-2458	DD 4	AGD	56	302790	6238470	Open site	Valid	Artefact : 2	Open Camp Site	98739,102184
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists,Australian Museum Business Services (AMB					**Permits**		
52-2-0086	Long Point;Matthews No.1 Shelter;	AGD	56	308300	6237700	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	Margrit Koettig					**Permits**		
45-5-0890	WG3 (Wattle Grove)	AGD	56	309100	6240030	Open site	Valid	Artefact : -	Open Camp Site	2474
	Contact	**Recorders**	Philip Boot					**Permits**	465	
45-5-0891	WG2 (Wattle Grove)	AGD	56	309020	6239950	Open site	Valid	Artefact : -	Open Camp Site	2474
	Contact	**Recorders**	Philip Boot					**Permits**	465	
45-5-0892	WG1 (Wattle Grove)	AGD	56	309070	6239950	Open site	Valid	Artefact : -	Open Camp Site	2474
	Contact	**Recorders**	Philip Boot					**Permits**	465	
45-5-2301	P-CP1	AGD	56	303690	6241790	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-5-2302	GP-CP2;	AGD	56	303750	6241950	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443
	Contact	**Recorders**	Helen Brayshaw					**Permits**	850	
45-5-2303	P-CP3	AGD	56	303400	6242200	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-5-2319	HPC 1;	AGD	56	301900	6243800	Open site	Valid	Artefact : -	Isolated Find	3374,3529,98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	846,1053	
45-5-2320	HPC 2; HPR1	AGD	56	301950	6243740	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -	Open Camp Site	3374,98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	846,2897,3007	
45-5-0844	Prestons 1;	AGD	56	303570	6243200	Open site	Valid	Artefact : -	Open Camp Site	2165,98369,98370,98371,98443,98739

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref Number : Glenfield2

Client Service ID : 69786

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Kerry Navin					**Permits**	311	
45-6-2428	Glenfield S.T.	AGD	56	306200	6239600	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	**Recorders**	Anthony English					**Permits**		
45-5-0123	George's River;	AGD	56	307040	6236964	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	R Etheridge					**Permits**		
45-5-0124	Harris Creek;	AGD	56	307040	6236964	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	B Mclean					**Permits**		
45-5-2376	P-CP10	AGD	56	303640	6241560	Open site	Valid	Artefact : -	Open Camp Site	3726,98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw,Elizabeth Rich					**Permits**	1564	
45-5-2377	P-CP11	AGD	56	302460	6243550	Open site	Valid	Artefact : -	Open Camp Site	3726,98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw,Elizabeth Rich					**Permits**		
45-5-0720	Kiawaka 3	AGD	56	305980	6240600	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1360
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists					**Permits**	264	
45-5-0721	Kiawaka 4	AGD	56	306000	6240660	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1360
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists					**Permits**		
45-5-0722	Kiawaka 5	AGD	56	306300	6240340	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1360
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists					**Permits**	2521	
45-5-0723	Kiawaka 2	AGD	56	306250	6240150	Open site	Valid	Artefact : -	Open Camp Site	1360
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists					**Permits**		
45-5-0724	Kiawaka 1	AGD	56	305950	6240270	Open site	Valid	Artefact : -	Open Camp Site	1360
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref Number : Glenfield2

Client Service ID : 69786

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-2-2298	HPC2;	AGD	56	301950	6243740	Open site	Valid	Artefact : -	Open Camp Site	3374,98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**		
45-2-2299	HPC1	AGD	56	301900	6243800	Open site	Valid	Artefact : -	Isolated Find	3374,98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	1316	
45-5-0833	Hoxton Park 2;	AGD	56	302710	6243720	Open site	Valid	Artefact : -	Open Camp Site	2118,98369,98370,98371,98443,98739
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-5-0775	CC-1 (Cabramatta Creek)	AGD	56	302560	6243250	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0776	CC-2 (Cabramatta Creek)	AGD	56	301990	6243030	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0778	MC-1 (Maxwells Creek)	AGD	56	304040	6242410	Open site	Valid	Artefact : -	Open Camp Site	1727,97544
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**	1025	
45-5-0779	MC-2 (Maxwells Creek)	AGD	56	303870	6242530	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0780	MC-3 (Maxwells Creek)	AGD	56	303350	6239250	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0781	MC-4 (Maxwells Creek)	AGD	56	303400	6239350	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0782	MC-5 (Maxwells Creek)	AGD	56	303530	6239640	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref Number : Glenfield2

Client Service ID : 69786

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-0783	MC-6;	AGD	56	303400	6239550	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0784	MC-7;	AGD	56	302900	6239240	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0785	MC-8;	AGD	56	303710	6240550	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0788	EP-1;	AGD	56	302420	6240300	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0789	EP-2;	AGD	56	302400	6239850	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0001	Macquarie Fields;Three Hand Alcove;	AGD	56	306685	6236409	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1976
	Contact	**Recorders**	ASRSYS					**Permits**		
45-5-2725	PAD-OS-1	AGD	56	303720	6241200	Open site	Valid	Artefact : -		98369,98370,98371,98443,98739
	Contact	**Recorders**	Robynne Mills					**Permits**	1396	
45-5-2744	MLE1	AGD	56	303500	6238550	Open site	Valid	Artefact : -		98739
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1989	
45-5-2800	MC9	AGD	56	303760	6241880	Open site	Valid	Art (Pigment or Engraved) : -		98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**		
45-5-2709	P-CP16	AGD	56	303900	6241890	Open site	Valid	Artefact : -		3726,98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw,Elizabeth White					**Permits**	1637	
45-5-2761	P-CP15	AGD	56	303750	6241690	Open site	Valid	Artefact : -		3726,98369,98370,98371,98443,98739

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Helen Brayshaw,Elizabeth White					Permits	1398	
45-5-2853	PAD 6 WSO	AGD	56	303510	6240920	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Helen Brayshaw					Permits	1638	
45-5-2883	MB.1	AGD	56	308700	6241700	Open site	Valid	Artefact : -		
	Contact	Recorders	Mary Dallas Consulting Archaeologists					Permits		
45-5-2875	PAD 6 Open Campsite	AGD	56	303610	6240840	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Central West Archaeological and Heritage Services Pty Ltd					Permits	1737	
45-5-2919	H667	AGD	56	306990	6237370	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
45-5-2934	H414	AGD	56	307600	6237325	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
45-5-2935	H413	AGD	56	308500	6235975	Open site	Valid	Grinding Groove : -		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
52-2-2324	H304	AGD	56	307050	6235850	Open site	Valid	Art (Pigment or Engraved) : -, Artefact : -		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
45-5-2931	H581	AGD	56	306850	6237490	Open site	Valid	Artefact : -		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
45-5-2957	799	AGD	56	308500	6236240	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders						Permits		
45-5-2963	Site H928	AGD	56	306840	6237510	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	Recorders	Bobbie Oakley					Permits		
45-5-2968	Site H1025	AGD	56	307280	6237500	Open site	Valid	Artefact : -		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
45-5-2946	H363	AGD	56	307050	6237560	Open site	Valid	Artefact : -		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref Number : Glenfield2

Client Service ID : 69786

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders						Permits		
45-5-2947	H362	AGD	56	307130	6238300	Open site	Valid	Artefact : -		
	Contact	Recorders						Permits		
45-5-2914	H820	AGD	56	308510	6236650	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Kelvin Officer,Navin Officer Heritage Consultants Pty Ltd					Permits		
45-5-2964	Site H970	AGD	56	307130	6236550	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Bobbie Oakley					Permits		
45-5-2969	Site H1029	AGD	56	308200	6236700	Open site	Valid	Grinding Groove : -		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
45-5-3187	Nineteenth Ave Scarred Tree (NA1)	AGD	56	302093	6243215	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact T Russell	Recorders	Ms.Jillian Comber					Permits		
45-5-2480	Maxwells Creek 12 (MC12)	AGD	56	303700	6241700	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	Recorders	Elizabeth White					Permits		
45-5-0889	WG 4 (Wattle Grove)	AGD	56	309130	6240170	Open site	Valid	Artefact : -	Open Camp Site	2474
	Contact	Recorders	Philip Boot					Permits	465	
45-5-0794	Holsworthy (H) 2;	AGD	56	309550	6240200	Open site	Valid	Artefact : -	Open Camp Site	1934
	Contact	Recorders	Philip Boot					Permits	456	
45-5-3529	EPCS4	GDA	56	302178	6239148	Open site	Valid	Artefact : 2		
	Contact	Recorders	Australian Museum Business Services (AMBS)					Permits		
45-5-3531	Glenfield 1	GDA	56	306252	6239702	Open site	Valid	Artefact : 1		
	Contact	Recorders	Australian Museum Business Services (AMBS)					Permits		
45-5-3535	SWRL Site 5	GDA	56	302757	6239032	Open site	Valid	Stone Arrangement : 5		
	Contact	Recorders	Australian Museum Business Services (AMBS)					Permits		
45-5-3439	CC4 Hoxton Park	AGD	56	301900	6243150	Open site	Valid	Artefact : 7		
	Contact	Recorders	Mary Dallas Consulting Archaeologists					Permits	2981	
45-5-0795	Holsworthy (H) 1;	AGD	56	309300	6240120	Open site	Valid	Artefact : -	Open Camp Site	1934
	Contact	Recorders	Philip Boot					Permits	456	
45-5-3639	BC1 (Liverpool)	GDA	56	305214	6237770	Open site	Valid	Artefact : 1		101368
	Contact	Recorders	Mr.Oliver Brown					Permits		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref Number : Glenfield2

Client Service ID : 69786

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-3629	Collingwood Park (CW 1)	GDA	56	307600	6243160	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		101316
	Contact	**Recorders**	Mr.Oliver Brown					**Permits**	3184	
45-5-3709	KB1 (Liverpool)	GDA	56	302939	6241996	Open site	Valid	Artefact : 1		99115
	Contact	**Recorders**	Michael Therin					**Permits**	3194	
45-5-3710	KB2 (Liverpool)	GDA	56	302386	6242062	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Michael Therin					**Permits**	3194	
45-5-3908	EPCS 1	AGD	56	302179	6240173	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Megan Mebberson					**Permits**		
45-5-3909	EPCS 3	AGD	56	302385	6239089	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Megan Mebberson					**Permits**		
45-5-3913	EPCS 12	AGD	56	302739	6238458	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Megan Mebberson					**Permits**		
45-5-3914	EPCS 13	AGD	56	302500	6238480	Open site	Valid	Artefact : 2		
	Contact	**Recorders**	Megan Mebberson					**Permits**		
45-5-3990	SWRL Site 14	GDA	56	302406	6239226	Open site	Valid	Artefact : 4		102198,102199
	Contact	**Recorders**	Australian Museum Business Services (AMBS)					**Permits**		
37-2-3969	EPCS 2	GDA	56	302420	6240380	Open site	Valid	Artefact : 9		102184
	Contact	**Recorders**	Australian Museum Business Services (AMBS),Ms.Ngaire Richards					**Permits**		
45-5-3984	EPSW1	GDA	56	302803	6238254	Open site	Valid	Artefact : 1		102184
	Contact	**Recorders**	Australian Museum Business Services (AMBS),Ms.Ngaire Richards					**Permits**		
45-5-3987	EPSW4	GDA	56	302124	6239327	Open site	Valid	Artefact : 2		102184
	Contact	**Recorders**	Australian Museum Business Services (AMBS),Ms.Ngaire Richards					**Permits**		
45-5-3988	EPSW5	GDA	56	302361	6238116	Open site	Valid	Artefact : 29		102184
	Contact	**Recorders**	Australian Museum Business Services (AMBS),Ms.Ngaire Richards					**Permits**		
45-5-3989	SW2	GDA	56	302124	6239332	Open site	Valid	Artefact : 1		102184
	Contact	**Recorders**	Australian Museum Business Services (AMBS),Ms.Ngaire Richards					**Permits**		

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Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☒ Additional information ☐

SITE IDENTIFICATION

Site name	Glenfield 1	**NPWS Site Number**	45-5-3531
Owner/manager			
Owner Address			

LOCATION

Location	Lot 9 DP833516						
How to get to the site	Coming from Sydney, travel west on the Hume Highway, bear left at Campbelltown Road, turn left at Glenfield Road, turn right at the roundabout, turn left at the next roundabout, then turn right onto an access road next to the railway line. Walk northeast along the road for approximately 300m. The site is in an area of exposure on the left side of the road, approximately 15m west of a 20km/hr road sign.						
1:250,000 map name					**NPWS map code**		
AMG Zone	56	**AMG Easting**	306252		**AMG Northing**	6239702	
Method for grid reference	Hand-held GPS	**Map scale (if method = map)**	1:25,000	**Map name**			
NPWS District					**NPWS Zone**	Sydney Zone	
Portion no.					**Parish**		

SITE DESCRIPTION

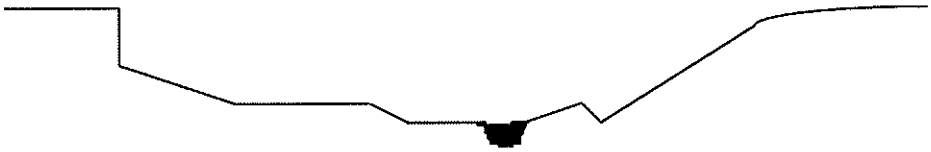
Site type(s)	Isolated find	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	This site is located c. 1 km west of the Georges River, within Lot 9 DP833516. The current railway line is present c. 50 m to the north of the site. The exposure is located beside an access road to the sand mine, c. 15 m west of a 20 km/hour sign. The land slopes slightly down to the south, and to the east after the speed sign. A series of houses is present on the southern side of the access road, but are not visible from the site because the southern side of the road has an embankment. The site comprises one piece of heat-shattered red silcrete. Ground surface visibility within the exposure was around 95%.		

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT

Land form	Flat	**Aspect**		**Slope**	
Mark position of the site					
Local rock type		**Land use/effect**			
Distance from drinking water	200m	**Source**	Glenfield Creek		
Resource zone (eg. estuarine, river, forest)		**Vegetation**			
Edible plants		**Faunal resources** (include shellfish)			
Other exploitable resources (eg. ochre)					
Are there other sites in the locality	Yes	**Are they in the Sites Register**	Yes	**Other site types include**	Stone artefact scatters, scarred trees

SITE MANAGEMENT

Site condition	Disturbed		
Management recommendations	Site should not be impacted by the proposed upgrade works to the railway line, however it is receommended that temporary fencing be erected around the site during construction works, so as to prevent accidental impact (eg from vehicle access).		
Have artefacts been removed from site	No	**When**	
By whom		**Deposited at**	
Consent applied for	☐	**Consent issued**	☐
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING

Reason for investigation	Aboriginal heritage assessment for proposed upgrade of Glenfield railway station		
Were local Aborigines contacted or present for the recording	☐ Not contacted ☒ Contacted and present ☐ Contacted but not present	**Names and addresses**	Cliff Foley Dharawal Local Aboriginal Land Council PO Box 20 Buxton NSW 2571 Alfred Fazldeen Cubbitch Barta Native Title Claimants Aboriginal Corporation 55 Nightingale Road Pheasants Nest NSW 2574 Gordon Morton Darug Aboriginal Cultural Heritage Assessments 28 Calala St Mt Druitt NSW 2770 Justine Coplin Darug Custodian Aboriginal Corporation PO Box 81

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

			Windsor NSW 2756 Grey Morley Darug Tribal Aboriginal Corporation PO Box 441 Blacktown NSW 2148 Yvonne Simms La Perouse Botany Bay Aboriginal Corporation \ 2/3 Birch Crescent East Corrimal NSW 2518 Keith Ball Wadi Wadi Coomaditchie Aboriginal Corporation 2/3 Birch Crescent East Corrimal NSW 2518 Paul Cummins Woronora Plateau Gundungara Elders Council 2/3 Birch Crescent East Corrimal NSW 2518

Is the site important to local Aborigines			
Verbal/written reference sources	AMBS (in prep) Stage B1 Glenfield Station Aboriginal Heritage Assessment. Report to Parsons Brinckerhoff Australia Pty Ltd.	**ASR report number(s)**	C- C-
Photographs taken	Yes	**No of Photos attached**	2
Site recorded by	Jenna Weston	**Date of recording**	28 July, 2008
Address/institution	Australian Museum Business Services 6 College St Sydney NSW 2010		

Glenfield 1 artefact details.

Material	Colour	Maximum Size (cm)	Artefact Type
Silcrete	Red	1	Heat shatter

Glenfield 1 location. View to north, showing train line in background.

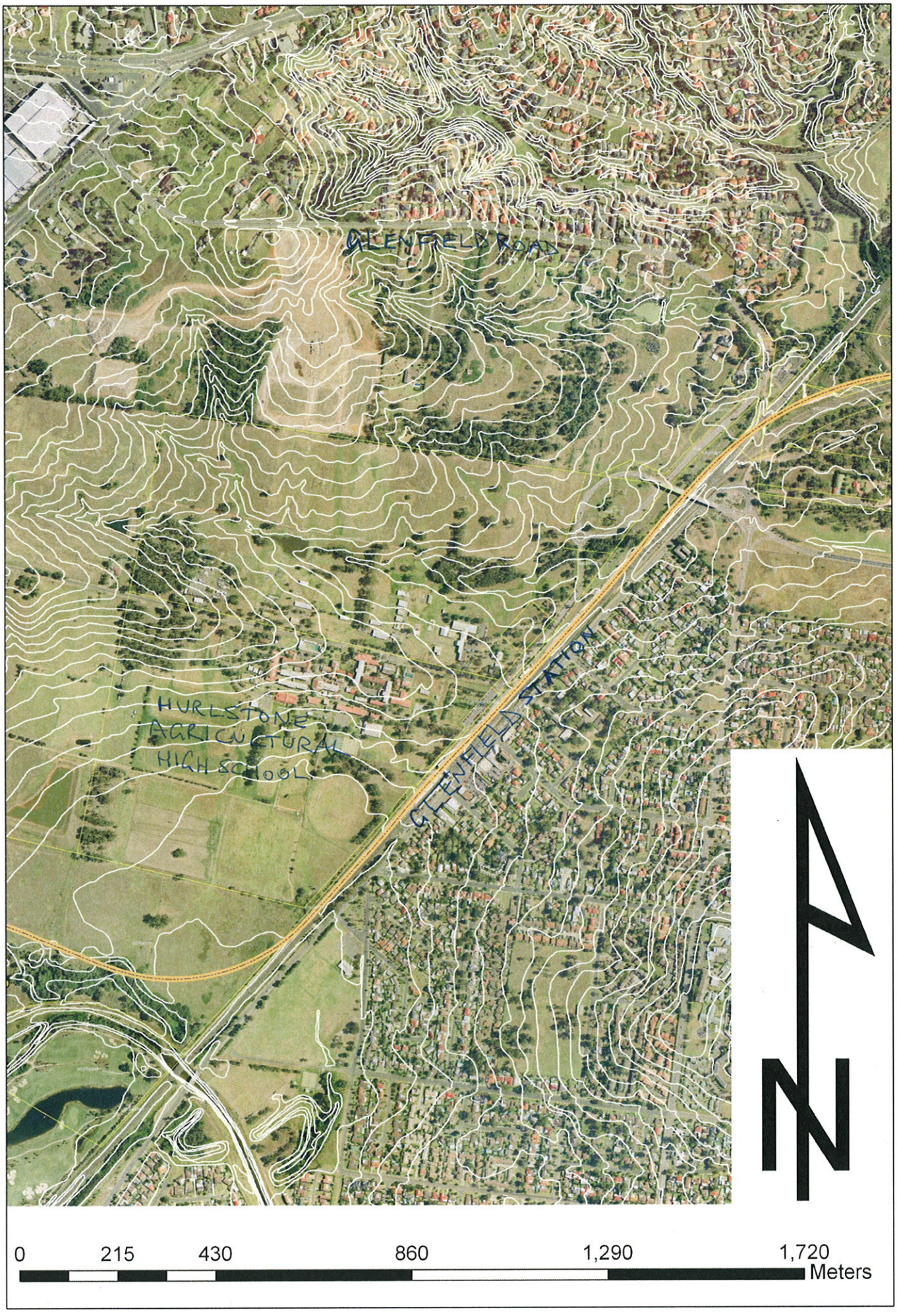
Glenfield 1 silcrete artefact.

0 70 140 280 420 560
Meters

Map Datum: GDA 1994

N

Australian museum


GLENFIELD ROAD
HURLSTONE AGRICULTURAL HIGH SCHOOL
GLENFIELD STATION
N
0
215
430
860
1,290
1,720
Meters

[✓] New recording [ ] Additional Info

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

45-6-2428

1:250,000 map sheet: SYDNEY WOLLONGONG NPWS Code 45

AMG Grid reference (Full reference - please include leading digits): 250K 30 62 00 mE (25K); 250K 62 39 60 00 mN (5/6, 25K)

Scale of map used for grid reference (Please use largest scale available): [ ] 1:25K [✓] 50K (preferred) [ ] 100K [ ] 250K

1:25K, 50K, 100K map name: LIVERPOOL

HEAD OFFICE USE ONLY:
NPWS Site no: 45-6-2428
Site types: SCARRED TREE
Accessioned by: BE Date: 25 NOV 1994
Data entered by: Date:

Owner/Manager: STATE RAIL AUTHORITY, NSW
Address:

Site name: GLENFIELD S.T. Locality/property name: RAIL RESERVE

NPWS District: STH. MET. Region: CENTRAL

Reason for investigation
Archaeological survey of proposed Moomba to Sydney ethane pipeline between Wilton and Botany, NSW

Portion no:
Parish:

Photos taken? Yes
How many attached? Yes (1)

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff (Draw diagram on separate sheet.)
Approach from Canterbury Rd. Cambridge Ave., Glenfield. Enter gate of sand mining area at "Hazelwood Park. Turn west and head towards railway line for 20-30m. Located on edge of vegetation track from railway fence

Other sites in locality? Site Types include:
Are sites in NPWS Register?

Have artefacts been removed from site? N/A When? N/A
By whom? Deposited where?

Is site important to local Aborigines? Yes
Give contact(s) name(s) + address(es) Ms. Narda Ingrey, Thaawal L.A.L.C. P.O. Box 20 BUXTON NSW

Contacted for this recording? Yes
(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report). English, A.J. (1994) Archaeological survey of proposed Moomba to Sydney Ethane pipeline. Wilton to Botany, NSW
NPWS Report Catalogue #

Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site: Excellent. Tree is living. No noticeable deterioration and not under threat when recorded.

Recommendations for management & protection (attach separate sheet if necessary):
See Report

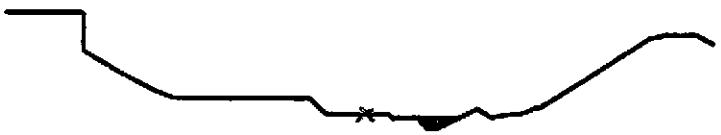
Site recorded by: Tony English Date: 22nd Sep. 1994
Address/institution: 41 Junior St., Leichhardt NSW 2040

SITE POSITION & ENVIRONMENT

OFFICE USE ONLY: NPWS site no:

1. Land form a. beach/hill slope/ridge top, etc: Flat b. site aspect: west c. slope: 0-2°

d. mark on diagram provided *or* on your own sketch the position of the site: e. Describe briefly:



f. Local rock type: g. Land use/effect:

2. Distance from drinking water: 200 m Source: Glenfield Creek

3. Resource Zone associated with site (estuarine, riverine, forest etc): Open woodland + scrub

4. Vegetation: Open eucalypt woodland.

5. Edible plants noted:

6. Faunal resources (include shellfish):

7. Other exploitable resources (river pebbles, ochre, etc):

Site type:
SCARRED TREE

CHECKLIST TO HELP: length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock.
DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types.
ART: area of surface decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.
BURIALS: number & condition of bone, position, age, sex, associated artefacts.
TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth.
QUARRIES: rock type, debris, recognisable artefacts, percentage quarried.
OTHER SITES EG. structures (fish traps, stone arrangements, bora rings, mia mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate

DESCRIPTION OF SITE & CONTENTS.
Note state of preservation of site & contents. Do NOT dig, disturb, damage site or contents.

Species: Eucalyptus spp.

Scar Measurements (maximum)

- Length (incl. regrowth): 198 cm.
- Inside scar length: 195 cm
- Width (incl. regrowth): 50 cm
- Inside width: 32 cm
- Width of regrowth: 3.5 cm
- Depth of regrowth: 7 cm
- Height of inside scar above grd: 0 cm
- Orientation: west
- Landform: flat
- Associated sites: None known
- Comment: Tall mature living tree. No evidence of axe marks on scar

Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.
Attach annotated photos (stereo where useful) showing scale, particularly for art sites.

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording ☐ Additional information ☒

SITE IDENTIFICATION

Site name	Glenfield S.T. (additional information)	**NPWS Site Number**	45-6-2428
Owner/manager			
Owner Address			

LOCATION

Location	Lot 3 DP735524				
How to get to the site	Coming from Sydney, travel west on the Hume Highway, bear left at Campbelltown Road, turn left at Glenfield Road, turn right at the roundabout, turn left at the next roundabout, then turn right onto an access road next to the railway line. Walk into the fenced paddock area, and the tree is located c..30m west north west of the treed fencline of the adjoining property.				
1:250,000 map name				**NPWS map code**	
AMG Zone	56	**AMG Easting**	306210	**AMG Northing**	6239615
Method for grid reference	Hand-held GPS	**Map scale (if method = map)**	1:25,000	**Map name**	
NPWS District				**NPWS Zone**	Sydney Zone
Portion no.				**Parish**	

SITE DESCRIPTION

Site type(s)	Scarred tree	**Site type code (NPWS use only)**	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet,/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead. likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	This site is located within an open area adjacent to a series of houses, within Lot 3 DP735524. The tree was previously recorded by Anthony English, and was relocated during the current survey, but not subject to a second recording. However, it was noted that metal wire was wrapped around the base of the tree, and the wood is beginning to decay near the base of the scar. These factors indicate that the tree is in a disturbed and deteriorating condition.		

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT

Land form	Flat	**Aspect**		**Slope**	
Mark position of the site					
Local rock type		**Land use/effect**			
Distance from drinking water	150m	**Source**	Glenfield Creek		
Resource zone (eg. estuarine, river, forest)		**Vegetation**			
Edible plants		**Faunal resources** (include shellfish)			
Other exploitable resources (eg. ochre)					
Are there other sites in the locality	Yes	**Are they in the Sites Register**	Yes	**Other site types include**	Stone artefact scatters, isolated finds

SITE MANAGEMENT

Site condition	Disturbed		
Management recommendations	Site should not be impacted by the proposed upgrade works to the railway line, however it is recommended that any access to the fenced paddock within which the tree is located will necessitate the erection of fencing around a 10m buffer zone surrounding the tree, during construction works, so as to prevent accidental impact (eg from vehicle access).		
Have artefacts been removed from site	No	**When**	
By whom		**Deposited at**	
Consent applied for	☐	**Consent issued**	☐
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING

Reason for investigation	Aboriginal heritage assessment for proposed upgrade of Glenfield railway station		
Were local Aborigines contacted or present for the recording	☐ Not contacted ☒ Contacted and present ☐ Contacted but not present	**Names and addresses**	Cliff Foley Dharawal Local Aboriginal Land Council PO Box 20 Buxton NSW 2571 Alfred Fazldeen Cubbitch Barta Native Title Claimants Aboriginal Corporation 55 Nightingale Road Pheasants Nest NSW 2574 Gordon Morton Darug Aboriginal Cultural Heritage Assessments 28 Calala St Mt Druitt NSW 2770 Justine Coplin Darug Custodian Aboriginal Corporation

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

			PO Box 81 Windsor NSW 2756 Grey Morley Darug Tribal Aboriginal Corporation PO Box 441 Blacktown NSW 2148 Yvonne Simms La Perouse Botany Bay Aboriginal Corporation \ 2/3 Birch Crescent East Corrimal NSW 2518 Keith Bail Wadi Wadi Coomaditchie Aboriginal Corporation 2/3 Birch Crescent East Corrimal NSW 2518 Paul Cummins Woronora Plateau Gundungara Elders Council 2/3 Birch Crescent East Corrimal NSW 2518

Is the site important to local Aborigines			
Verbal/written reference sources	AMBS (in prep) Stage B1 Glenfield Station Aboriginal Heritage Assessment. Report to Parsons Brinckerhoff Australia Pty Ltd.	**ASR report number(s)**	C- C-
Photographs taken	Yes	**No of Photos attached**	2
Site recorded by	Jenna Weston	**Date of recording**	28 July, 2008
Address/institution	Australian Museum Business Services 6 College St Sydney NSW 2010		

Glenfield S.T. location. View to north east, showing edge of tree line behind adjacent house.

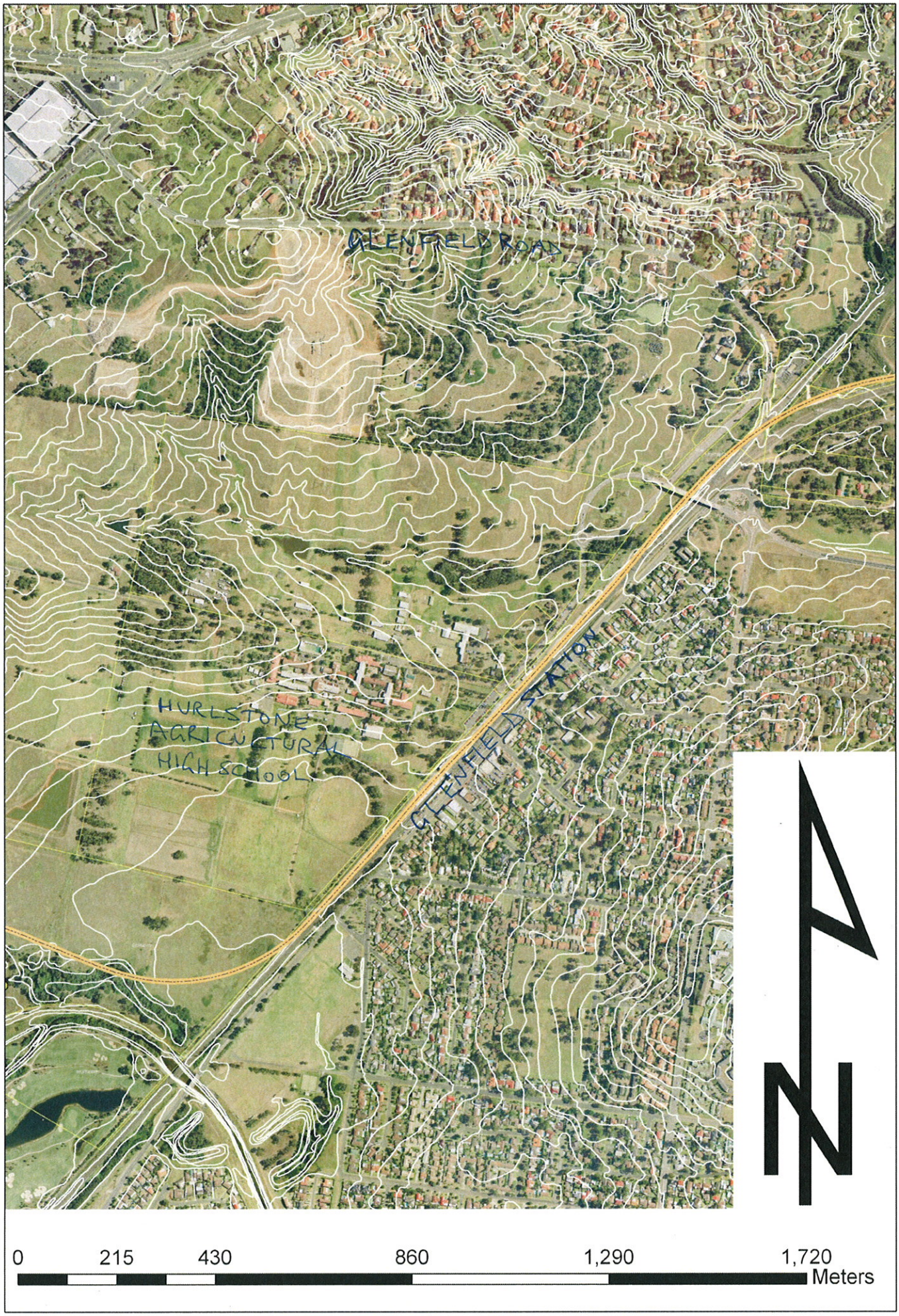
Metal wire wrapped around base of scarred tree.

0 70 140 280 420 560 Meters

Map Datum: GDA 1994

N

Australian museum


GLENFIELD ROAD
HURLSTONE AGRICULTURAL HIGH SCHOOL
GLENFIELD STATION
N
0
215
430
860
1,290
1,720
Meters

APPENDIX 2: ABORIGINAL COMMUNITY CONSULTATION

Organisation/Group	Representative Contacted	Date	Comments	AHMS Contact
Cubbitch Barta Native Title Claimants Aboriginal Corporation	Glenda Chalker	11.5.12	Invited a representative to attend a site visit of the study area	Alan Williams
Tharawal LALC	Elwyn Brown	11.5.12	Invited a representative to attend a site visit of the study area	Alan Williams
Aboriginal Land Rights Act 1983	The Office of the Registrar	15/5/12	Sent letter via express post	Carmel Prunty
Campbelltown City Council	General Manager	15/5/12	Sent letter via express post	
Sydney Metropolitan Catchment Management Authority	General Manager	15/5/12	Sent letter via express post	Carmel Prunty
Tharawal Local Aboriginal Land Council	Elwyn Brown	15/5/12	Sent letter via express post	Carmel Prunty
Native Title Services Corporation	General Manager	15/5/12	Sent letter via express post	
Metropolitan Branch	Lou Ewins	15/5/12	Sent letter via express post	
Native Title Services Corporation	Nakari Thorpe	22.5.12	Provided information on the region showing no active or finalised claims.	Alan Williams
NTSCorp	Peter Schultz	22.5.12	Advised that he had distributed my information to all cultural knowledge holders known to NTSCorp for the region, and asked that they contact me.	Alan Williams
OEH	Lou Ewins	17.5.12	Provided a list of Aboriginal stakeholders requiring consultation	Alan Williams
DACHA	Celestine Everingham	28.5.12	Registered an interest in the project	Alan Williams
Campbelltown MacArthur Advertiser	Via email	06.06.12	Notification of advert	Carmel Prunty
Darug Tribal Aboriginal Corporation	Sandra Lee	1.6.12	E-mailed notification letter seeking their interest	Alan Williams
Darug Custodian Aboriginal Corporation	Leanne Watson	1.6.12	E-mailed notification letter seeking their interest	Alan Williams
Darug Aboriginal Cultural Heritage Assessments	Celestine Everingham	1.6.12	Posted notification letter seeking their interest	Alan Williams
Tharawal LALC	Elywn Brown	1.6.12	E-mailed notification letter seeking their interest	Alan Williams
Gandangara LALC	Mikael Smith	1.6.12	E-mailed notification letter seeking their interest	Alan Williams
Peter Falk Consultancy	Peter Falk	1.6.12	E-mailed notification letter seeking their interest	Alan Williams
Tocomwall	Scott Franks	1.6.12	E-mailed notification letter seeking their interest	Alan Williams
Darug Aboriginal Landcare	Des Dyer	1.6.12	E-mailed notification letter seeking their interest	Alan Williams

Organisation/Group	Representative Contacted	Date	Comments	AHMS Contact
Inc				
Darug Land Observations	Gordon Workman	1.6.12	E-mailed notification letter seeking their interest	Alan Williams
Cubbitch Barta Native Title Claimants Aboriginal Corporation	Glenda Chalker	1.6.12	Posted notification letter seeking their interest	Alan Williams
Gunjeewong Cultural Heritage Aboriginal Corporation	Cherie Turrise	1.6.12	Posted notification letter seeking their interest	Alan Williams
Darug Aboriginal Landcare Inc	Des Dyer	4.6.12	DALI registered an interest in the project	Alan Williams
Darug Land Observations	Gordon Workman	4.6.12k	DLO registered an interest in the project	Alan Williams
Peter Falk Consultancy	Peter Falk	5.6.12	Peter Falk registered an interest in the project.	Alan Williams
Darug Aboriginal Cultural Heritage Assessments	Celestine Everingham	5.6.12	DACHA re-registered an interest in the project	Alan Williams
Tharawal LALC	Elywn Brown	6.6.12	Registered an interest in the project and confirmed that the subject area was within the TLALC's boundaries	Alan Williams
Darug Custodian Aboriginal Corporation	Leanne Watson	9.6.12	DCAC registered an interest in the project.	Alan Williams
Tocomwall	Scott Franks	8.6.12	Tocomwall registered an interest in the project.	Alan Williams
Campbelltown City Council	Andrew Spooner	12.6.12	Provided information on Aboriginal stakeholders in the region, specifically the Tharawal LALC	Alan Williams
OEH	Lou Ewins	18.6.12	Provided a letter outlining the Aboriginal stakeholders who had registered an interest.	Alan Williams
Tharawal LALC	Elwyn Brown	18.6.12	Provided a letter outlining the Aboriginal stakeholders who had registered an interest.	Alan Williams
All RAPs	-	22.6.12	Provided a proposed methodology for the ACHA	Alan Williams
Darug Aboriginal Cultural Heritage Assessments	Celestine Everingham	26.6.12	Reviewed and approved the methodology proposed for the ACHA.	Alan Williams
Darug Custodian Aboriginal Corporation	Leanne Watson	27.6.12	Reviewed and approved the methodology proposed for the ACHA.	Alan Williams
Darug Land Observations	Gordon Workman	9.7.12	Discussed this project and several others. Advised of a site visit in late July.	Alan Williams
Cubbitch Barta Native Title Claimants Aboriginal Corporation	Glenda Chalker	7.7.12	Provided comments on the re-zoning report. Supported report and recommendations	Alan Williams
DLO, DACHA, DCAC, DALI,	-	20.7.12	Rang and e-mailed everyone regarding a site visit	Alan Williams

Organisation/Group	Representative Contacted	Date	Comments	AHMS Contact
Tocomwall, Peter Falk Consultancy			next week	
DLO, DACHA, DCAC, Tocomwall, Peter Falk Consultancy		23.7.12	Email to confirm site visit on Wednesday	Fenella
Peter Falk Consultancy	Peter Falk	23.7.12	Email from Peter to say that he is unavailable on Wednesday. Fenella to send copies of site photos and any artefact photos.	Fenella
DLO, Tocomwall, DACHA, DCAC	Gordon Workman, Margaret Crawford, Gordon Morton, Alyce Mervin	25.7.12	Undertook site visit with the RAPs. Investigated the proposed development footprint and the wider study area. No specific issues with the development raised	Alan Williams
DALI	Des Dyer	25.7.12	Met with Des in public carpark within the study area to discuss the project and survey findings. DALI has no insurances so could not be permitted on site. Des had no issues with the project or likely recommendations.	Alan Williams
DLO	Gordon Workman	30.7.12	Gordon emailed his photos from the site visit.	Fenella Atkinson
Peter Falk Consultancy	Peter Falk	1.8.12	Email to Peter to summarise results of site visit.	Fenella Atkinson

NSW GOVERNMENT | Office of Environment & Heritage

Our reference: DOC12/19622

Attn: Alan Williams
Archaeological Heritage Management Solutions
349 Annandale St
Annandale NSW 2038

Dear Mr Williams,

Thank you for your letter dated 14/5/2012 to the Office of Environment and Heritage (OEH) regarding obtaining a list of the Aboriginal stakeholders that may have an interest in projects for the area of the Glenfield Waste Deport (Blacktown LGA).

Before making an application for the issue of an Aboriginal Heritage Impact Permit, the applicant must carry out an Aboriginal community consultation process in accordance with the National Parks and Wildlife Regulation 2009 and completed to the stage described in subclause 80C.

Please find attached the list of Aboriginal stakeholders known to OEH that may have an interest in the project. OEH's list of regional stakeholders is a list of groups, organisations or individuals who may hold cultural knowledge relevant to a proposal in a region. Consultation with Aboriginal people should not be confused with employment. Inclusion on the OEH's list is not an automatic right to employment. It is the decision of a proponent on who they choose to engage to deliver services based on a range of considerations including skills, relevant experience, and OHS considerations. To be clear, the proponent is under no obligation to employ Aboriginal people registered for consultation.

Further, receipt of this information does not remove the requirement of a proponent/consultant to advertise in local print media and contact other bodies seeking interested Aboriginal parties. Consultation with Aboriginal stakeholders must be in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* which can be found on the Office of Environment and Heritage (OEH) public website by accessing the following link:

http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf

Please note that these requirements replace the *Interim Community Consultation Requirements for Applicants, December 2004.*

PO Box 668 Parramatta NSW 2124
Level 7, 79 George St Parramatta NSW 2150
Tel: (02) 9995 5000 Fax: (02) 9995 6900
ABN 30 841 387 271
www.environment.nsw.gov.au

If you wish to discuss any of the above matters further please contact Margrit Koettig, Archaeologist, on (02) 9995 6866.

Yours sincerely

Lou Ewins 21/5/12

Lou Ewins
Manager Planning & Aboriginal Heritage
Office of Environment and Heritage
Department of Premier and Cabinet

Aboriginal Stakeholders that may have an interest: Camden LGA and surrounds

Darug Custodial Aboriginal Corporation	Leanne Watson	02 4577 5181 / 0415 770 163	PO Box 81, Windsor NSW 2756
Darug Tribal Aboriginal Corporation	Sandra Lee	02 9622 4081	PO Box 441, Blacktown NSW 2148
Darug Aboriginal Cultural Heritage Assessments	Gordon Morton	02 4567 7421 or 0422 865 831	90 Hermitage Rd, Kurrajong Hills NSW 2758
Darug Land Observations	Gordon Workman	0415 663 763/ fax 02 9831 8868	PO Box 571, Plumpton, NSW 2761
Darug Aboriginal Land Care Inc	Des Dyer	0408 360 814	18a Perigee Close, Doonside 2767
Cubbitch Barta	Glenda Chalker	0427 218 425	55 Nightingale Rd, Pheasants Nest NSW 2574
Gunjeewong Cultural Heritage Aboriginal Corporation *	Cherie Carroll Turrise	(02) 6355 5673	1 Bellvue Place, Portland NSW 2847
Peter Falk Consultancy	Peter Falk	0401 938 060	Po Box 1018 Mittagong NSW 2575
Scott Franks		0404 171 544	PO Box 76, Caringbah NSW 1495
Tharawal LALC	Robyn Straub	(02) 46810059	PO Box 20 Buxton NSW 2571
Gandangara LALC	Mark (Jack) Johnson	(02) 96025280	PO Box 1038 Liverpool NSW 2170

*Cherie is Ngunnawal Elder however lived in the Western Sydney area during her childhood. She recognises she is not from the area but has associations.

campbelltown
city council

12 June 2012

Alan Williams
Archaeological & Heritage Management Solutions
349 Annandale Street
ANNANDALE, NSW 2038

Dear Mr Williams

RE: Request for Information on Aboriginal Stakeholders for proposed rezoning and development at Glenfield Waste Disposal, Glenfield, NSW

I refer to your letter dated 14 May 2012 seeking information on relevant Aboriginal individuals and/or communities that may hold cultural knowledge of relevance to determining the significance of Aboriginal objects and/or places for the above mentioned proposed rezoning and development.

It is recommended that you liaise with the following group as part of the archaeological/Aboriginal Heritage Assessment process:

Tharawal Local Aboriginal Land Council
CEO Mr Greg Bonder
PO Box 168
PICTON NSW 2571
Phone: (02) 4681 0059

If you require any further information please contact Angela Taylor (Senior Environmental Officer) on 4645 4847.

Yours sincerely

Andrew Spooner
Acting Manager Environmental Planning

Civic Centre Queen Street Campbelltown PO Box 57 Campbelltown NSW 2560 DX5114
Telephone 02 4645 4000 Facsimile 02 4645 4111 TTY 02 4645 4615
Email council@campbelltown.nsw.gov.au Web www.campbelltown.nsw.gov.au
ABN 31 459 914 087

abn: 71 098 971 209
w: www.ntscorp.com.au

22 – 5 - 2012

ref: OEH : 22 -05-2012/3

Alan Williams
Manager NSW – Aboriginal Heritage
AHMS
349 Annandale St
ANNANDALE NSW 2038

Dear Mr Williams

Aboriginal Cultural Heritage Assessment

proposed re-zoning and development at Glenfield Waste Disposal - Glenfield

I refer to your letter of **14 May 2012** regarding the above matter.

We acknowledge that section 4.1.2 of the Office of Environment & Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* require you to contact us in order to compile a list of Aboriginal people who may have an interest for the proposed project area and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places. However, we advise that NTSCORP's privacy guidelines restrict us from providing proponents with contact details of traditional owners who may have such an interest or hold such knowledge.

Please be advised that, in response to your notification, we will forward your correspondence to any individuals, groups and organisations whom NTSCORP is aware assert traditional interests within or hold cultural knowledge about the relevant area. Recipients of our correspondence will be invited to register their interest in the project directly with you **as soon as possible.**

Please be aware that NTSCORP cannot make a guarantee or undertaking that the recipients of our correspondence represent the entirety of traditional owners for the relevant area.

Yours faithfully,

Peter Schultz
Senior Consultant – Land & Notifications
NTSCORP Limited

Head Office
Level 1, 44-70 Rosehill Street, Redfern NSW 2016
PO Box 2105 Strawberry Hills NSW 2012
p: + 61 2 9310 3188
f: + 61 2 9310 4177
freecall: 1800 111 844

Regional Office (Coffs Harbour)
Suite 2, 133 West High Street, Coffs Harbour NSW 2450
PO Box 156 Coffs Harbour NSW 2450
p: + 61 2 6651 4588
f: + 61 2 6651 7954

National Native Title Tribunal

South-East & Central Registry –Sydney Office
Level 25, 25 Bligh Street
Sydney NSW 2000
GPO Box 9973
Sydney NSW 2001
Telephone (02) 9227 4000
Facsimile (02) 9227 4030

22 May 2012

Alan Williams
Archaeologist
Archaeological & Heritage Management Solutions P/L
349 Annandale Street
Annandale NSW 2038

Our Reference: 4911/12sj
Your Reference: 12057-1

Dear Mr Williams

Native Title Search Results of Glenfield within Campbelltown City Council Local Government Area

Thank you for your search request received on 14 May 2012 in relation to the above area.

Search Results
The results provided are based on the information you supplied and are derived from a search of the following Tribunal databases:

Register Type	NNTT Reference Numbers
Schedule of Applications (unregistered claimant applications)	Nil.
Register of Native Title Claims	Nil.
National Native Title Register	Nil.
Register of Indigenous Land Use Agreements	Nil.
Notified Indigenous Land Use Agreements	Nil.

At the time this search was carried out, there were **no relevant entries** in the above databases.

Please note: There may be a delay between a native title determination application being lodged in the Federal Court and its transfer to the Tribunal. As a result, some native title determination applications recently filed with the Federal Court may not appear on the Tribunal's databases.

Tribunal accepts no liability for reliance placed on enclosed information

The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representation, either express or implied, as to the accuracy or suitability of the information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

If you have any further queries, please do not hesitate to contact me on the number below or on the free call number 1800 640 501.

Yours sincerely

Nakari Thorpe
Senior Case Management Assistant
Telephone: (02) 9227 4004
Facsimile: (02) 9227 4030
Email: Nakari.thorpe@nntt.gov.au

Searching the NNTT Registers in New South Wales

Search service
On request the National Native Title Tribunal will search its public registers for you. A search may assist you in finding out whether any native title applications (claims), determinations or agreements exist over a particular area of land or water.

In New South Wales native title cannot exist on privately owned land including family homes or farms.

What information can a search provide?
A search can confirm whether any applications, agreements or determinations are registered in a local government area. Relevant information, including register extracts and application summaries, will be provided.

In NSW because we cannot search the registers in relation to individual parcels of land we search by local government area.

Most native title applications do not identify each parcel of land claimed. They have an external boundary and then identify the areas not claimed within the boundary by reference to types of land tenure e.g., freehold, agricultural leasehold, public works.

What if the search shows no current applications?
If there is no application covering the local government area this only indicates that at the time of the search either the Federal Court had not received any claims in relation to the local government area or the Tribunal had not yet been notified of any new native title claims.

It does not mean that native title does not exist in the area.

Native title may exist over an area of land or waters whether or not a claim for native title has been made.

Where the information is found
The information you are seeking is held in three registers and on an applications database.

National Native Title Register
The National Native Title Register contains determinations of native title by the High Court, Federal Court and other courts.

Register of Native Title Claims
The Register of Native Title Claims contains applications for native title that have passed a registration test.

Registered claims attract rights, including the right to negotiate about some types of proposed developments.

Register of Indigenous Land Use Agreements
The Register of Indigenous Land Use Agreements contains agreements made with people who hold or assert native title in an area.

The register identifies development activities that have been agreed by the parties.

Application summaries
An application summary contains a description of the location, content and status of a native title claim.

This information may be different to the information on the Register of Native Title Claims, e.g., because an amendment has not yet been tested.

How do you request a search?

A search request form is available on the Tribunal's web site at:
http://www.nntt.gov.au/registers/search.html
Mail, fax or email your request to the
Tribunal's Sydney registry, identifying the local government area/s you want searched.

Email: SydneySearch@nntt.gov.au
Fax: (02) 9227 4030
Address: GPO Box 9973, Sydney NSW 2001
Phone: (02) 9227 4000

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P: (08) 6262 2025
W: www.ahms.com.au E: info@ahms.com.au ABN: 45 088 058 388 ACN: 088 058 388

1 June 2012

Our ref: 1200507-1

«First_Name» «Last_Name»
«Company_Name»
«Address_Line_1»
«City» «State» «ZIP_Code»

Re: Notification of Aboriginal Cultural Heritage Assessment – Glenfield Waste Disposal Recycling Facility
Project Information and Invitation for Registration of Interest

Dear «First_Name»,

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to notify you that we have been engaged by L.A. Kennett Enterprises Pty Ltd to undertake an Aboriginal Cultural Heritage Assessment and/or Aboriginal Heritage Impact Permit applications for a proposed recycling facility at the Glenfield Waste Disposal, Glenfield, NSW (**Figure 1**).

In addition, the site is currently under-going a re-zoning application with the Campbelltown City Council. A preliminary assessment has already been undertaken of the proposed site as part of the proposed re-zoning. The preliminary assessment indicates that much of the study area has been disturbed by the current land use activities. However, four sites (two scarred trees, an isolated find and a potential archaeological deposit) were noted.

L.A. Kennett Enterprises Pty Ltd proposes to construct a new recycling facility along the edge of the current landfill site (**Figure 2**). The land in question is located on Cambridge Avenue within the Campbelltown Local Government Area (Auto Consol 14018 -92 (Lot 91 DP 1155962, Lot 2 DP 333578, Lot 1 DP 113201); Lot 3, DP 735524; Lot 3, DP 736881). The proponent is L.A. Kennett Enterprises who can be contacted via Simon Duffy - Environmental Property Services (A: Level 1, 19 Stockton Street, NELSON BAY NSW 2315; T: 02 4981 1600).

The proposed recycling facility will be assessed under Part 4 (Division 4.1 State significant development) of the *Environmental Planning and Assessment Act 1979,* and therefore AHMS is undertaking an Aboriginal Cultural Heritage Assessment in accordance with the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005) as well as the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, April 2011), *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, April 2010), and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, September 2010). An important part of the assessment will be Aboriginal community consultation that aims to identify cultural values and places of importance to the Aboriginal community within the subject land.

An additional purpose of the Aboriginal community consultation may be to assist the applicant in the preparation of an application for an Aboriginal Heritage Impact Permit (AHIP) should it be necessary, as well as to assist the Office of Environment and Heritage to consider and determine any such application.

We are inviting registrations from Aboriginal individuals and/or organisations, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places and who wish to be involved in the community consultation process.

If you or your organisation are interested in being part of the consultation process, please provide a registration of interest to:

Alan Williams
Address: AHMS, 349 Annandale Street, Annandale, NSW 2038;
Phone: 02 9555 4000;
Fax: 02 9555 7005; or
Email: awilliams@ahms.com.au.

Registrations are requested on or by **14 June 2012.**

To assist us with communicating project information effectively could you please include the following information in your registration of interest:

1. A clear identification of the organisation registering an interest in the project;
2. Your preferred method of communication with AHMS and the proponent during consultation for this project, including a nominated contact person and contact details;

3. Comment on the level of consultation / project involvement you require (Do you wish to attend any meetings? Do you wish to be involved in any fieldwork? Do you simply want a copy of the final report?);
4. If you wish to be involved in any meetings or fieldwork, please ensure we have current copies of your public liability, workers compensation and professional indemnity (if available) insurances as soon as possible.

As part of the consultation process we are obliged to provide the contact details of organisations and individuals who register an interest to the OEH and the Tharawal LALC. Please advise us if you do not wish this to occur.

Please also consider the following questions, but note that these issues can also be discussed over the course of the project:

5. Guidance on the protocols, sensitivity, use and/or distribution of any cultural information that you provide to AHMS and the proponent as part of this project;
6. Identification of any Aboriginal objects or places of cultural significance that you are aware of within or in the vicinity of the proposed activity area.

Please note that registration of interest will not necessarily lead to participation in fieldwork. Participants will be engaged by the client on the basis of experience, cultural knowledge, appropriate insurances and our personnel requirements.

Please don't hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours faithfully,

Alan Williams
Archaeologist

CLASSIFIEDS

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Deaths and Funerals

DUGUID
James Munro (Jim)
Late of The Oaks

Passed away on 3rd June 2012

Aged 70 Years

Dearly loved husband of Kaye. Loving father and father-in-law of Linda and Husty, Sharon, Daryl and Anny. Cherished Pop to Bryce, Alex, Abby, Jack and Rarnie. Dear brother, uncle and friend to many.

Gone to the 19th Hole Forever.

Family and friends are kindly invited to attend a celebration of Jim's life which will be held in the South Chapel, Forest Lawn Crematorium, Leppington on Tuesday 12th June 2012 commencing at 2:30pm. In lieu of flowers, donations to Camden Hospital would be appreciated.

WILLIAM R. GROVES FUNERAL DIRECTOR
Picton 4677 1644
Camden 4655 6433

SMITH
Mirrie
4.6.1921 - 315.2012
In her 91st Year

Mirrie died peacefully at Nareen Gardens Nursing Home in the presence of her children Ann-Maree and Andrew. Mirrie who's home was in Wyong, was the youngest child of John and Annie Hall of "Winbourne" Elderslie (via Camden). She was the devoted wife of Colin (dec 1974). Mirrie was sister to Ted, Hilda, Ada, Marge, Harry, George and Eileen (all dec). She was the mother-in-law and friend to Alan, Grandmother and grandmother in law of Ben and Lisa, Luke, Emma and Winston. Great grandmother of Toby, Macy and Joey.

Loved beyond measure

The relatives, friends and carers of Mirrie are cordially invited to attend her Funeral Service to be conducted by the Reverend Dan Conner at St James Anglican Church, Wyong at 1pm on Tuesday 12th June, 2012. At the condusion of the service the cortege will proceed to Jilliby Cemetery where she will be laid to rest with her late husband.

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In Memoriam

CHESHAM
Lynda Narelle

25/12/1953 - 4/6/2008

Sadly missed by Graham, boys Andrew, Jason & Bradley & grandkids Dean, Abbey, Isabella & Riley.

LEE OCKENDEN
18/3/1974 - 11/6/2003
Rembering Lee from his family. Lest We Forget.

In Memoriam

ATTEWELL
William (Bill)
26.6.63 - 5.6.11

It's been a year since you left us and not a day goes by that we don't miss you and wish you were here.

Love always, Jessica, Luke, Paige and your five Grandchildren xxx

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In Memoriam

ATTEWELL
William Leslie (Bill)
26/6/63 - 5/6/2011

It's been a year since you left us. Missing you is like having days without sunshine. It's one endless night. Love still grows and fills me when I think of you or see your face.

All my love
Danielle xx

WRIGHT (nee Coles)
Julie Anne
9.10.61 - 3.06.08

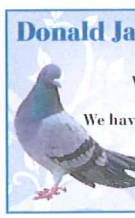
We thought of you with love today, but that is nothing new. We thought about you yesterday and the day before that too. We will never fail to think of you, we will never cease to care, but how we wish we could turn around and find you standing there.

Love always,
Mum & Dad, Simon & Deb xxx.

Kevin Stephen Hyland
23/10/1959 - 07/06/2003

In memory of our loving Father, Grandfather, Son, Brother and Uncle.

Sadly Missed
Loved Forever
The Hylands'



Donald James Laws (Donnie)
9.6.2010

We think about you always and talk about you too.

We have your precious memories, but wish we still had you.

Love Beryl, Ricky, Karina, Clayton and seven grandchildren

Karen Burgess
05/10/1969 - 03/06/2008

My Darling Karen,
Just as there is no way to measure all the love you gave us, words cannot describe how special you were and how much you were loved. You were so wonderful and brought so much joy and fulfilment to our lives, every day reminds me of how much I miss you. As the years pass, my love does not waver, for you are my soul mate, together soon.

Love always and forever
Matt xx

Leisa Ann Shaw
"Princess"
4/5/86 - 6/6/04

Yet another year has passed without you but our memories and your smile keep us going.

Love always
Mum, Dad, Daniel and family & friends.

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melissasjumpingcastles.net
0421 048 278 9729 0636

Legal Notices

IN THE SUPREME COURT OF NEW SOUTH WALES EQUITY DIVISION-PROBATE LIST
After 14 days from publication of this notice an application for probate of the Will dated 23 November 2004 of GEORGE ORR late of Narellan in the State of New South Wales, will be made by KAREN PERRY the executrix of the Will. Creditors are required to send particulars of their claims upon his estate to: MICHAEL SLATTERY, Solicitor 11a Cordeaux Street, CAMPBELLTOWN NSW 2560 02 4628 0000.

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Public Notices

Notification of Aboriginal Heritage Assessment and Invitations for Registrations of Interest - Glenfield Waste Disposal, Glenfield.

L.A. Kennett Enterprises Pty Ltd is undertaking an Aboriginal Heritage Assessment for a proposed re-zoning and subsequent development application for the southern portion of Glenfield Waste Disposal, Glenfield, NSW.

Registrations are invited from Aboriginal individuals and/or organisations, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places and who wish to be involved in the community consultation process.

The purpose of the Aboriginal community consultation is to assist the proponent in preparing an Aboriginal Heritage Assessment for the project area, and if necessary to assist the Department of Planning and/or the Office of Environment and Heritage in considering the assessment.

Registrations of interest should be provided by no later than 20 JUNE 2012 to Alan Williams, of Archaeological and Heritage Management Solutions P/L, by:

Phone: (02) 9555 4000
Fax: (02) 9555 7005
Email: awilliams@ahms.com.au
Or Post: 349 Annandale Street, Annandale, NSW 2038.

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Wanted to sublet room in prestige weight loss & wellness centre in Narellan. Must be qual & insured. Must be ready to start 12.6.12.

Send resume to
swcosmetictattoo@iprimus.com.au

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9605 9666

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Tenders

Rosemeadow Public School Canteen Licence

Tenders are called for the licence of the Rosemeadow Public School Canteen commencing Term 3 2012 for a period of approximately three years. Annual school enrolments will be approximately 565. General enquiries and request for a Tender Information Package should be referred to Rosemeadow Public School – Telephone number 02 4621 1733. Tenders must be submitted in a sealed envelope marked "Confidential " Canteen Tender and sent to:

The Principal
Rosemeadow Public School
64 Anthony Drive
Rosemeadow NSW 2560

Tenders close at 3 pm on Friday 15th June 2012. A tender briefing and a site visit will be held on Friday 8th June 2012 by arrangement, to discuss aspects of this tender and inspect the site. Tenderer should notify the School Admin Manager of their intention to attend.

Tenders

OUT OF SCHOOL HOURS CARE SERVICE

Opportunity to provide services for the operation of an Out of School Hours Care Service at Appin Public School, 97 Appin Road, Appin NSW 2560

DEPARTMENT OF EDUCATION & COMMUNITIES NSW
South Western Sydney Region

Requests for documentation can be obtained at a cost of $110, from Appin Public School, 97 Appin Road, Appin NSW 2560 Tel: 0246 311 220 between 9:00am - 3:00pm Monday to Friday.

Only those who pay the documentation fee, collect the application package and submit the required documents within the timeframe will be considered in the evaluation. Applications must be in duplicate and enclosed in an envelope. NO FOLDERS please.

Applications should be received in the APPLICATION BOX at Appin Public School, 97 Appin Road, Appin NSW 2560 by 3pm on 27th June 2012 and addressed:

CONFIDENTIAL
Opportunity to provide services for an Out of School Hours Care Service
at Appin Public School

Darug Aboriginal Cultural Heritage Assessments

ABN 51734106483

Gordon Morton

Mob: 0422 865 831
Fax: 45 677 421

Celestine Everingham
90 Hermitage Rd., Kurrajong Hills, 2758
Ph/Fax: 45677 421
Mob: 0432 528 896

28 5 · 12

Attention

Alan Williams
re Glenfield Waste Disposal - Glenfield

DACHA wishes to register an interest in the above area. We wish to be consulted at all times and be involved in any fieldwork I look forward to hearing from you on this project.

Yours Sincerely,
G W. Morton
&
C. Everingham

Fenella Atkinson

From: desmond dyer [desmond4552@hotmail.com]
Sent: Sunday, 3 June 2012 10:24 PM
To: Alan Williams
Subject: RE: Glenfield Waste Disposal - Part 4 (Division 4.1) development

Hi Alan,
yes the Darug Aboriginal Landcare would like to register for the Glenfield Waste Diposal
Des Dyer

From: AWilliams@ahms.com.au
To: desmond4552@hotmail.com
Subject: Glenfield Waste Disposal - Part 4 (Division 4.1) development
Date: Fri, 1 Jun 2012 00:40:40 +0000

Dear Des,

Please find attached a letter seeking to identify your interest in a proposed development at Glenfield Waste Disposal, Glenfield, NSW. Due to the newspaper advert publication (a requirement of this phase of consultation), the registration process will be ongoing until 20 June 2012 (please disregard the 14 June identified in this letter).

Happy to discuss

Thanks
Al

Alan Williams
Senior Archaeologist
AHMS ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS PTY LTD
A: 349 Annandale St, Annandale, NSW 2038
P: +61 (0)2 9555 4000
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Fenella Atkinson

From: mulgokiwi@bigpond.com

Sent: Sunday, 10 June 2012 1:09 PM

To: Alan Williams

Subject: Glenfield Waste Disposal Recycling facility

Dear Alan
Darug Custodian Aboriginal Corporation would like to register their interest in the Glenfield Waste disposal recycling facility project.
This area is within Darug boundaries.

Regards
Leanne Watson

Fenella Atkinson

From: Peter Falk [kanga26@live.com.au]
Sent: Tuesday, 5 June 2012 11:29 AM
To: Alan Williams
Subject: RE: Glenfield Waste Disposal - Part 4 (Division 4.1) development

Alan
I wish to be registered for this project

1. Organisation: Peter Falk Consultancy
PO Box 1018
Mittagong NSW 1018
0401938060

2.Communication: Email kanga26@live.com.au

3. Level of Consult: I wish to attend all meetings and be involved in field work

4. Current Insurances; Please see Fenella as she has copy of my current insurance

As a Sole Trader I do not require Workers Comp (ref. to Workers Comp Act Sec. 155)
Thanks
Peter

Peter Falk Consultancy

From: AWilliams@ahms.com.au
To: kanga26@live.com.au
Subject: Glenfield Waste Disposal - Part 4 (Division 4.1) development
Date: Fri, 1 Jun 2012 00:44:36 +0000

Dear Peter,

Please find attached a letter seeking to identify your interest in a proposed development at Glenfield Waste Disposal, Glenfield, NSW. Due to the newspaper advert publication (a requirement of this phase of consultation), the registration process will be ongoing until 20 June 2012 (please disregard the 14 June identified in this letter).

Happy to discuss

Thanks
Al

Alan Williams
Senior Archaeologist
AHMS ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS PTY LTD
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Fenella Atkinson

From: Elwyn brown [heritage@tharawal.com.au]
Sent: Wednesday, 6 June 2012 9:30 AM
To: Alan Williams
Subject: RE: Glenfield Waste Disposal - Part 4 (Division 4.1) development

Hi Alan

Yes we would like to be involved with this and yes glenfield is within the boundries of Tharawal Local Aboriginal Land Council, please let me know when this assessment will take place.

Regards,
Elwyn Brown
Cultural & Heritage Officer

Tharawal Local Aboriginal Land Council
Ph: 02 4681 0059
Fax: 02 4683 1375

I would just like to take this opportunity to pay my respects to the traditional owners of the land that we now walk on and work on
the Dharawal people, and pay my respects to all elders of this land past and present

---

From: Alan Williams [mailto:AWilliams@ahms.com.au]
Sent: Friday, 1 June 2012 11:01 AM
To: Elwyn brown
Subject: Glenfield Waste Disposal - Part 4 (Division 4.1) development

Hi Elwyn,

I realize you were involved in the first phase of this, but I am required under consultation to send this since it's a new phase of work. Please let me know if you wish to stay involved.

Please find attached a letter seeking to identify your interest in a proposed development at Glenfield Waste Disposal, Glenfield, NSW. Due to the newspaper advert publication (a requirement of this phase of consultation), the registration process will be ongoing until 20 June 2012 (please disregard the 14 June identified in this letter).

Also, the response I have from Office of Environment and Heritage indicates that Gandangara LALC are also relevant to this area. Can you confirm whether this study area is in your boundaries or theirs?

Happy to discuss

Thanks
Al

Alan Williams
Senior Archaeologist
AHMS ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS PTY LTD
A: 349 Annandale St, Annandale, NSW 2038

Tocomwall PTY LTD
ACN 137 694 618
ABN 13 137694618
PO Box 76
CARINGBAH NSW 1495
info@tocomwall.com.au

8th June 2012

Alan Williams

ARCHAEOLOGICAL &
HERITAGE MANAGEMENT
SOLUTIONS PTY LTD

349 Annandale St,
Annandale, NSW 2038

Dear Alan

RE: Request for Registration for Glenfield Waste Disposal, Glenfield, NSW

Tocomwall, trading as Yarrawalk is seeking *primary involvement* in all consultation meetings and field work for **Glenfield Waste Disposal, Glenfield, NSW Project.**

Tocomwall represents traditional owners from this and retains local and oral history on behalf of its membership. We do not accept or support any person or organisation that comments regarding the said area unless confirmed in writing by myself.

Please also be advised that this Aboriginal organisation does not do volunteer work or attend unpaid meetings.

All correspondence should be emailed to the following yarrawalk@tpg.com.au or to the above postal address.

Yours faithfully

Scott Franks
Director & Aboriginal Heritage Manager

AHMS
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22 June 2012

Our ref: 120507-1

«First_Name» «Last_Name»
«Company_Name»
«Address_Line_1»
«City» «State» «ZIP_Code»

Re: Project Information and Proposed Aboriginal Cultural Heritage Assessment Methodology:
Glenfield Waste Disposal, Glenfield, NSW

Dear «First_Name»,

Purpose of this Document

L.A. Kennett Enterprises Pty Ltd is proposing to re-zone the Glenfield Waste Disposal, Glenfield, NSW from 1(a) rural to industrial (**Figure 1**). At the same time, development plans for a new recycling facility in the subject area are being detailed (**Figure 2**).

Aboriginal heritage in relation to the re-zoning application has already been addressed (see discussion below); the focus of this letter and associated documentation is to undertake Aboriginal consultation in relation to the proposed recycling facility.

The proposed recycling facility has yet to be designed in detail, but the general location of the facility is known (**Figure 2**). The project is proposed for approval under Part 4 (Division 4.1) of the *Environmental Planning and Assessment Act 1979,* and will therefore be assessed by the Department of Planning and Infrastructure. As part of the Environmental Approval application, an Aboriginal Cultural Heritage Assessment in accordance with *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005) is required. These guidelines in turn require consideration of the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, April 2011), *Aboriginal*

Cultural Heritage Consultation Requirements for Proponents (DECCW, April 2010), and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, September 2010).

This letter provides the background of the previous assessment, and outlines the proposed activities and methods associated with the proposed ACHA. It has been developed to address requirements of Section 4.2 and 4.3 in the Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.*

If you have any comments on the methodology, please send them to AHMS, or call to discuss, by **20 July 2012**.

Contact Details

This report has been prepared by Archaeological & Heritage Management Solutions (AHMS) for Environmental Property Services (EPS) on behalf of the proponent, L.A. Kennett Enterprises Pty Ltd:

Proponent	Archaeological Advisor
Environmental Property Services Level 1, 19 Stockton Street, Nelson Bay NSW 2315 **Contact Person:** Simon Duffy T. 02 4981 1600 E: simonduffy@enviroproperty.com.au	**Archaeological & Heritage Management Solutions Pty Ltd** 349 Annandale Street Annandale NSW 2038 **Contact Person:** Alan Williams T. 02 9555 4000 F. 02 9555 7005 M.0408 203 180 E: awilliams@ahms.com.au

The Project (Proposed Activity)

Kennett Enterprises Pty Ltd is proposing to construct a large recycling facility near the existing landfill site in the subject area. While specific details are not yet available, the facility's construction footprint is broadly an L-shape running along the southern and western sides of the existing landfill site (**Figure 3**).

Background

In May 2012, L.A. Kennett Enterprises Pty Ltd proposed to both re-zone the Glenfield Waste Disposal, Glenfield, NSW from 1(a) rural to industrial, and at the same time begin the Environmental Approval process for the development of a new recycling facility in the subject area.

The application for the re-zoning was undertaken in late May 2012. It was developed to meet Campbelltown City Council requirements for inclusion in their new LEP and due to timeframes included a Preliminary Aboriginal Heritage Assessment. This assessment is attached in **Appendix 1**.

In brief, the Preliminary Assessment identified that much of the subject area had been heavily disturbed by both the current waste disposal activities and historic sand extraction. However, four Aboriginal objects/sites were identified and recorded. These included two scarred trees[1] located in the western quadrant of the study area, an isolated object in a similar location, and a large potential archaeological deposit near the Georges River (**Figure 3**). It was considered that none of these sites should hinder any re-zoning, but that further consideration of them would be considered in any future development proposals.

While the four known Aboriginal objects/sites are not within the proposed development footprint, further assessment (in the form of an ACHA) to satisfy the conditions of the Environmental Assessment application were recommended and are now being implemented.

Proposed Assessment Methodology

AHMS proposes to develop the Aboriginal Cultural Heritage Assessment (ACHA) according to the relevant OEH guidelines:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW,*
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010,*
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW.*

The ACHA will include the following:

[1] *It will not be elaborated here, but it is considered that two scarred trees are probably the same site, with one tree being erroneously recorded instead of the other.*

1. A review of the archaeology, ethno-history, landscape and land-use history of the subject area and surrounding region.
2. A predictive model of the archaeological potential of the subject area.
3. Details and results of a survey of the subject area (undertaken as outlined below).
4. Details of the process and results of the Aboriginal cultural heritage consultation process undertaken for the project.
5. Assessment of the significance, both cultural and archaeological, of any Aboriginal sites, objects and/or places identified within the study area.
6. Assessment of the potential Aboriginal cultural heritage impact of the proposed development, and recommendations to manage and/or mitigate this potential impact.

The ACHA will be submitted as a draft for review to all the Registered Aboriginal Parties. Comments and recommendations received from the Registered Aboriginal Parties will be included in the final version of the ACHA.

Survey

AHMS proposes to undertake a survey of the subject area, according to the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*.

Our proposed survey team will include an AHMS archaeologist, and representatives of the Registered Aboriginal Parties. We have allowed up to one day for the survey. The survey will be designed to target the following:

- Any AHIMS sites within the subject area;
- Areas with exposed soil;
- Areas identified in the predictive modelling as having higher potential, such as along creek lines;
- Mature native trees.

The survey would involve the recording of Aboriginal objects and/or sites, as well as other relevant information including landform types, disturbance, and ground exposure and visibility. The information would be recorded using photographs, sketches, written descriptions, and co-ordinates (using a hand-held non-differential GPS). Any new sites recorded would be registered with the OEH Aboriginal Heritage Information Management System (AHIMS).

Aboriginal Consultation

Currently, the project has only undertaken informal consultation with the Tharawal LALC and Cubbitch Barta Aboriginal Corporation.

However, AHMS has recently begun the formal consultation process in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). Through this process 8 Aboriginal individuals/organisations have registered an interest in the project, specifically:

- Tharawal LALC.
- Cubbitch Barta Native Claimants Aboriginal Corporation.
- Darug Custodian Aboriginal Corporation.
- Darug Aboriginal Land Inc.
- Darug Land Observations.
- Peter Falk Consulting .
- Darug Aboriginal Cultural Heritage Assessments.
- Tocomwall.

Please note that unless otherwise advised, we are required to send your contact and address details to OEH as part of the consultation procedure.

Timeframes

The following is an indicative timeframe for the project:

- Distribution of this document to the RAPs: 19 June 2012;
- End of review period for the proposed methodology: 17 July 2012;
- Site Survey: week beginning 16 July 2012;
- Development of ACHA: June – mid July 2012; and
- Review and finalisation of ACHA by RAPs: mid July - mid August 2012.

Information Sought

Consistent with Section 4.3 and 4.4 of OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010,* AHMS is seeking the following information from your organisation:

1. A nominated representative of your organisation with which to undertake consultation on this project;
2. A clear identification of the organisation you are representing throughout this project;
3. Your nominated individual's contact information including phone number, fax number, postal address and e-mail (if available);
4. Your preferred method of communication with AHMS during the project. Please also provide the necessary information (contact person, phone number, fax, e-mail, etc.) to ensure AHMS can undertake this preferred method of communication;
5. Feedback on the proposed methods outlined above;
6. If you wish to be involved in any fieldwork, please nominate your proposed field representatives and ensure AHMS has your organisations insurances and daily rates;
7. Any protocols that you would like adopted during the project;
8. Identification of any Aboriginal objects of cultural significance and/or importance that you are aware of within the subject area, and how you wish them to be dealt with during the project;
9. Identification of any places of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the project;
10. Guidance on the protocols, sensitivity, use and/or distribution of any cultural information that you provide AHMS;
11. Whether you require any further information prior to AHMS proceeding with the project.

We request that you provide this information by **20 July 2012** of the date of this letter. For further information, please contact Alan Williams on 02 9555 4000.

Yours sincerely

Alan Williams

Senior Archaeologist

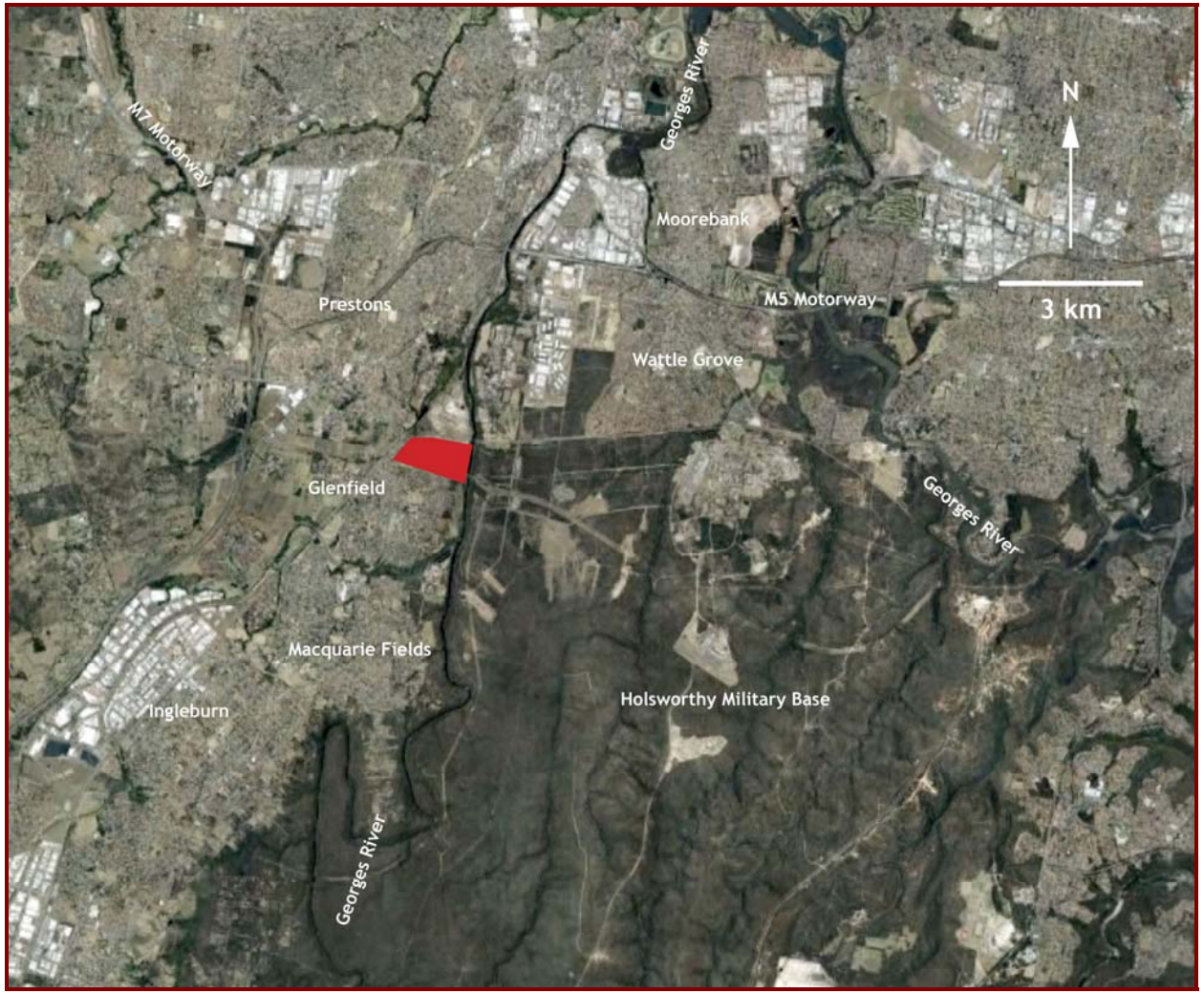

Figure 1. Location of Subject Area.

Figure 2. The proposed recycling development footprint (approximate).

Figure 3. *Map of archaeological sites within the subject site. GWD 1 and Glenfield ST are potential scarred trees, Glenfield 1 is an isolated find, GWD 2 is a potential archaeological deposit. Existing disturbance is noted in red.*

Appendix 1: AHMS 2012 Preliminary Assessment

Archaeological and Heritage Management Solutions Pty Ltd
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DARUG CUSTODIAN ABORIGINAL

CORPORATION

PPO BOX 81 WINDSOR 2756

PH: 0245775181 FAX: 0245775098 MOB: 0415770163

ABN: 81935722930

mulgokiwi@bigpond.com

25th of June 2012

Attention: Alan Williams.

SUBJECT: Glenfield Waste Disposal – Aboriginal Cultural Heritage Assessment methodology.

Dear Alan,

The Darug Custodian Aboriginal Corporation have received and reviewed the Glenfield Waste disposal Aboriginal Cultural Heritage Assessment methodology.

This area is within the boundaries of the Darug language group (tribe) we support the proposed methodology.

Our nominated site officer for this project will be Leanne Watson or Justine Coplin or Alyce Mervin dependent on availability. Please direct all contact through Leanne Watson.

It is a main aim of our group to protect and care for Darug sites. Please contact us with all further enquiries on 0415770163 or mulgokiwi@bigpond.com

Regards

LWat

Leanne Watson

Darug Aboriginal Cultural Heritage Assessments

ABN 51734106483

Gordon Morton & Associates

Mob: 0422 865 831
Fax: 45 677 421

Celestine Everingham
90 Hermitage Rd., Kurrajong Hills, 2758
Ph/Fax: 45677 421
Mob: 0432 528 896

26 . 6 . 12

Attention:

Alan Williams

re Glenfield Waste Disposal, Glenfield, N.S.W.

DECCW have reviewed your methodology for the Glenfield Waste Disposal and we support your aims and objectives. DECCW wish to be involved in all fieldwork.

Yours Sincerely,
C. Everingham

APPENDIX 3: UTM Arboricultural Assessment of Glenfield ST and GWD 1

URBAN TREE MANAGEMENT

CONSULTING ARBORICULTURISTS & HORTICULTURISTS

Urban Tree Management Australia Pty Ltd
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Accredited member of
INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS ®

REPORT:

ARBORICULTURAL ASSESSMENT

OF

Scarred Trees

AT

Glenfield Waste Disposal Services
Glenfield
New South Wales

FOR

Environmental Property Services

On behalf of

Glenfield Waste Services

Prepared 29 October 2012
Reference 15051

Contents

SUMMARY

This report was prepared for Environmental Property Services (EPS) and examines 2 live trees (*the trees*), summarized in Table 1.0, located within the southern portion of the Glenfield Waste Services site, Glenfield NSW (*the site*). The purpose of the report is to assist in determining whether the wounds on the trees are of *Aboriginal cultural* or *Non-Aboriginal cultural* origin. Based on the investigations detailed in this report the wounds on the trees are considered to be of Non-Aboriginal cultural origin.

Table 1.0 Summary of each tree with origin of wounding.

UTMA Tree No. & Archaeological No.	**Genus and species**	**Common name**	**1. Age range of tree** in yrs. approx. / **2. Age range of wound** in yrs. approx.	**Likely origin of wound/s**	**Photograph of tree**
Glenfield ST (#45-5-2428)	*Eucalyptus moluccana* Roxb.	Grey Box	**1.** >75 - <100 **2.** >25 - <40	1.1 Non -Aboriginal Cultural origin, borer insects damage or in combination with an abrasion impact event from steel cable fastened around base of trunk.	   

Table 1.0 Summary of each tree with origin of wounding continued.

UTMA Tree No. & Archaeological No.	**Genus and species**	**Common name**	**1. Age range of tree** in yrs. approx. / **2. Age range of wound** in yrs. approx.	**Likely origin of wound/s**	**Photograph of tree**
GWD 1	*Eucalyptus tereticornis* Smith	Forest Red Gum	**1.** >75 - <100 **2.** >30 - <50	2.1 Non -Aboriginal Cultural origin, abrasion impact event.	 

1.0 INTRODUCTION

Archaeological and Heritage Management Solutions (AHMS), was commissioned by Environmental Property Services for Glenfield Waste Services to undertake an Aboriginal Heritage Assessment of the site. Part of the assessment included a site visit by registered Aboriginal stakeholder groups. During the site visit the trees were identified as scarred trees possibly of Aboriginal cultural origin.

URBAN TREE MANAGEMENT © (UTMA) was engaged by EPS, Level 1, 19 Stockton Street, Nelson Bay NSW 2315 on behalf of Glenfield Waste Services to determine the following information for *the trees*: age of the trees, age of wounding event/s, likely causation of the wound, condition of *the trees*, possible remaining lifespan of the trees or risk to the life of *the trees* and the likelihood of the wounds on the trees being of *Aboriginal cultural or Non-Aboriginal cultural* origin. .

This report will be used to assist with the consultation with the registered Aboriginal stakeholder groups regarding the scarred trees.

Mr Danny Draper *(the author)* attended the site, on Wednesday 17 October 2012 and examined the trees, their growing environments and wounding. The dimensions of the trees wound/s were recorded and the wound/s photographed. The age of each tree provided is an estimate only and offered within a range due to the uncertainty of such unsubstantiated field observations without the application of Dendrochronology or other records. Without such precise data the age of trees are usually considered in stages of life span against their biomass *in situ* as Young (0-20%), Mature (20-80%) and Over-mature (senescent) (80-100%).

2.0 METHODOLOGY

The trees are identified in the AHMS Aboriginal Heritage Assessment report as Glenfield ST (#45-5-2428) and GWD 1. For ease of reference each tree has been assigned the AHMS reference number.

The inspection/s was undertaken by a visual assessment conducted from the ground and considers as part of the assessment/s of the remaining lifespan of a live tree or durability of the remains of a dead tree.

A glossary of terms is included as Appendix C covering the description of the tree/s.

Assessment of Trees

The following criteria were recorded to reflect the current status of the trees being: Age class, Condition class, Form class, Dimensions, Crown cover (live foliage as %), Crown density (density of live foliage evident as %), vigour class and Sustainable Retention Index Value (SRIV) version 4 (IACA, 2010) of each live tree (Appendix A), where appropriate.

The age of the trees was estimated from a sound professional knowledge or research of the individual tree taxa, growth of trees within the region based on habitat, rainfall, soil type and land use practices and considered against the dimensions of each tree encountered and the limitations of its growing environment *in situ*. A tree may be described in greater detail than others where it was considered appropriate to more accurately describe the location of the wound or the circumstances which may have led to its formation.

Assessment of Wounds to determine Archaeological status as Scarred Trees

As a tree grows vascular cambium as a thin layer of dynamic cells close to the surface produces xylem to form wood on the inner side, and phloem to form bark on the outer side. The cambium grows as a continuous ring and is laid down as fibres along the trunk, stems and roots when a new growth increment layer is developed. The vascular cambium translocates nutrients in solution through the fibres from the roots to the leaves through the xylem and sugars produced in the leaves as photosynthates through the phloem and ray cells and to the roots. Their structural importance allows for strength and flexibility as energy from loading forces from the trees mass and wind movement stimulates adaptive growth and reactive growth. The shape and form of a tree is affected as wind moves along stems from the distal to proximal end dissipating and diminishing through damping through the trunk and roots and out into the ground (James *et al* 2006, Mattheck & Breloer 1994, pp. 14-19).

When the vascular cambium is disrupted a wound occurs. If the vascular cambium is severed to a sufficient depth fibres above and below will become desiccated and die forming a wound with the extent of tissue dieback often unpredictable and extending beyond the initial point of wounding. The coating of live tissue allows for a uniform distribution of loading forces over the entire tree – the *axiom of uniform stress* (Mattheck & Breloer 1994, p. 183), with additional or less wood produced depending on loading forces of compression, tension, shear and torsion. The stimulus of wounding usually changes the distribution of loading forces and the growth responses from the tree which can manifest as altered growth patterns as the load bearing capacity of the tree is modified and the crown and growing conditions alter over the life of the tree. Such changes may be caused by shedding branches, hollowing from termites, fungal decay or fire, clearing of nearby trees increasing exposure to winds, branch shedding, further wounding, and root damage from excavation, soil cultivation or erosion.

When wounding occurs the trees biomechanics predispose it to attempt to restore the alignment of its fibres and to protect it from pathogens by the growth of new wood and to isolate the wound through 4 walls of defence as provided by (CODIT) Compartmentalization of Decay In Trees (Shigo 1989, p. 45) by chemically altering surrounding wood and walling off the damage using barriers provided by existing cellular structures as Walls 1-3 and finally to conceal the wound separating it from the damage caused at the time of wounding beneath layers of new wood as Wall 4. At the time of wounding Wall 1 is formed by plugging xylem vessels vertically above and below the wound. Wall 2 is formed tangentially in growth rings by the concentration of lignin in the cells of late season's growth acting to prevent the inward spread of pathogens. Wall 3 forms at the sides of the wound from ray cells producing toxins which limits spread laterally. Wall 4 is the new wood separating the initial wound site from new growth and forms the *wound margin*.

The sides of the wound are *wound margin left* and *wound margin right* which slowly converge and usually form an oblong, circular or elliptic shape (Draper and Richards 2009). The distal and proximal ends of a wound are the *wound apex* and *wound base* respectively and may be irregular, jagged, obtuse, rounded, truncate to acute ($<90^{O}$) where the margins converge often forming a wound seam or partial occlusion (Draper and Richards 2009). The wood exposed by the removal of the bark is the *wound face* although this may be absent if a void is evident as a *cavity* or a larger void as a *hollow* (Draper and Richards 2009).

No matter what the shape of the wound the tree will ultimately attempt to align the fibres to grow over and conceal the wound to restore the cover of living wood around and along the stem to return the stem to its structural optimum, capable of receiving a uniform stress loading (Mattheck and Breloer 1994, pp. 12-16). Ultimately most margins converge and graft to conceal the *wound face* and it is then that the tree has achieved wound *occlusion* (Draper and Richards 2009). The living tissue disrupted at the time of wounding will always die, remain damaged and continue to deteriorate even when a wound is occluded by successive growth rings because trees do not heal they can only conceal the damaged cells with consecutive layers formed by each seasons growth (Mattheck and Breloer 1994, pp. 12-16).

Wound margins encroach over the wound face as new growth ring increments are added around the tree. The *wound margin depth* on the left and right sides usually deepens over time before the wound is occluded and can be measured perpendicular from the wound face to the outer edge of the trunk, or from the outer edge of the trunk to the inner edge of the void if the wound face is absent (Draper and Richards 2009). It is not uncommon for the depth of the *wound margin right* and *wound margin left* or the distances from the *initial wound margin* to the *wound margin* to be different because of reactive growth stimulated by differential loading along the stem in compression, tension, torsion or shear stimulating more wood to be laid down on the side bearing the greatest load (Mattheck and Breloer 1994, pp. 12-16). Where margins are of a similar width and depth they are usually equally loaded or may both be neutrally loaded (Mattheck 2004, p. 17).

As the wound wood margins grow across the wound face from the point of initial wounding a general differentiation in the colour of bark and its texture from surrounding unwounded tissue will sometimes be evident and can assist to indicate the extent of the width of the wound and the approximate location or extent of the *initial wound margin* (Draper and Richards 2009). However this may become less apparent over time with wounds that have been *occluded* for long periods due to the successive growth increments added sometimes concealing the wound entirely, or on trees with thick bark.

By measuring the width of the wound between the left and right *initial wound margin* the diameter of the trunk at the time of wounding and the approximate age of the tree can be estimated. The location of a wound on a trunk is static although the diameter of the stem is increased circumferentially by rings as growth increments, hence the wound margins and wound occlusion. The circumference of the trunk and stems of large old trees increases with age and the layers may be slightly thinner over a radial distance where such growth has slowed, than for younger trees or where they are not stimulated by loading.

The trees in the area are expected to grow at a relatively medium pace due to an average rainfall of 867.7 mm as recorded at the nearby Liverpool (Whitlam Centre), collected from 1962-2001, Latitude: 33.93 °S Longitude: 150.91 °E, Elevation: 20 m (Australian Government Bureau of Meteorology 2012), approximately 4.5 km away.

To differentiate between *cultural scarring*, historical scarring, recent mechanical damage or natural causes, the following were considered:

1. Age class
2. Ease of access to the location of wounding
3. Tree and its dimensions at the time of wounding
4. Extent of wounding, its symmetry (symmetrical / asymmetrical)
5. Extent of growth around wound site since initial wounding whether tree alive/dead
6. Impact of that wounding on the tree since the wounding event
7. Land use history
8. Condition class
9. Vigour class
10. Influence of its growing environment and its constraints
11. Proximity to other trees, shape and growth habit
12. Crown form
13. Shading
14. Rainfall
15. Insect damage
16. Fire
17. Soil
18. Aspect
19. Slope
20. Drainage

3.0 TREE ASSESSMENT

3.1 Assessment of Tree/s – Tree - Glenfield ST (#45-5-2428)

Tree No. Glenfield ST (#45-5-2428) Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound** in yrs. approx. 4. **Date range since tree died** in yrs. approx., e.g. died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
Eucalyptus moluccana Roxb. Grey Box	1. M 2. 75 - <100 3.1 >25 - <40 4. N/A	P	F - D	16 Approx. 10, Radial	600x370, 485 Av, E/W	85 85	MGVP - 6 1

Description

E. moluccana Roxb. - Grey Box is a small to medium sized woodland and occasionally tall forest tree (Brooker and Kleinig 1999, p. 220), with crown spread 10-20 m and commonly attaining a height of 15-25 m (Elliot and Jones 1986, p. 149) to 20-30 m with a diameter 0.6-1.2 m DBH, straight trunk up to half or more the height (Boland *et al*, 2006, p. 240). Grey Box has a high green density (GD) approximately 1170 kg / m^3 and an air dry density (ADD) of 1120 kg/ m^3 heartwood very durable, sapwood occasionally attacked (Bootle 1985, p. 256) to resistant to *Lyctid borers,* heartwood very hard, termite-resistant, strong and very durable (Boland *et al*, 2006, p. 322), indicative gradual deterioration since wounding.

Trunk straight to 4.0 m approx., erect, crown deliquescent, comprised of 2 codominant first order structural branches (FOSB), orientation northeast/southwest; 1 superior to northeast, erect; 1 inferior to southwest acutely divergent and ascending, supporting approximately 70% and 30% of the live crown respectively. High volume dieback in mid-upper crown comprised of small and large deadwood as mature epicormic shoots and third and lower order branches. Trunk wound on west side of trunk and soil levels increased around base of trees approximately 100-150 mm above grade. Steel cable fastened around base of trunk, largely concealed by soil and plant material.

Wound 1

Trunk wound extending below grade 100-150 mm (excavated), narrow linear, symmetrical, located on west side of trunk. Wound extending from -150 – 3450 mm (3600 mm long) and 400 mm approximately at widest at 800 mm. Wound face extending from -20 – 3220 mm (3240 mm long) and 200 mm at widest at 800 mm. Margins entire, apex and base rounded. Depth of margins: right 75-85 mm proximal-distal and left 20-50 mm proximal-distal. Width of margins: right 130 mm approximately and left 90 mm approximately.

Small occluded trunk wound 120 x 90 mm located 100 mm below grade below left wound margin (Photographs 1.3 and 1.4). This wound is unlikely to be from lightning as no substantial wounding in the crown is evident, although the basal wound is consistent with the Earthing of a lightening discharge.

The impact of the intensity of lightning strikes can vary between trees. The structural damage is derived primarily from a short distance, short duration, intense, strong shock wave radiating from the lightning core and additional damage as green tissue is superheated and by steam venting, a significant cause of damage to roots (Coder 2007). The lightning charge path follows the internal grain of a tree in the vascular cambium which has a lower resistance to the flow of electricity when compared to the outside of the bark and leaves even when wet (Coder 2007). In the outer crown thin branches and leaves have reduced electrical resistance and the charge moves internally along the fibres and through the cambium but as the charge builds the flow of current cannot be sustained and a flash-over to the surface starts and follows the grain of the xylem and builds to form a shock wave from atmospheric heating against the trunk, forming an intense compression against the bark and inner wood and a rebounding torsion wave around the trunk (Coder 2007) causing massive damage and delignification. This can be intensified when multiple strokes in a single lightning strike generate multiple shock waves (Taylor 1977).

Here the tree is expected to have been young when such a strike may have occurred, but the tree would have likely caught on fire or since decayed being much smaller than present. The final indicator that the small, occluded, basal wound was not caused by lightening is that the vascular cambium was damaged by longicorn borers prior to the development of the basal wound and the disrupted tissue dried out preventing the internal flow of the electrical discharge. The wound is likely an occluded abrasion impact event from the movement of the steel cables against the trunk, but the full extent of such damage is unknown.

Wound face entire to heartwood with patches of remnant sapwood, proximal, adjacent left wound margin and wound base (see Photographs 1.1 and 1.2). Minimal weathering as delignification of the heartwood with Longicorn borer (order *Cerambycidae*), where larvae have disrupted the vascular cambium and sapwood by feeding and then burrowing into the heartwood (Creffield 1996) to pupate causing the broader linear, shallow concave depressions evident (see Photographs 1.1 and 1.2). The disrupted tissue desiccates and dies back causing the extent of the lesion distally. Termite mud evident adjacent the left wound margin and wound face and protruding from exposed ray cells as linear vertical cracks, concentrated from mid-top of wound face.

E. moluccana Roxb. Grey Box has a high green density of 1170 kg / m^3 and is strong and moderately durable, not susceptible to *Lyctus* or termite attack (Bootle 1985, p. 256) indicative of its gradual weathering since wounding. However, the wounding is likely to be recent accounting for minimal wreathing of the heartwood generally although it may have been protected by the weaker sapwood which has almost completely weathered away with only shallow fragmented patches evident (Photographs 1.1 and 1.2). The specimen is small and likely regrowth since the cessation of agricultural activities, whereas older specimens can be expected of much larger dimensions. This wound is expected to have affected approximately 10-15% of trunk *in situ*. The wound is expected to be >25-<40 years old. From the dimensions and age of the tree in early maturity, depth of its margins, minimal weathering of durable heartwood as minor delignification and the remains of some sapwood with insect borer damage extending to heartwood, the wound is likely to be of Non-Aboriginal cultural origin and caused by borer insects or in combination with an abrasion event from the steel cable.

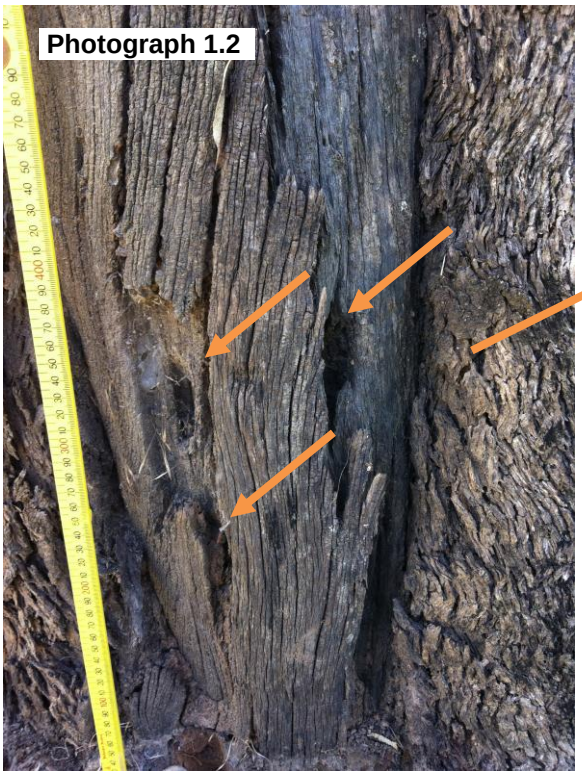
Risks to tree

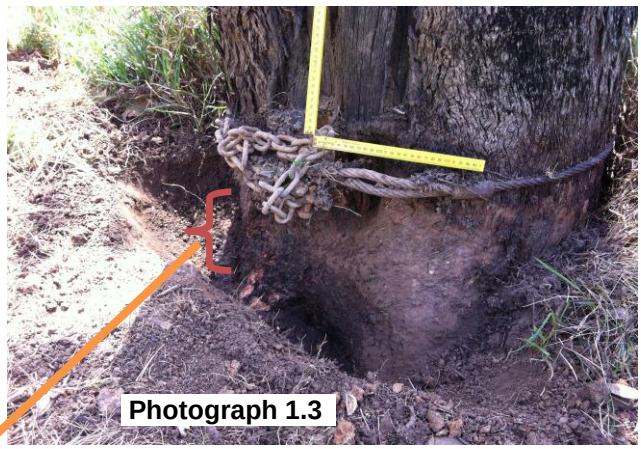
Damage from fire, fungal decay, physical damage and from abrasion or collision impacts.

Photograph 1.0

Photograph 1.1

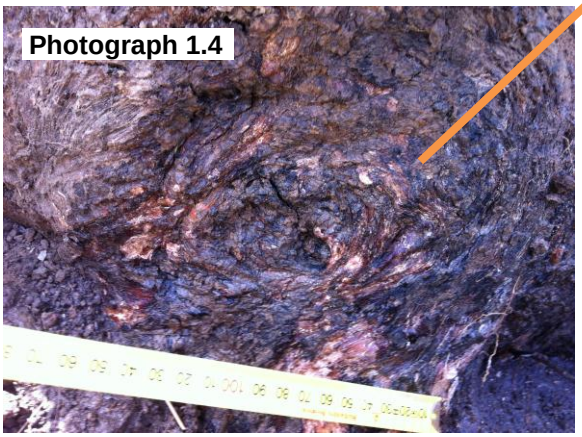
Photograph 1.2





Photograph 1.3

Photograph 1.4



Photograph 1.0 taken by Danny Draper. View to east of Tree Glenfield ST (#45-5-2428) *Eucalyptus moluccana* Roxb. – Grey Box, with bold arrow showing location of wound on west side of trunk.

Photograph 1.1 View to east of Tree Glenfield ST (#45-5-2428) with trunk wound shown with a folding ruler extended to 1 m. Red brace indicates area of remnant sapwood, proximal, adjacent left wound margin and wound base, shown in greater detail in Photograph 1.2.

Photograph 1.2 View to east of Tree Glenfield ST (#45-5-2428)- with detail of remnant sapwood, proximal, adjacent left wound margin and base with bold orange arrows showing the remnants of Longicorn borer (order *Cerambycidae*), where larvae have disrupted the vascular cambium and sapwood by feeding and then burrowing into the heartwood to pupate causing the broader linear, shallow concave depressions evident. The disrupted tissue dies back causing the extent of lesion distally.

Photograph 1.3 View to east of Tree Glenfield ST (#45-5-2428)- with trunk wound base, shown excavated to 150 mm below grade with a folding ruler extended to 250 mm (horizontally) above steel cable fastened around trunk. Red brace indicates occluded wound margin from damaged root or abrasion wound on trunk, not likely to be from lightening.

Photograph 1.4 Occluded wound margin 100 mm below grade, shown with retractable ruler extended to 170 mm. Elongated wound distally, expected to be caused by Longicorn Borers or in combination with abrasion as partial ring barking by steel cable causing dieback of vascular cambium extending above point of initial vascular cambium disruption.

3.1 Assessment of Tree/s – Tree GWD 1 -

Tree No. GWD 1 Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound** in yrs. approx. 4. **Date range since tree died** in yrs. approx., e.g. died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
Eucalyptus tereticornis Smith Forest Red Gum	1. M 2. >75 - <100 3.1 >30 - <50 4. N/A	P	I - D	16 Approx. / 12x8, E/W	800x850, 825 Av, NNE/SSW	70 75	MGVP - 6 1

Description

E. tereticornis Smith – Forest Red Gum is a small to medium sized to tall woodland or forest tree (Brooker and Kleinig 1999, p. 101) with crown spread 10-25 m and commonly attaining a height of 20-30 m (Elliot and Jones 1986, p. 222) to 20-50 m with a diameter up to 2.0 m DBH, straight trunk up to half or more the height (Boland *et al*, 2006, p. 322). Forest Red Gum has a high green density (GD) of 1200 kg / m^3 and an air dry density (ADD) of 1050 kg/ m^3 heartwood durable, sapwood occasionally attacked by *Lyctid borers* (Bootle 1985, p. 281), heartwood hard, strong and durable (Boland *et al*, 2006, p. 322), indicative gradual deterioration since wounding.

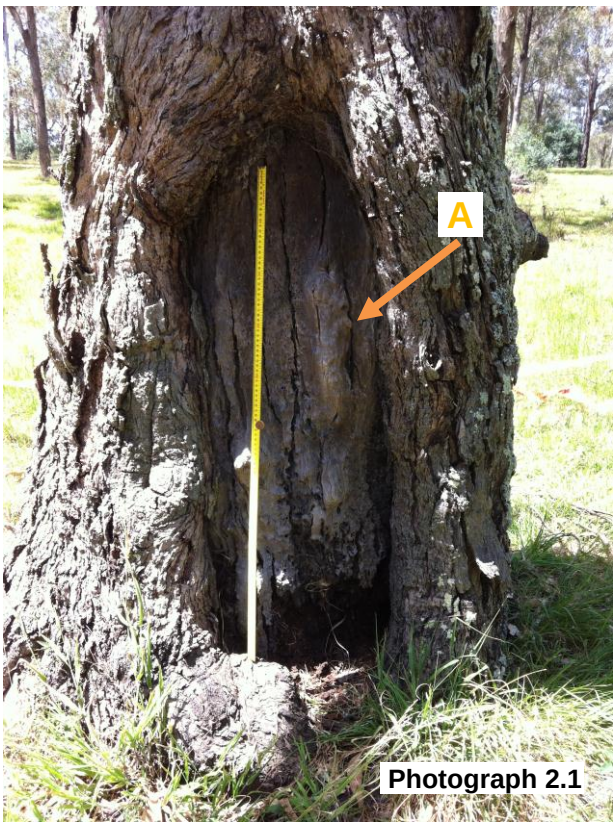
Wound 1

Basal wound, oval–rectangular, symmetrical, on northwest side of trunk. Wound extending from ground to 1600 mm and 600 mm at widest at 1100 mm. Wound face extending from 250-1350 mm and 390 mm at widest at 1100 mm (see Photograph 2.1). Wound margins entire, save for base, apex rounded, and base extending to ground along right wound margin. Wound face entire save for disrupted base adjacent right margin extending to decayed heartwood where a cavity is forming. At approximately 600 mm a 280 mm long protuberance, 20 mm high and 25 mm wide was evident extending from the wound face (Photographs 2.1 and 2.2) and likely making the bark unsuitable for an Aboriginal artifact, whereas smooth bark is more traditionally extracted. Adjacent the left side of the wound face (Photographs 2.1 and 2.2) remains of epicormic strands (Burrows 2002) as spike like protuberances 10-15 x 20 mm were evident, formed by bud primordia in the pith extending to the sapwood. Here negligible weathering as delignification has occurred from the sap wood or the fine points from the epicormic strands, indicative of a recent wounding event. Depth of margins: right 110-140 mm proximal-distal and left 190-170 mm proximal-distal. Width of margins: right 100 mm approximately and left 120 mm approximately.

This wound is expected to have affected approximately 10-15% of trunk circumference *in situ* and is expected to be approximately >30 - <50 years old. The specimen is small and likely regrowth since the cessation of agricultural activities, whereas older specimens can be expected of much larger dimensions. With minimum weathering of the sapwood and weathering extending to the heartwood this is indicative of an initial abrasion impact event causing localized partial delamination of the bark, allowing decay and subsequent activities of animals from foraging or seeking shelter to exploit the cavity and to exacerbate its extension over time. Due to the likely young age of the tree when the wounding occurred, the subsequent minimal weathering of the wound face and vigorous wound wood development as margins and partial occlusion, the scar appears to be of Non-Aboriginal cultural origin.

Risks to tree

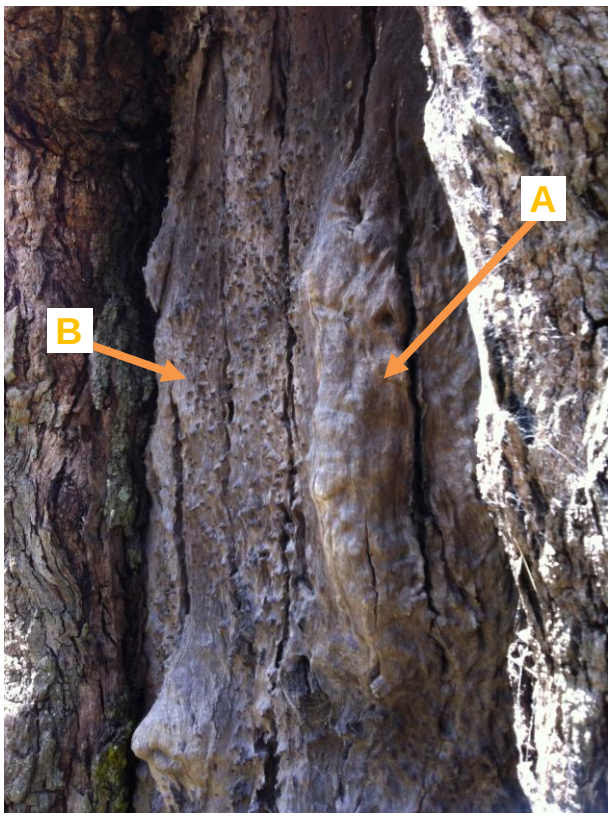
Damage from fire, fungal decay, physical damage and from abrasion or collision impacts.



Photograph 2.0 taken by Danny Draper. View to southeast of Tree GWD 1- *Eucalyptus tereticornis* Smith – Forest Red Gum, Wound 1, with trunk wound shown with a folding ruler extended to 1 m.

Photograph 2.1 taken by Danny Draper. View to southeast of Wound 1, with trunk wound shown with a folding ruler extended to 1 m. Right wound margin extending to ground as wound base and structural root. Right wound margin extends to ground where decay has occurred. Linear protuberance on upper wound face (right) marked '**A**', indicated by bold arrow, shown in greater detail in Photograph 2.2.

Photograph 2.2 taken by Danny Draper. View to southeast of Wound 1 (detail), '**A**' showing 280 mm long protuberance, indicative of the wrinkled and likely unsuitable nature of the bark for an Aboriginal artifact, whereas smooth bark is usually used. '**B**' shows an area Epicormic Strands as spike like protuberances formed by bud primordia in the pith extending to the sapwood. Here negligible weathering as delignification of the sap wood has occurred, indicative of recent wounding event.



Photograph 2.2

4.0 CONCLUSION

4.1 This is provided in table form and summarizes the key information.

UTMA Tree No. & **Archaeological No.**	Age of Tree **Age range of tree** in yrs. approx.	Age of Scar **Age range of wound** in yrs. approx.	Likely cause of Scar
Glenfield ST (#45-5-2428)	>75 - <100	1) >25 - <40	1) Non-Aboriginal cultural origin, borer insect damage or in combination with an abrasion impact event from steel cable fastened around base of trunk.
GWD 1	>75 - <100	2) >30 - <50	2) Non-Aboriginal cultural origin, an abrasion impact event.

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Hort. Cert.

Appendix A

Matrix - Sustainable Retention Index Value (SRIV) ©

Version 4, 2010

Developed by IACA – Institute of Australian Consulting Arboriculturists www.iaca.org.au

The matrix is to be used with the value classes defined in the Glossary for Age / Vigour / Condition.
An index value is given to each category where ten (10) is the highest value.

Age Class	Vigour Class and Condition Class					
	Good Vigour & Good Condition (GVG)	Good Vigour & Fair Condition (GVF)	Good Vigour & Poor Condition (GVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth. No remedial work or improvement to growing environment required. May be subject to high vigour. Retention potential - Medium – Long Term.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term. Potential for longer with remediation or favourable environmental conditions.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed immediately or retained for Short Term. Potential for longer with remediation or favourable environmental conditions.
(Y) Young	**YGVG - 9** **Index Value 9** Retention potential - Long Term. Likely to provide minimal contribution to local amenity if height <5 m. High potential for future growth and adaptability. Retain, move or replace.	**YGVF - 8** **Index Value 8** Retention potential - Short – Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium-high potential for future growth and adaptability. Retain, move or replace.	**YGVP - 5** **Index Value 5** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Low-medium potential for future growth and adaptability. Retain, move or replace.	**YLVG - 4** **Index Value 4** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium potential for future growth and adaptability. Retain, move or replace.	**YLVF - 3** **Index Value 3** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Low-medium potential for future growth and adaptability. Retain, move or replace.	**YLVP - 1** **Index Value 1** Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height <5 m. Low potential for future growth and adaptability.
(M) Mature	**MGVG - 10** **Index Value 10** Retention potential - Medium - Long Term.	**MGVF - 9** **Index Value 9** Retention potential - Medium Term. Potential for longer with improved growing conditions.	**MGVP - 6** **Index Value 6** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVG - 5** **Index Value 5** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVF - 4** **Index Value 4** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVP - 2** **Index Value 2** Retention potential - Likely to be removed immediately or retained for Short Term.
(O) Over-mature	**OGVG - 6** **Index Value 6** Retention potential - Medium - Long Term.	**OGVF - 5** **Index Value 5** Retention potential - Medium Term.	**OGVP - 4** **Index Value 4** Retention potential - Short Term.	**OLVG - 3** **Index Value 3** Retention potential - Short Term. Potential for longer with improved growing conditions.	**OLVF - 2** **Index Value 2** Retention potential - Short Term.	**OLVP - 0** **Index Value 0** Retention potential - Likely to be removed immediately or retained for Short Term.

Appendix B

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Appendix C

Glossary

From
Dictionary for Managing Trees in Urban Environments
Institute of Australian Consulting Arboriculturists (IACA) 2009.

Wounds

Abrasion Wound *Mechanical wound* causing *laceration* of tissue by an abrasive impact *episode* e.g. grazed by a motor vehicle or the continuous action of the rubbing of *crossed branches* or stems where no graft has formed.

Basal Trunk Wound A wound on the trunk extending to the *root crown* where the base of the wound is open at the ground and usually truncated. Dependant upon the width of its base such a wound may not become *occluded*.

Blaze A wound cut into a tree usually to the sapwood and sometimes extending to heartwood to create a marker point e.g. by a surveyor, the *wound face* may be further incised or painted to denote additional information.

Branch Tear *See Branch Tear Out.*

Branch Tear Out Dislodging of a branch from its point of attachment where it is torn away from the *branch collar* snapping the *branch tail* causing a *laceration*, usually to the underside of the *branch union* of the branch or trunk to which it was attached forming a *tear out wound*.

Branch Tear Wound *See Tear Out Wound.*

Callus Wood Undifferentiated and unlignified wood that forms initially after wounding around the margins of a wound separating damaged existing wood from the later forming lignified wood or *wound wood*.

Canker A *wound* created by repeated localised killing of the *vascular cambium* and bark by wood *decay* fungi and bacterium usually marked by concentric disfiguration. The wound may appear as a depression as each successive *growth increment* develops around the *lesion* forming a *wound margin* (Shigo 1991, p. 140, Keane *et al* 2000, p. 332).

Cavity A usually shallow void often localized initiated by a *wound* and subsequent *decay* within the trunk, branches or roots, or beneath bark, and may be enclosed or have one or more opening.

Decay Process of degradation of wood by microorganisms (Australian Standard 2007, p. 6) and fungus.

Delaminate A *mechanical wound* caused when the bark is stripped from a tree, usually from the trunk as a continuous sheet back to the vascular cambium. This may occur from an impact or abrasion *episode* such as a collision with a motor vehicle and the tree may become *ringbarked*. See also *Partially Delaminated*.

Delamination The separation of fibres often evident as longitudinal splitting of wood (Lonsdale 1999, p. 313).

Delignification The decomposition of *lignin* from *wood* by chemical deterioration, resulting in loss of strength, evident by separation of fibres into hair like strands. See also *Lignification*.

Depth of Margin Distance from outer trunk perpendicular to the *wound face*. This may assist in determining the age of a wound.

Dieback Wound Wounding where *dieback* extends beyond a branch collar as with *natural pruning* and extends to other branches, trunk or roots. See also *Secondary Crown* and *Stag-headed*.

Enclosed Wound Wound with a perimeter of *wound wood* with a well-defined apex, base and margins and often evident on an older wound. On a pruned branch that is rounded the enclosing wound wood from the branch collar may be circular with no definite apex or base evident. However, on a pruned branch where the *wound face* is oval in shape due to *reaction wood*, the enclosing *wound wood* from the branch collar may form a definite apex, base or margins.

Environmental Wounding/Damage Wounding inflicted by environmental factors or modifications to the growing *environment* of a tree, e.g. sun-scald, drought, fire, water logging, wind damage to leaves, branches, bark or roots, phytotoxic damage from chemicals, or air, soil or water pollution.

Fire Wound Wounding caused by fire. Such wounds may cause initial damage or may be secondary from a previous wounding *episode*/*s*. Some fire damage may be superficial or may destroy a tree in full or part rendering it potentially vulnerable to failure. Note: fire damaged trees can be potentially hazardous and should be assessed carefully.

Frilling *Ringbarking* by steel hatchet or axe as a continuous band of overlapping linear lacerations around a stem or trunk, where cleaved sections may be opened by the wedged blade giving a frilled appearance. Also a discontinuous line of linear lacerations made around the stem of a live tree or shrub weed for the application and uptake of herbicide.

Hollow A large void initiated by a *wound* forming a *cavity* in the trunk, branches or roots and usually increased over time by *decay* or other contributing factors, e.g. fire, or fauna such as birds or insects e.g. ants or termites. A hollow can be categorized as an *Ascending Hollow* or a *Descending Hollow*.

Horizontal Wound Usually superficial horizontal wounding from insects burrowing between bark layers and revealed by decorticating bark. Often evident on smooth bark Eucalypts.

Impact Wound *Mechanical wound* caused by an impact *episode* e.g. collision by a motor vehicle.

Incision Wound caused by cutting or engraving. See also *Laceration*.

Increment strip A linear, usually narrow, *fluted* section of *adaptive wood,* forming in a place of high *stress* indicating the pattern of *force flow* (Mattheck 2004, p. 140). Evident as lighter coloured bark usually occurring around the edges of a *notch* or *branch stub*, along a *buttress*, or along a *sharp-edged rib*.

Initial Wound Margin The site of initial wounding often evident as a faint line of discoloured bark or bark of a different texture to adjacent undamaged trunk. This may assist in determining the age of a wound.

Insect Wound Wounding to any part of a tree caused by insect activity, e.g. borers and termites.

Laceration Wound caused by tearing. See also *Incision*.

Lightning Strike Wound A wound from a lightning strike. Such a wound may kill a tree outright or cause it to catch fire, or may destroy the tree in full or part, or no injury may be evident and a tree gradually declines through resulting *stress*. Bark may be exploded from the tree by pressure radiating from the core of the lightning path resulting in further compounded damage through water heating and steam explosions in the tissues and the electrical disruption of living cells (Coder 2004, pp. 35-44).

Mechanical Wound Wounding inflicted by abrasion e.g. by motor vehicles, grass mowing equipment, grazing by horses, cows or birds (parrots); impact e.g. by motor vehicle collisions; drilling e.g. with increment cores, resistographs, cable bracing, hanging pots, hammocks etc.; branch tearing e.g. from wind damage, collision from falling branches, vandalism; and root severance e.g. root pruning for excavation for building or utility services or for agricultural cultivation.

Open Wound Wound with poor to non-existent perimeter or *callus wood* or *wound wood* on an older wound without well-defined apex, base or margins and often this will be associated with a recent wounding *episode* or an older episode on a senescent tree or a tree in *poor condition* or of *low vigour*, or where repeated wounding episodes such as inflicted by ongoing borer activity damages and continually alters wound perimeters, or repeated scalping of exposed roots by lawn mowing equipment.

Occlusion Growth processes where *wound wood* develops to enclose the *wound face* by the merging of *wound margins* concealing the *wound* and restoring the growing surface of the structure with each *growth increment* gradually realigning *fibres* in the wood longitudinally along the stem to maximise uniform stress loading. See also *Axiom of Uniform Stress*.

Occlusion Seam A line of *included bark* where the interface of merging *wound margins* is *occluded* or forms a *partial occlusion*.

Partial Occlusion *Wound wood* growth that encloses some of the *wound face* by the merging and *grafting* of some sections of the *wound margins.* Usually evident by reduced *wound face* width and indicated where an *apex* or *base* is *acute* with the vertical extent often indicated by the length of an *occlusion seam*.

Partially Bridged Occlusion *Wound wood* partly forming an *occlusion* by joining areas of the *wound margins* across the *wound face* at point/s other than the base or apex and may form an *occlusion seam*.

Pruning Wound A wound created by the act of *pruning*.

Ram's Horning *Wound wood* that becomes curled inward and can wrap around itself as it crosses a void such as a *cavity* and may succumb to cracking with those wounds susceptible to further infestation by *decay* pathogens.

Scarred Tree A tree containing a wound of cultural or scientific interest, inflicted initially for a specific purpose, e.g. by indigenous people to extract implements or carved as a marker or with a pattern for ceremonial purposes, or as a marker and *blaze* by a surveyor or explorer, or from an accidental *wound* that has not *occluded*.

Stepped Incision A localised area of deeper wounding often extending to the heartwood, usually proximally within a *blaze*, removing a vertical semi-circular wedge like section from the *wound face* with a horizontal bench like structure formed by deep cuts as its base. Such wound sections usually taper distally and may be cut around the outer edges to assist removal of the semi-circular wedge, and likely undertaken to inhibit regrowth.

Structural Wound Any wound occurring on a tree as a result of a structural failure e.g. branch splitting or *hazard beam*, diminishing its stability in full or part.

Succession Wound Preceding layers of failed wound margin/s forming a step like sequence away from the *wound face*, where present, to the current wound margin/s indicating repeated cycles of formation and failure of *CODIT Wall 4*.

Sun Scald Wounding usually on the upper side of branches after sudden exposure to sunlight especially in summer e.g. after excessive pruning of the upper crown, or following storm damage stripping foliage or branches e.g. *Ficus spp.*

Survey Marker Wound *See Blaze.*

Tear Out *See Branch Tear Out.*

Tear Out Wound A wound of usually concave shape created by a *branch tear out*.

Wound Damage inflicted upon a tree through injury to its living cells, from biotic or abiotic causes, e.g. where *vascular cambium* has been damaged by branch breakage, impact or insect attack. Some wounds *decay* and cause *structural deterioration* or *defects*. Trees of *normal vigour* are able to resist and contain infection by walling off areas within the wood by *compartmentalization*. See *Compartmentalization Of Decay In Trees (CODIT)*. An *occlusion* may eventually conceal a wound but the enclosed *defect* remains internally and *decay* may continue to develop further weakening the *heartwood* and *sapwood* compromising the tree's *structural integrity*. The cause of a wound may be accidental e.g. *branch tear out* or deliberate e.g. *carved tree*.

Wound Apex The distal end of a wound. The shape may be acute, irregular, jagged, obtuse, rounded, or truncate.

Wound Apex Acute Apex of a wound that is tapering and the *occlusion* interface angle is less than $<90^{O}$.

Wound Apex Irregular The *wound wood* growth at the apex mostly interrupted forming an edge that is not uniform or jagged. Often this may be influenced by a *successional wound* resulting in disproportionate development of *callous wood* and *wound wood.*

Wound Apex Jagged The *wound wood* growth or tissue damaged initially at the apex that is uneven and likely to have been caused by laceration.

Wound Apex Obtuse Apex of a wound that is tapering and the *occlusion* interface angle is greater than >90^{O}.

Wound Apex Rounded The *wound wood* growth at the apex that is curved.

Wound Apex Truncate The *wound wood* growth or tissue damaged initially at the apex that is even and likely to have been caused by incision.

Wound Base The proximal end of a wound. The shape may be acute, irregular, jagged, obtuse, rounded, or truncate.

Wound Base Acute Base of wound that is tapering and the *occlusion* interface angle is less than <90^{O}.

Wound Base Irregular The *wound wood* growth at the base mostly interrupted forming an edge that is not uniform or jagged. Often this may be influenced by a *successional wound* resulting in disproportionate development of *callous wood* and *wound wood.*

Wound Base Jagged The *wound wood* growth or tissue damaged initially at the base that is uneven and likely to have been caused by laceration.

Wound Base Obtuse Base of wound that is tapering and the *occlusion* interface angle is greater than >90^{O}.

Wound Base Rounded The *wound wood* growth at the base that is curved.

Wound Base Truncate The *wound wood* growth or tissue damaged initially at the base that is even and likely to have been caused by incision.

Wound Face Surface area of tissue exposed by injury, e.g. bark, sapwood, heartwood.

Wound Face Cracks Horizontal Transverse cracks in a *wound face* indicative of failure from *tension* force (Mattheck & Breloer 1994, p. 183).

Wound Face Cracks Vertical Longitudinal cracks in a *wound face* indicative of failure from *compression* force (Mattheck & Breloer 1994, p. 183).

Wound Face Entire Surface of exposed tissue is uniform without damage extending to a different layer or unaffected by borers or decay, e.g. possibly described as *wound face* entire to dead sapwood.

Wound Face Incomplete Surface of exposed tissue is not uniform with damage extending to different layers or affected by borers or decay, e.g. possibly described as *wound face incomplete* with cavity at apex. See also *Wound face entire*.

Wound Face Exposed Heartwood Wound extending to reveal the *heartwood*, or has deteriorated through *decay* to reveal this layer of wood.

Wound Face Exposed Sapwood Wound extending to reveal the sapwood, or has deteriorated through *decay* to reveal this layer of wood.

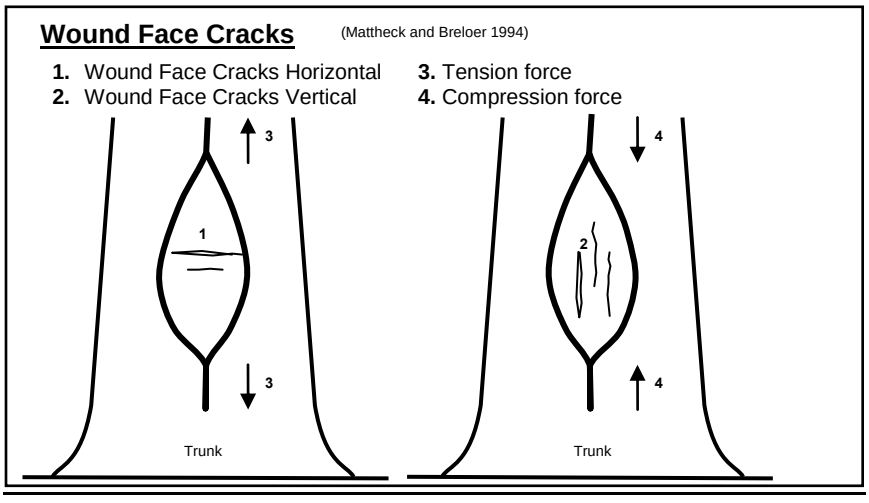
Wound Margin The left and right sides of a *wound* as bound by the alignment of fibres along a stem or root longitudinally, being either the remaining undamaged living cells and new *callus wood* and *wound wood* on older wounds. Here the fibres are usually formed from *meristematic* cells. A wound margin may be circular on a *pruning wound* or form around the perimeter of a *canker*.

Wound Margin Entire The *wound wood* growth in the margin is mostly uninterrupted forming a uniform edge.

Wound Margin Irregular The *wound wood* growth in the margin is mostly interrupted and forms an edge that is not uniform e.g. where repeated wounding *episode*s such as inflicted by ongoing borer activity damages and continually alters the *wound perimeter* with *callus wood* and *wound wood*. See also *Successional Wound*.

Wound Margin Left The left side of a wound margin when the distal and proximal ends of the wound is known, to determine the *wound apex* and *wound base*, respectively.

Wound Margin Right The right side of a wound margin when the distal and proximal end of the wound is known, to determine the *wound apex* and wound base, respectively.



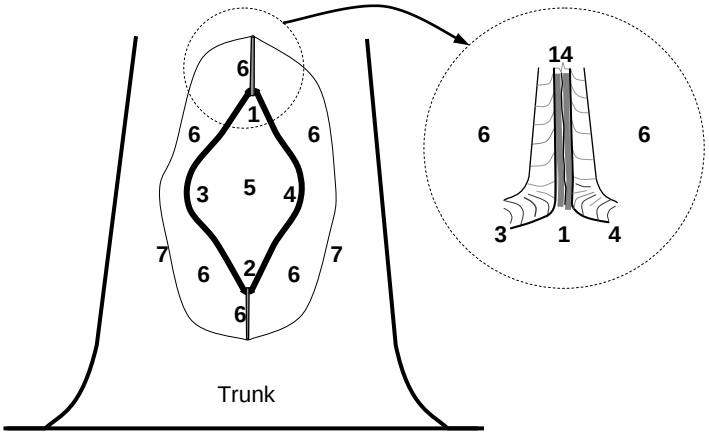
Wound Margin Width Distance from *wound margin* to the site of initial wounding. Where evident the *initial wound margin* may be identified by discoloured bark or bark of a different texture to adjacent undamaged trunk. This may also assist in determining the age of a wound.

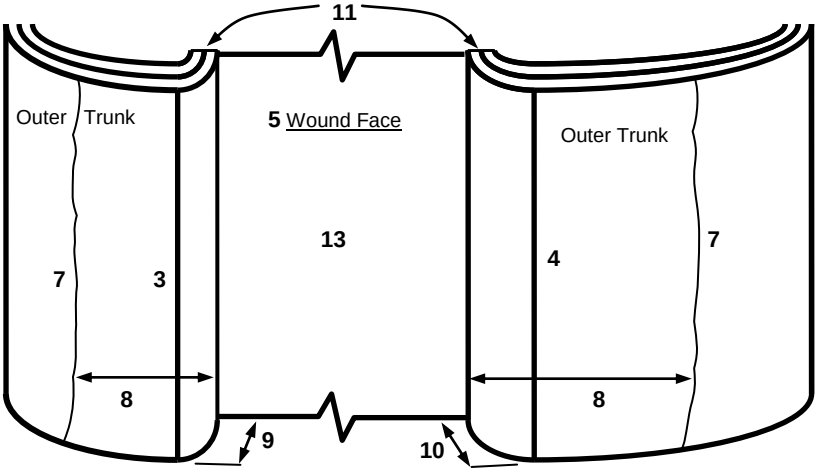
Wound Wood Aged *callus wood* around the margins of a wound that becomes differentiated to form *CODIT Wall 4* producing new lignified wood. This wood may grow to surround a wound and may eventually develop to enclose the wound by *occlusion*.

Wound Diagrams

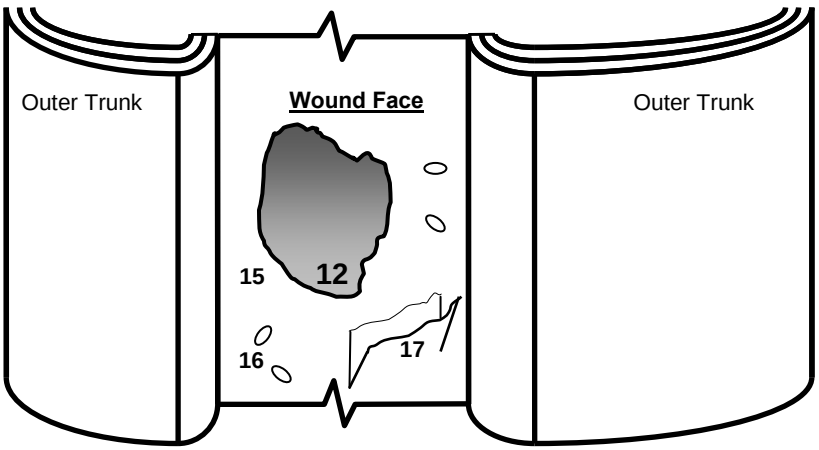
Wound Parts

1. Apex
2. Base
3. Wound Margin Left
4. Wound Margin Right
5. Wound Face
6. Partial Occlusion
7. Initial Wound Margin
8. Margin Width
9. Left Margin Depth
10. Right Margin Depth
11. Wound Wood
12. Cavity
13. Wound Face Entire
14. Occlusion Seam



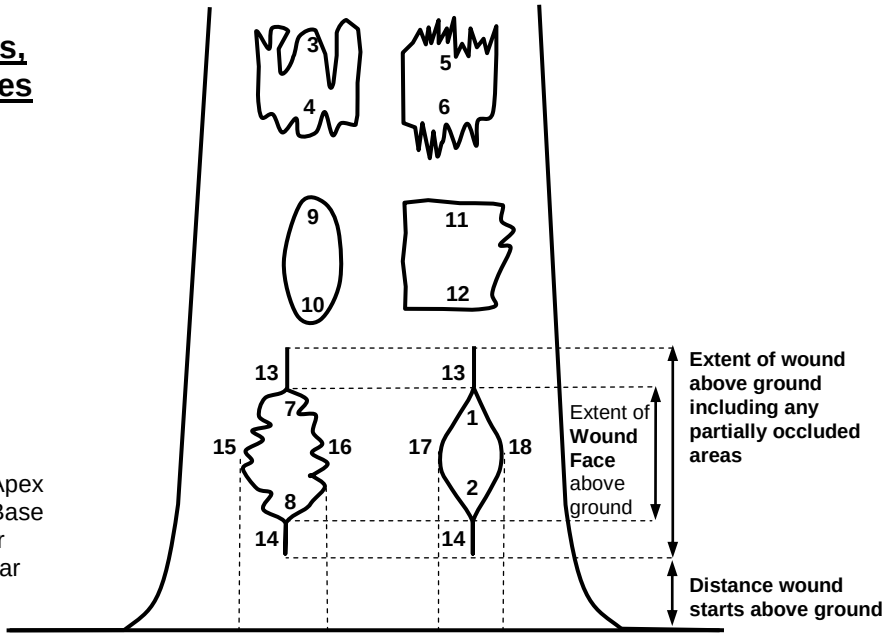


Examples of other Wound Faces
15. Wound face extending from dead sapwood to cavity in heartwood.
16. Oval shaped borer exit holes evident indicative of Longicorn Borer (Family Cerambycidae).
17. Linear laceration as made by an axe.



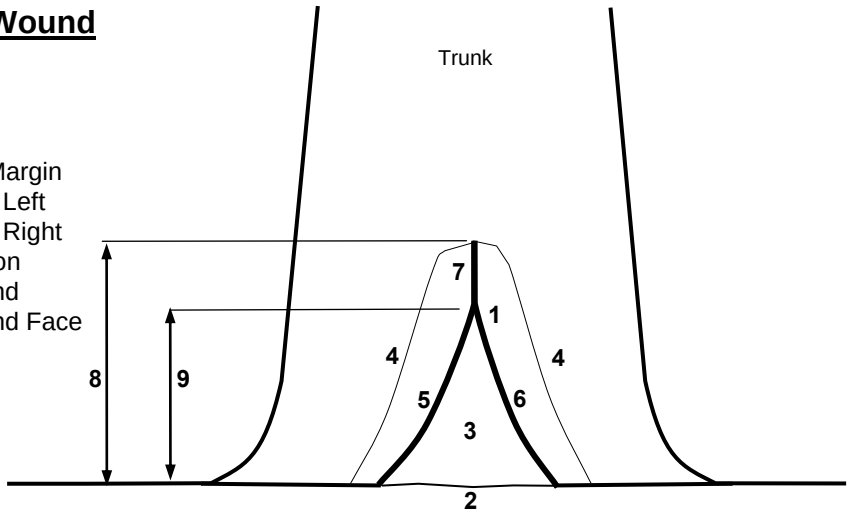
Wounds, Margins, Apexes and Bases

1. Apex Acute
2. Base Acute
3. Apex Irregular
4. Base Irregular
5. Apex Jagged
6. Base Jagged
7. Apex Obtuse
8. Base Obtuse
9. Apex Rounded
10. Base Rounded
11. Apex Truncate
12. Base Truncate
13. Partially Occluded Apex
14. Partially Occluded Base
15. Left Margin Irregular
16. Right Margin Irregular
17. Left Margin Entire
18. Right Margin Entire



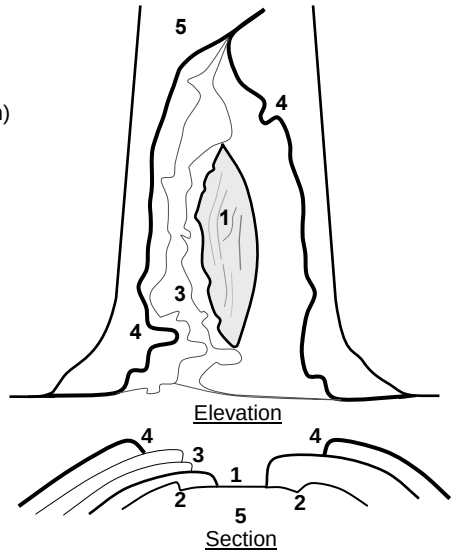
Basal Trunk Wound

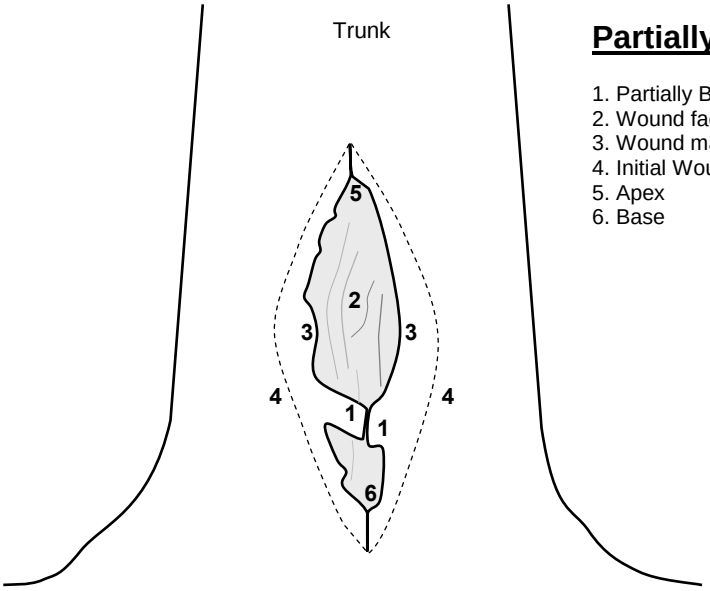
1. Apex
2. Base
3. Wound Face
4. Initial Wound Margin
5. Wound Margin Left
6. Wound Margin Right
7. Partial Occlusion
8. Extent of Wound
9. Extent of Wound Face



Successional Wound

1. Initial wound face
2. Initial wound margins (concealed when viewed in Elevation)
3. Successive wound margins
4. Wound margins (current)
5. Trunk





Partially Bridged Occlusion

1. Partially Bridged Occlusion
2. Wound face
3. Wound margins
4. Initial Wound Margins
5. Apex
6. Base

Condition of Trees

Condition A tree's *crown form* and growth habit, as modified by its *environment* (aspect, suppression by other trees, soils), the *stability* and *viability* of the *root plate*, trunk and structural branches (first (1^{st}) and possibly second (2^{nd}) order branches), including structural defects such as wounds, cavities or hollows, *crooked* trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with *vigour* and it is possible for a tree to be of *normal vigour* but in *poor condition*. Condition can be categorized as *Good Condition*, *Fair Condition*, *Poor Condition* and *Dead*.

Good Condition Tree is of good habit, with *crown form* not severely restricted for space and light, physically free from the adverse effects of *predation* by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour. See also *Condition*, *Fair Condition* and *Poor Condition*.

Fair Condition Tree is of good habit or *misshapen*, a form not severely restricted for space and light, has some physical indication of *decline* due to the early effects of *predation* by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the *environment* essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour. See also *Condition*, *Good Condition* and *Poor Condition*.

Poor Condition Tree is of good habit or *misshapen*, a form that may be severely restricted for space and light, exhibits symptoms of advanced and *irreversible decline* such as fungal, or bacterial infestation, major die-back in the branch and *foliage crown*, *structural deterioration* from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local *environment* that would normally be sufficient to provide for its basic survival if in *good* to *fair* condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and *predation* by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour. See also *Condition*, *Good Condition* and *Fair Condition*.

Dead Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms;
Processes
Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves);
Osmosis (the ability of the root system to take up water);
Turgidity (the ability of the plant to sustain moisture pressure in its cells);
Epicormic shoots or *epicormic strands* in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a *lignotuber*);
Symptoms
Permanent leaf loss;
Permanent wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots);
Abscission of the *epidermis* (bark desiccates and peels off to the beginning of the sapwood).

Removed No longer present, or tree not able to be located or having been cut down and retained on a site, or having been taken away from a site prior to site inspection.

Periods of Time

Periods of Time The life span of a tree in the urban environment may often be reduced by the influences of encroachment and the dynamics of the environment and can be categorized as *Immediate*, *Short Term*, *Medium Term* and *Long Term*.

Immediate An *episode* or occurrence, likely to happen within a twenty-four (24) hour period, e.g. tree failure or collapse in full or part posing an imminent danger. See also *Short Term*, *Medium Term* and *Long Term*.

Short Term A period of time less than <1 – 15 years. See also *Periods of Time*, *Immediate*, *Medium Term* and *Long Term*.

Medium Term A period of time 15 – 40 years. See also *Periods of Time*, *Immediate*, *Short Term* and *Long Term*.

Long Term A period of time greater than >40 years. See also *Periods of Time*, *Immediate*, *Medium Term* and *Short Term*.

Vigour

Vigour Ability of a tree to sustain its life processes. This is independent of the *condition* of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g. *dormant*, deciduous or semi-deciduous trees. Vigour can be categorized as *Normal Vigour, High Vigour*, *Low Vigour* and *Dormant Tree Vigour*.

Normal Vigour Ability of a tree to maintain and sustain its life processes. This may be evident by the *typical* growth of leaves, *crown cover* and *crown density*, branches, roots and trunk and *resistance* to *predation*. This is independent of the *condition* of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation. See also *Vigour*, *Low Vigour* and *High Vigour*.

High Vigour *Accelerated growth* of a tree due to incidental or deliberate artificial changes to its growing *environment* that are seemingly beneficial, but may result in *premature aging* or failure if the favourable conditions cease, or promote *prolonged senescence* if the favourable conditions remain, e.g. water from a leaking pipe; water and nutrients from a leaking or disrupted sewer pipe; nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard; a tree subject to a stringent watering and fertilising program; or some trees may achieve an extended lifespan from continuous *pollarding* practices over the life of the tree.

Low Vigour Reduced ability of a tree to sustain its life processes. This may be evident by the *atypical* growth of leaves, reduced *crown cover* and reduced *crown density*, branches, roots and trunk, and a deterioration of their functions with reduced *resistance* to *predation*. This is independent of the *condition* of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation. See also *Vigour*, *Normal Vigour* and *High Vigour*.

Dormant Tree Vigour Determined by existing turgidity in lowest order branches in the outer extremity of the crown, with good bud set and formation, and where the last *extension growth* is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.

Good Vigour See *Normal Vigour*.

Poor Vigour See *Low Vigour*.

Health A tree's *vigour* as exhibited by *crown density*, *crown cover*, leaf colour, presence of epicormic shoots ability to withstand *predation* by pests and diseases, *resistance* and the degree of *dieback*.

Age of Trees

Age Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as *Young*, *Mature* and *Over-mature* (British Standards 1991, p. 13, Harris *et al*, 2004, p. 262).

Young Tree aged less than <20% of life expectancy, *in situ*. See also *Age*, *Mature* and *Over-mature*.

Mature Tree aged 20-80% of life expectancy, *in situ*. See also *Age*, *Young* and *Over-mature*.

Over-mature Tree aged greater than >80% of life expectancy, *in situ,* or *senescent* with or without reduced *vigour*, and declining gradually or rapidly but irreversibly to death. See also *Age*, *Young* and *Mature*.

Premature Aging Apparent hastened aging and deterioration of a tree where it has been subject to conditions or practices adverse to expected normal growth, resulting in a *spiral of decline*. The following are examples of processes that may start such cycles:

- Top lopping of a mature tree
- In a new car park, the excavation of soil severing the roots of a tree close to its trunk and then sealing the soil surface with asphalt or concrete up to the trunk
- Open trenching alongside a street tree severing all roots in the trench, then top lopping it for power line clearance, and then extensive damage to bark by abrasion by trucks and excavation equipment as tree is adjacent to a construction site
- Root damage from *soil compaction* to substantial areas of the root plate.

Prolonged Senescence A phenomenon in an *over-mature* tree or tree with *structural deterioration* in its *condition* and often *vigour* as *abnormal vigour* as a result of modifications to the tree or the growing environment essential for its survival where it is sustained beyond the *typical* extent of its life cycle, or prevented from failing in full or part from *structural deterioration* by a beneficial artificial modification to its growing environment either by deliberate or incidental intervention, e.g. water from a leaking tap, water and nutrients from a leaking sewer pipe creating a *hydroponic* environment, or by physically propping up a tree with *structural deterioration* as with a *veteran tree*, or by it *leaning* or growing against another tree or structure for support.

Axiom of Uniform Stress The principle that a tree is mechanically optimized growing only sufficient wood for support and loading. As a result, no area is under-loaded to breaking point or over-loaded with excess material (Mattheck & Breloer 1994, pp. 12-13).

Visual Tree Assessment (VTA) A visual inspection of a tree from the ground based on the principle that, when a tree exhibits apparently superfluous material in its shape, this represents repair structures to rectify *defects* or to reinforce weak areas in accordance with the *Axiom of Uniform Stress* (Mattheck & Breloer 1994, pp. 12-13, 145). Such assessments should only be undertaken by suitably competent practitioners.

Drop Zone The distance away from a tree that may be physically influenced by a falling branch.

Fall Zone The distance away from a tree that may be physically influenced if it was cut down or subject to *collapse*.

Leaning Trees

Leaning A tree where the *trunk* grows or moves away from upright. A lean may occur anywhere along the *trunk* influenced by a number of contributing factors e.g. genetically predetermined characteristics, competition for space or light, prevailing winds, aspect, slope, or other factors. A *leaning* tree may maintain a *static lean* or display an increasingly *progressive lean* over time and may be hazardous and prone to *failure* and *collapse*. The degrees of leaning can be categorized as *Slightly Leaning*, *Moderately Leaning*, *Severely Leaning* and *Critically Leaning*.

Slightly Leaning A leaning tree where the trunk is growing at an angle within 0^{O}-15^{O} from upright.

Moderately Leaning A leaning tree where the trunk is growing at an angle within 15^{O}-30^{O} from upright.

Severely Leaning A leaning tree where the trunk is growing at an angle within 30^{O}-45^{O} from upright.

Critically Leaning A leaning tree where the trunk is growing at an angle greater than $>45^{O}$ from upright.

Progressively Leaning A tree where the degree of *leaning* appears to be increasing over time.

Static Leaning A leaning tree whose lean appears to have stabilized over time.

Windthrow Tree failure and collapse when a *force* exerted by wind against the *crown* and *trunk* overcomes resistance to that force in the *root plate*, such that the *root plate* is lifted from the soil on one side as the tree tips over.

Symmetry

Symmetry Balance within a *crown,* or *root plate,* above or below the *axis* of the trunk of branch and foliage, and root distribution respectively and can be categorized as *Asymmetrical* and *Symmetrical*.

Asymmetrical Imbalance within a crown, where there is an uneven distribution of branches and the foliage *crown* or *root plate* around the vertical *axis* of the trunk. This may be due to *Crown Form Codominant* or *Crown From Suppressed* as a result of natural restrictions e.g. from buildings, or from competition for space and light with other trees, or from exposure to wind, or artificially caused by pruning for clearance of roads, buildings or power lines. An example of an expression of this may be, crown asymmetrical, bias to west. See also *Symmetrical* and *Symmetry*.

Symmetrical Balance within a crown, where there is an even distribution of branches and the *foliage crown* around the vertical *axis* of the trunk. This usually applies to trees of *Crown Form Dominant* or *Crown Form Forest*. An example of an expression of this may be crown symmetrical. See also *Symmetry* and *Asymmetrical*.

Crown Spread Orientation Direction of the *axis* of *crown spread* which can be categorized as *Orientation Radial* and *Orientation Non-radial*.

Crown Spread Orientation Non-radial Where the crown extent is longer than it is wide, e.g. east/west or E/W. Further examples, north/south or N/S, and may be *Crown Form Codominant*, e.g. **A** or **B**, *Crown Form Intermediate* e.g. **A**, or *Crown Form Suppressed* e.g. **B***, and* crown symmetry is *symmetrical* e.g. **A**, or *asymmetrical* e.g. **B**.

Crown Spread Orientation Radial Where the *crown spread* is generally an even distance in all directions from the trunk and often where a tree has *Crown Form Dominant* and is *symmetrical.*

Diameter at Breast Height (DBH) Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4 m. The trunk of a tree is usually not a circle when viewed in cross section, due to the presence of *reaction wood* or *adaptive wood*, therefore an average diameter is determined with a *diameter tape* or by recording the trunk along its narrowest and widest axes, adding the two dimensions together and dividing them by 2 to record an average and allowing the orientation of the longest axis of the trunk to also be recorded. Where a tree is growing on a lean the distance along the top of the trunk is measured to 1.4m and the diameter then recorded from that point perpendicular to the edge of the trunk. Where a *leaning* trunk is *crooked* a vertical distance of 1.4m is measured from the ground. Where a tree branches from a trunk that is less than 1.4m above ground, the trunk diameter is recorded perpendicular to the length of the *trunk* from the point immediately below the base of the flange of the *branch collar* extending the furthest down the trunk, and the distance of this point above ground recorded as *trunk* length. Where a tree is located on sloping ground the DBH should be measured at half way along the side of the tree to average out the angle of slope. Where a tree is *acaulescent* or *trunkless* branching at or near ground an average diameter is determined by recording the radial extent of the trunk at or near ground and noting where the measurement was recorded e.g. at ground.

Significant Important, weighty or more than ordinary.

Significant Tree A tree considered important, weighty or more than ordinary. Example: due to prominence of location, or *in situ*, or contribution as a component of the overall landscape for *amenity* or aesthetic qualities, or *curtilage* to structures, or importance due to uniqueness of taxa for species, subspecies, variety, *crown form*, or as an historical or cultural planting, or for age, or substantial dimensions, or habit, or as *remnant vegetation*, or habitat potential, or a rare or threatened species, or uncommon in cultivation, or of Aboriginal cultural importance, or is a commemorative planting.

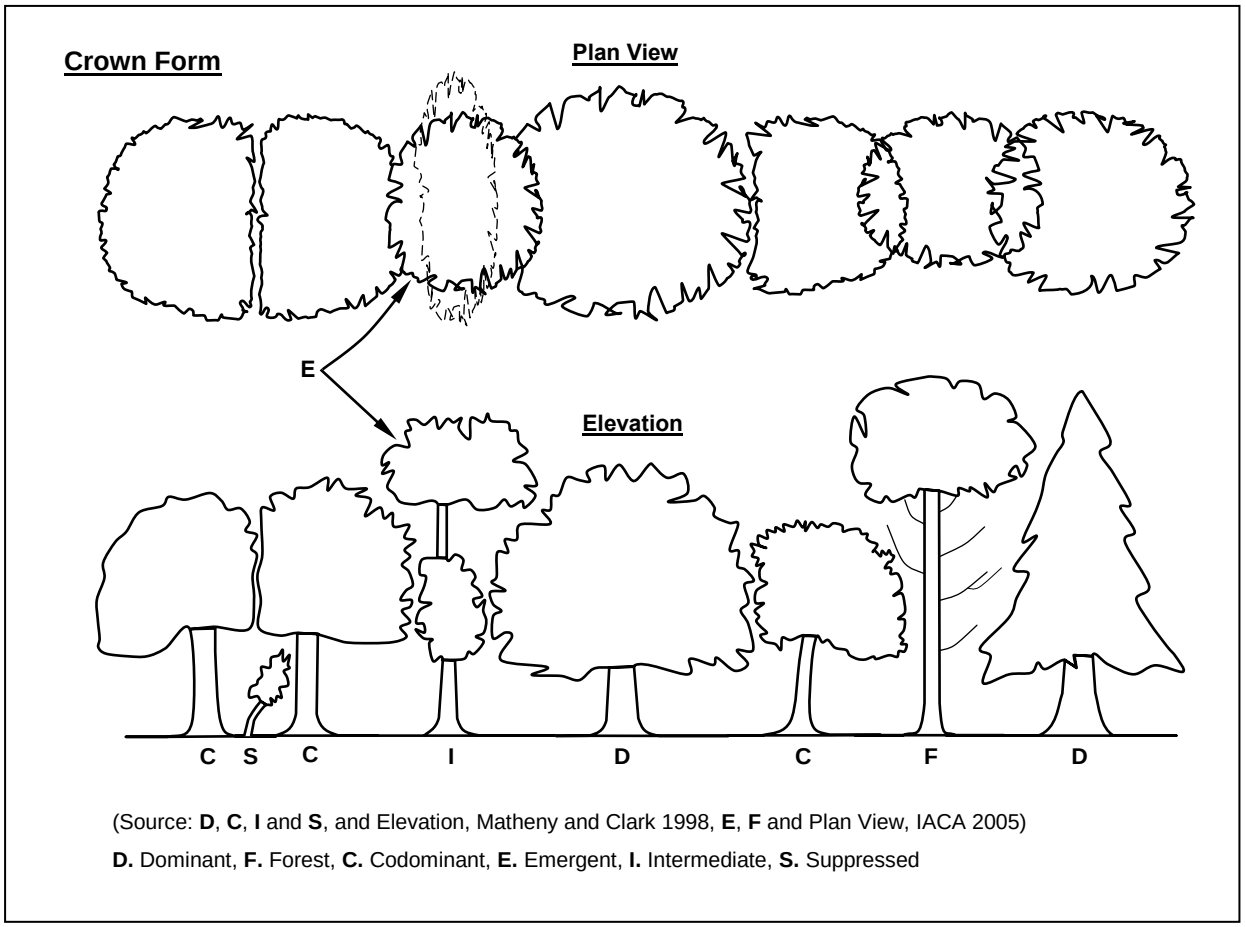
Sustainable Retention Index Value (SRIV) A visual tree assessment method to objectively determine a qualitative and numerical rating for the viability of urban trees for development sites and management purposes, based on general tree and landscape assessment criteria using classes of *age*, *condition* and *vigour*. SRIV is for the professional manager of urban trees to consider the tree *in situ* with an assumed knowledge of the *taxon* and its growing environment. It is based on the physical attributes of the tree and its response to its environment considering its position in a matrix for age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property. This also factors the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. SRIV is supplementary to the decision made by a tree management professional as to whether a tree is retained or removed (IACA - Institute of Australian Consulting Arboriculturists 2005).

Form of Trees

Crown Form The shape of the crown of a tree as influenced by the availability or restriction of space and light, or other contributing factors within its growing environment. Crown Form may be determined for tree shape and habit generally as *Dominant*, *Codominant*, *Intermediate*, *Emergent*, *Forest* and *Suppressed*. The habit and shape of a *crown* may also be considered qualitatively and can be categorized as *Good Form* or *Poor Form*. See also *Forest Grown* and *Open Grown*.

Good Form Tree of *typical* crown shape and habit with proportions representative of the taxa considering constraints such as origin e.g. indigenous or exotic, but does not appear to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, or cultural practices such as lopping and competition for space and light. See also *Poor Form*.

Poor Form Tree of *atypical* crown shape and habit with proportions not representative of the species considering constraints and appears to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, cultural practices such as lopping and competition for space and light; causing it to be *misshapen* or disfigured by disease or vandalism. See also *Good Form*.



(Source: **D**, **C**, **I** and **S**, and Elevation, Matheny and Clark 1998, **E**, **F** and Plan View, IACA 2005)

D. Dominant, **F.** Forest, **C.** Codominant, **E.** Emergent, **I.** Intermediate, **S.** Suppressed

Crown Form Codominant Crowns of trees restricted for space and light on one or more sides and receiving light primarily from above e.g. constrained by another tree/s or a building.

Crown Form Dominant Crowns of trees generally not restricted for space and light receiving light from above and all sides. See also *Crown Form Emergent* and *Open Grown*.

Crown Form Emergent Crowns of trees restricted for space on most sides receiving most light from above until the *upper crown* grows to protrude above the canopy in a stand or forest environment. Such trees may be *crown form dominant* or transitional from *crown form intermediate* to *crown form forest* asserting both *apical dominance* and *axillary dominance* once free of constraints for space and light.

Crown Form Forest Crowns of trees restricted for space and light except from above forming tall trees with narrow spreading crowns with foliage restricted generally to the top of the tree. The trunk is usually erect, straight and continuous, tapering gradually, crown often excurrent, with first order branches becoming structural, supporting the live crown concentrated towards the top of the tree, and below this point other first order branches arising radially with each *inferior* and usually temporary, divergent and ranging from horizontal to ascending, often with internodes exaggerated due to competition for space and light in the *lower crown*.

Crown Form Intermediate Crowns of trees restricted for space on most sides with light primarily from above and on some sides only.

Crown Form Suppressed Crowns of trees generally not restricted for space but restricted for light by being *overtopped* by other trees and occupying an understorey position in the canopy and growing slowly.

Forest Grown A tree with *crown form forest* grown in a group with competition for space and light protected from wind, often resulting in a taller tree with a narrow spreading crown that is concentrated towards the top of the tree (Matheny & Clark 1998, p. 18).

Open Grown A tree with *crown form dominant*, grown singly without competition for space and light, exposed to wind, often resulting in a shorter tree with a broad spreading crown that extends towards the ground (Matheny & Clark 1998, p. 18).

Deadwood

Deadwood Dead branches within a tree's crown and considered quantitatively as separate to *crown cover* and can be categorised as *Small Deadwood* and *Large Deadwood* according to diameter, length and subsequent *risk* potential. The amount of dead branches on a tree can be categorized as *Low Volume Deadwood*, *Medium Volume Deadwood* and *High Volume Deadwood*. See also *Dieback.*

Deadwooding Removing of dead branches by *pruning*. Such pruning may assist in the prevention of the spread of *decay* from *dieback* or for reasons of safety near an identifiable target.

Small Deadwood A dead branch up to 10mm diameter and usually <2 metres long, generally considered of low *risk* potential.

Large Deadwood A dead branch >10mm diameter and usually >2 metres long, generally considered of high *risk* potential.

Low Volume Deadwood Where <5 dead branches occur that may require *removal*.

Medium Volume Deadwood Where 5-10 dead branches occur that may require *removal*.

High Volume Deadwood High Volume Deadwood Where >10 dead branches occur that may require *removal*.

Dieback

Dieback The death of some areas of the *crown*. Symptoms are leaf drop, bare twigs, dead branches and tree death, respectively. This can be caused by root damage, root disease, bacterial or fungal canker, severe bark damage, intensive grazing by insects, *abrupt changes* in growth conditions, drought, water-logging or over-maturity. Dieback often implies reduced *resistance, stress* or *decline* which may be temporary. Dieback can be categorized as *Low Volume Dieback*, *Medium Volume Dieback* and *High Volume Dieback*.

Low Volume Dieback Where <10% of the *crown cover* has died. See also *Dieback*, *High Volume Dieback* and *Medium Volume Dieback*.

Medium Volume Dieback Where 10-50% of the *crown cover* has died.

High Volume Dieback Where >50% of the *crown cover* has died.

Epicormic Shoots

Epicormic Shoots Juvenile shoots produced at branches or trunk from *epicormic strands* in some Eucalypts (Burrows 2002, pp. 111-131) or sprouts produced from dormant or latent buds concealed beneath the bark in some trees. Production can be triggered by fire, pruning, wounding, or root damage but may also be as a result of *stress* or *decline*. Epicormic shoots can be categorized as *Low Volume Epicormic Shoots*, *Medium Volume Epicormic Shoots* and *High Volume Epicormic Shoots*.

Low Volume Epicormic Shoots Where <10% of the c*rown cover* is comprised of live *epicormic shoots*.

Medium Volume Epicormic Shoots Where 10-50% of the *crown cover* is comprised of live *epicormic shoots*.

High Volume Epicormic Shoots Where >50% of the *crown cover* is comprised of live *epicormic shoots*.

Epicormic Strands In some taxa of the Myrtaceae family narrow bands of meristematic tissue radiate in stems from pith extending to the outer bark containing bud primordia evident as small prickle or dimple structures up to 10 mm diameter, that after the stimulus of a trauma event such as fire or defoliation develop to form new buds allowing *crown regeneration* (Burrows 2001, Pp. 111-131).

Trunk

Acaulescent A *trunkless* tree or tree growth forming a very short *trunk*. See also *Caulescent.*

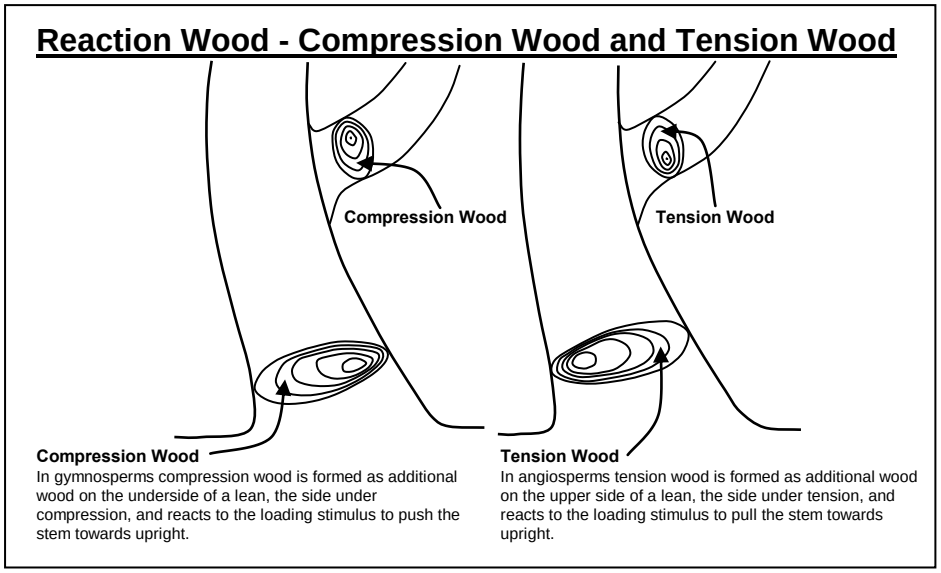
Caulescent Tree grows to form a *trunk*. See also *Acaulescent*.

Trunk A single stem extending from the *root crown* to support or elevate the *crown*, terminating where it divides into separate *stems* forming *first order branches*. A trunk may be evident at or near ground or be absent in *acaulescent* trees of *deliquescent* habit, or may be continuous in trees of *excurrent* habit. The trunk of any *caulescent* tree can be divided vertically into three (3) sections and can be categorized as *Lower Trunk*, *Mid Trunk* and *Upper Trunk*. For a *leaning* tree these may be divided evenly into sections of one third along the trunk.

Acoustic resonance Auditory reverberation within an object and the air after an object has been struck.

Sounding Tapping of roots, trunk or branches with a mallet or hammer to sample the *acoustic resonance* to compare sound wood with wood that is decayed or *hollow*.

Adaptive wood Additional load-bearing wood formed in response to mechanical stresses and gravitational force upon the *vascular cambium* to provide a uniform distribution of loading. Examples are *Ribs*, *Round-edged rib* or *Sharp-edged rib* and *Buttresses.* See also *Reaction wood*, *Compression wood* and *Tension wood.*



Reaction wood A negative geotropic response in some *secondary xylem* to counter a lean or predominant mechanical force, formed as *tension wood* in dicotyledonous *angiosperms* and as *compression wood* in *gymnosperms* (Figure 24). See also *Adaptive wood*.

Compression Wood *Reaction wood* formed by Gymnosperms as additional wood growth on the under side of a stem opposing a lean, reacting to the loading stimulus to push the stem upwards.

Tension Wood *Reaction wood* formed in dicotyledonous *Angiosperms* as additional wood growth on the upper side of a stem opposing a lean, reacting to the loading stimulus to pull the stem upwards.