

AHMS

Aboriginal Cultural Heritage Assessment [FINAL]



SIMTA

SYDNEY INTERMODAL TERMINAL ALLIANCE

Part 3A Concept Application

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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 <i>National Parks and Wildlife Act 1974</i> 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 <i>Environmental Planning and Assessment Act 1979</i> .
Aboriginal object	A statutory term defined under the <i>National Parks and Wildlife Act 1974</i> 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 projects subject to Parts 4 and 5 of the <i>Environmental Planning and Assessment Act, 1979</i> .
Department of Environment, Climate Change and Water (DECCW)	Now known as the Office of Environment and Heritage (OEH).
Director General's Requirements (DGRs)	Project specific requirements of the Director General, Department of Planning (now the Department of Planning and Infrastructure (DoPI) under Section 75F of the <i>Environmental Planning and Assessment Act, 1979</i> for projects subject to Part 3A of the <i>Act</i> .

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 <i>Environmental Planning and Assessment Act, 1979</i> . The Guidelines include site assessment and Aboriginal community consultation process.
<i>National Parks and Wildlife Act 1974</i>	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 <i>National Parks and Wildlife Act, 1974</i> .
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 the Sydney Intermodal Terminal Alliance (SIMTA).

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.
DNSDC	Defence National Storage and Distribution Centre (the SIMTA site)
DoP	Department of Planning
DP	Deposited Plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LTO	Land Titles Office
NHL	National Heritage List
NPW Act	<i>National Parks and Wildlife Act 1974</i>
OEH	Office of Environment and Heritage (formerly DECCW)
PAD	Potential Archaeological Deposit
PEA	Preliminary Environmental Assessment
SIMTA	Sydney Intermodal Terminal Alliance

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- Tim Wells, Darug Aboriginal Cultural Heritage Assessments (DACHA);
- John Reilly Darug, Tribal Aboriginal Corporation (DTAC);
- Donna Whillock and Alfred Frazldeen, Tharawal Local Aboriginal Land Council (Tharawal LALC);
- Scott Franks, Tocomwall;
- Gordon Workman, Darug Land Observations (DLO);
- Tony Williams (Aboriginal Elder); and
- Vanessa Hardy, Cultural Heritage Connections Pty Ltd.

EXECUTIVE SUMMARY

Background

- In late 2010 Archaeological and Heritage Management Solutions (AHMS), was commissioned by Hyder Consulting Pty Ltd for Sydney Intermodal Terminal Alliance (SIMTA) to undertake an Aboriginal Cultural Heritage Assessment of the SIMTA proposal. The SIMTA proposal includes the SIMTA site (currently occupied by the Defence National Storage and Distribution Centre) Moorebank Avenue, Moorebank, NSW, and a proposed rail corridor on adjacent land.
- This report was undertaken in accordance with the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*, July 2005, and the Director General's Requirements under Part 75F of the *Environmental Planning and Assessment Act, 1979*. The report also mirrors many of the requirements of OEH's (2010) *Code of Practice for Archaeological Investigations of Aboriginal Objects in New South Wales*, and (2010) *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* as specific best practice standards and processes for Aboriginal heritage assessment in NSW.
- Aboriginal consultation was undertaken and included the Tharawal Local Aboriginal Land Council (LALC), Cubbitch Barta Native Title Claimants, Darug Tribal Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments, Tocomwall and Darug Land Observations.
- The assessment included an archaeological predictive model which was informed by a detailed background analysis of previous archaeological investigations in the region and information from the AHIMS database. A site survey was also undertaken in conjunction with the Aboriginal communities.
- The assessment identified that most of the SIMTA site and parts of the proposed rail corridor were heavily disturbed and/or previously developed areas, and the potential for preservation of archaeological materials was low. Artefacts were identified in three areas, and three areas of potential archaeological deposit

(PAD) were identified. One area, considered to have Aboriginal archaeological potential based on the background research, was not surveyed due to access issues (Area 1 in Figure 33).

- The areas where artefacts were identified were: a river terrace on the east side of the Georges River (PAD 1, Figure 33), the southern-most part of the SIMTA site (Transect 1) and the disused rail corridor directly south of and adjacent to the SIMTA site (PAD 3). In addition, the golf course south of Anzac Creek (PAD 2), has been designated PAD 2 (Figure 33).
- As the design of the SIMTA proposal has not been finalised, it is not known how it may impact on the PADs or sites. However, it is understood that excavation, grading and the use of heavy or metal tracked vehicles may potentially damage the PADs and sites within the subject area.
- The assessment identified the following general recommendations for Aboriginal cultural heritage:
 1. Consultation between SIMTA and relevant Registered Aboriginal Parties (RAPs) should be maintained throughout the design and construction of the SIMTA proposal.
 2. Where possible, SIMTA should aim to avoid impacting any known Aboriginal heritage objects, sites or places and places that have potential Aboriginal heritage or cultural values, throughout the life of the SIMTA proposal.
 3. Where impact cannot be avoided, SIMTA should choose partial impact rather than complete impact wherever possible and ensure that appropriate measures to mitigate impacts are developed and implemented as required and as appropriate during design, construction and operation of the various stages of the SIMTA proposal.
 4. If re-location of any element of the SIMTA proposal outside the area assessed in this study is proposed, further assessment of the additional area(s) should be undertaken to identify and appropriately manage Aboriginal objects/sites/places that may be in this additional area(s).
 5. In the event that previously undiscovered Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) are discovered during

construction, all works in the vicinity of the find should cease and SIMTA should determine the subsequent course of action in consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency as appropriate.

6. Should suspected human skeletal material be identified, all works should cease and the NSW Police and the NSW Coroner's Office contacted. Should the burial prove to be archaeological of Aboriginal origin, consultation with a heritage professional, relevant RAPs and/or the relevant State government agency, should be undertaken by SIMTA.
 7. SIMTA should ensure that any reports or documents for the SIMTA proposal concerning Aboriginal heritage comply with applicable statutory requirements (those currently applicable are outlined in this report), are prepared in accordance with best practice professional standards and, where appropriate, ensure findings are provided to OEH AHIMS Registrar and the relevant RAPs.
- The assessment identified the following site specific recommendations for Aboriginal cultural heritage:
 1. To ensure cultural values for both the SIMTA site and proposed rail corridor are appropriately characterised and assessed, Aboriginal consultation should continue to be undertaken in accordance with applicable guidelines and requirements.
 2. The artefacts identified in Transect 1 on the SIMTA site, and Transect 7 immediately south of the SIMTA site, should be collected by RAPs in conjunction with a heritage professional before construction commences. A Care and Control Agreement should be completed between SIMTA and the RAPs regarding the future of the artefacts (it is usually preferred that they be reburied nearby).
 3. Given the extensive historical disturbance within the remainder of the SIMTA site, it is considered that the likelihood of the presence of intact or significant Aboriginal objects and/or sites is low and no further archaeological

investigations are warranted in these remaining areas.

4. In relation to the proposed rail corridor, with the exception of PADs 1 - 3 (Figure 33), it is considered that the likelihood of the presence of intact or significant Aboriginal objects and/or sites is low and no further archaeological investigations are warranted in the remaining areas.
5. Any areas outside those investigated as part of this assessment, most notably those areas within 50 m of the eastern and western banks of the Georges River, should not be impacted without further assessment.
6. Areas of the study area in close proximity to Georges River and the southwestern most corner of the proposed rail corridor, which could not be adequately investigated due to access issues, should be investigated further. The background and predictive models presented in this report may suffice for a conditional approval, however, access and more detailed assessment of these areas is required to fully identify development impacts.
7. In relation to PADs 1 - 3 (Figure 33), it is recommended that, either:
 - Impacts within these areas are entirely avoided (i.e. no modifications are made to any ground surface in any way, including but not limited to excavation, grading and the use of heavy or metal tracked vehicles); or
 - Test excavations be undertaken in each of PADs 1 - 3 in accordance with current archaeological practice and any relevant guidelines to determine the nature, extent and significance of any Aboriginal archaeological deposit. Such testing could be undertaken under Section 75U of the *Environmental Planning and Assessment Act 1979*, and be used to inform the assessment prior to lodgment of the EA, or as part of a Statement of Commitments following the approval.If significant Aboriginal site(s) are identified in PADs 1, 2 or 3, then design of the SIMTA proposal to avoid such sites(s) is the preferred option. However, if it is not considered possible to avoid such site(s), then salvage excavations of the PADs in accordance with current archaeological practice, any relevant guidelines and in consultation with the RAPs should be undertaken to gather as much information on the site(s) as possible prior to disturbance.
8. Based on the comments received throughout the consultation process, the

RAPs support the above recommendations (see **Appendix C**). However, Cubbitch Barta Native Title Claimants has noted the possible presence of a scarred tree at the golf course. Based on this potential for scarred trees in this area, it is recommended that :

Any proposed impacts to mature trees (greater than 80 years old) in the golf course should be avoided.

If avoidance is not feasible, any mature trees that will be impacted by the proposed development should be inspected to identify and potential Aboriginal cultural scarring. The survey, if required, should be undertaken early in the planning process to avoid any project delays.

Should the survey identify any trees with potential cultural scarring, further heritage assessment and/or mitigation measures may need to be developed.

1. INTRODUCTION

1.1 Proponent Details

This report has been prepared by Archaeological & Heritage Management Solutions (AHMS) for Hyder Consulting (Hyder) on behalf of the proponent, Sydney Intermodal Terminal Alliance (SIMTA). SIMTA is a consortium of Qube Logistics and QR National (Table 1).

The Director-General Requirements (DGRs) were issued for the project on 24 December 2010. A summary of the DGRs for Indigenous heritage and where they are addressed in this report is presented in Table 2.

Table 1. Proponent Contact Details.

Proponent	Archaeological Advisor
<p>Sydney Intermodal Terminal Alliance (SIMTA)</p> <p>Qube Logistics Holdings Ltd Level 14, 3 Spring Street Sydney NSW 2000 Contact Person: David Knight, Director T. 02 8917 0300 E: dknight@qubelogistics.com.au</p> <p>QR National GPO Box 456 Brisbane QLD 4001 Contact Person: Mark Leisemann, General Manager and Business Development - Intermodal T. 07 3235 1976</p>	<p>Archaeological & Heritage Management Solutions Pty Ltd 349 Annandale Street Annandale NSW 2038</p> <p>Contact Person: Alan Williams T. 02 9555 4000 F. 02 9555 7005 M.0408 203 180 E: awilliams@ahms.com.au</p>

Table 2. Director-General's Requirements for Heritage

Director-General's Requirements	Where Addressed
Identify areas and items of indigenous and non-indigenous heritage significance and natural areas that could be impacted directly or indirectly, including potential archaeological deposits and the Australian Army Engineers Group and Kitchener House (formerly Arpafeelie) and an appropriate assessment of potential impacts (including site surveys);	This report only addresses Indigenous heritage. Sections 10 and 11 provide a summary of the significance and the potential impact by the project.
Detail how any impacts on items of indigenous and non-indigenous heritage would be addressed and managed as part of the subsequent project stages; and	This report only addresses Indigenous heritage. Sections 12 and 13 provide a summary of the management and mitigation options potential impacts to Indigenous heritage.
Taking into consideration of <i>NSW Heritage Manual, Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC)</i> .	This report was developed in accordance with the (2005) <i>Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC)</i> and where relevant the Office of Environment & Heritage's (2010) <i>Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales</i> .

1.2 Subject Area

Location of the SIMTA Proposal

The subject area is located in Moorebank, NSW, in the Liverpool Local Government Area (Figure 1). It is 27 kilometres west of the Sydney Central Business District (CBD), 16 kilometres south of the Parramatta CBD and five kilometres east of the M5/M7 Motorway Interchange. The subject area consists of two parts, the SIMTA site and a proposed rail

corridor.

The SIMTA site is approximately 83 hectares in area, currently occupied by the Defence National Storage Distribution Centre (DNSDC) at Moorebank Avenue, Moorebank, NSW (**Figure 2**). It is identified as Lot 1 in DP1048263 and zoned IN1 - General Industrial under Liverpool City Council Local Environment Plan (LEP), 2008. The SIMTA site is relatively flat, averaging 14 metres Australian Height Datum (AHD), with a low hill on its eastern side rising to approximately 22 meters AHD. It currently supports a number of industrial buildings. Development to the west of the site includes the School of Military Engineering, associated military related activities and a Royal Australian Airforce golf course. To the immediate west of these developments is the Georges River.

The proposed rail corridor is 75 hectares of land located adjacent to the SIMTA site, extending south to the East Hills Rail Line and south-west to the Southern Sydney Freight Line (**Figure 2**). It is proposed to accommodate a 20 metre wide (variable width) rail alignment linking the SIMTA site to the Southern Sydney Freight Line. It consists of parts of Lot 3001 DP1125930 and Lot 1 DP825852, in addition to several lots within the current rail corridor and Glenfield Waste Disposal site. The rail corridor includes Commonwealth and privately owned land, with a small section owned by Railcorp, NSW. It is bisected north to south by the Georges River; and Anzac Creek runs east to west through the eastern side of it. The Commonwealth land in the eastern side of the rail corridor is densely vegetated. A disused rail siding from the East Hills Rail Line extends approximately 750 meters to the SIMTA site through the vegetation, marking the eastern boundary of the proposed rail corridor.

The area surveyed and considered in this assessment, included the largest area represented on any of the available maps of the subject area.

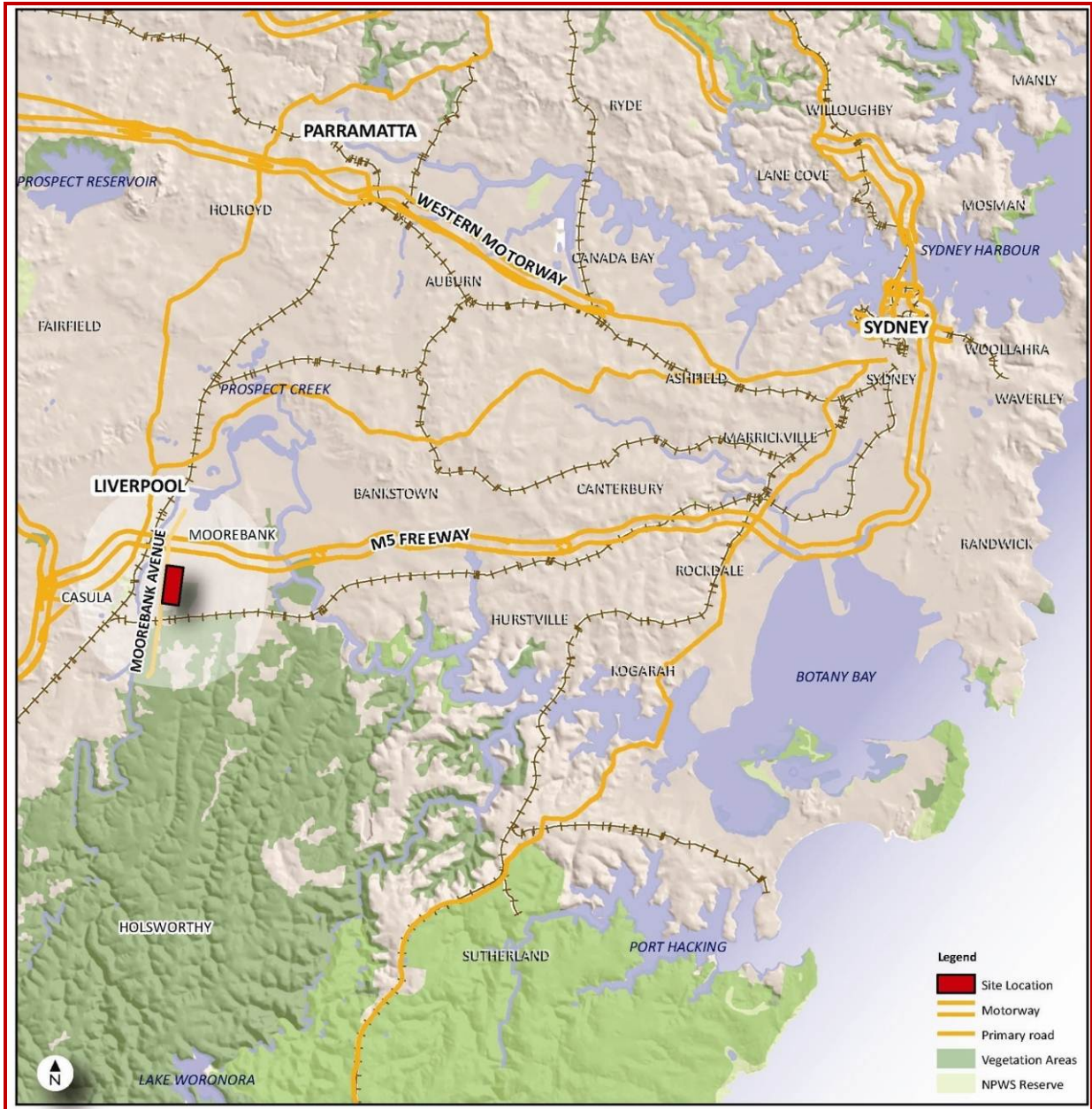


Figure 1. Location of Subject Area.



Figure 2. The subject area of the SIMTA proposal.

1.3 Proposed Development & Approval Context

The SIMTA Concept Plan proposal includes the staged development of the subject area as an intermodal terminal facility with warehouse and distribution facilities, and dedicated rail link between the Southern Sydney Freight Line and the SMITA site. Key components of the SIMTA proposal include:

- Demolition of most of the current buildings and landscape elements at the SIMTA site.
- A rail corridor and rail link, which would link the SIMTA site to the Southern Sydney Freight Line.
- An intermodal terminal.
- Warehouse and distribution facilities.
- Ancillary terminal facilities.

A Concept Plan approval is being sought for the SIMTA proposal, under the transitional provisions relating to Part 3A assessments under the *Environmental Planning and Assessment Act 1979* (Department of Planning Application Reference No. MP10-0193).

1.4 Report Aims and Objectives

The principle aims of the assessment are to:

- Outline the statutory requirements relevant to the subject area with regard to Aboriginal cultural heritage.
- Carry out background research to identify registered/documented Aboriginal objects, sites, and places, and to identify the potential for any unrecorded objects and places of Aboriginal cultural heritage significance.
- Undertake Aboriginal community consultation in accordance with the applicable Guidelines and DGRs (this assessment has broadly followed OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*).
- Carry out a field survey to rediscover and assess registered/documented 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 (i.e. registered Aboriginal objects, sites and PADs and Aboriginal objects, sites and PADs identified during the survey).

- Assess the archaeological (scientific), public and Aboriginal (social) significance of any Aboriginal sites or objects that may be impacted by the SIMTA proposal.
- Identify any possible Aboriginal cultural heritage constraints for the SIMTA proposal.
- Assess the potential for direct and indirect impact to Aboriginal cultural heritage.
- Identify and recommend measures to mitigate any potential adverse impacts to Aboriginal cultural heritage.

1.5 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.

1.6 Investigator and Contributors

This report was written by Anna Biggs, Archaeologist, AHMS with assistance from Alan Williams, B.Sc., M.Sc., MAACAI, Senior Archaeologist. Vanessa Hardy, Cultural Heritage Connections reviewed the technical components of the report and Lisa Newell, Associate Director, AHMS reviewed and edited the draft report and provided statutory and mitigation action input. This report was externally reviewed by Sandra Wallace (Artefact) at the request of SIMTA.

2. STATUTORY CONTEXT

2.1 Commonwealth legislation

2.1.1 The 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 The 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. However, places on the CHL are not necessarily of State heritage value, though in many instances they are,

even if the applicable State heritage lists do not specifically include them. Places on the CHL are usually of local heritage value, even if the relevant local heritage list does not specifically include them.

The inconsistencies that can occur between Commonwealth (NHL and CHL) and State (state and local) statutory lists reflect the separate heritage management processes and statutory control contexts of the States and the Commonwealth with regards to land and Commonwealth property. An omission or inclusion on one list but not the other does not necessarily reflect any specific acceptance or rejection on heritage significance grounds.

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.

The SIMTA site includes the Defence National Storage Distribution Centre (DNSDC), Moorebank Avenue, Moorebank, NSW. The DNSDC is included in the CHL primarily for its ongoing Defence use and built heritage values. The DNSDC CHL citation does not include or refer to the site embodying or containing Aboriginal cultural values.

2.1.3 The 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 31 January 2011, 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 3A of the Act, or as State Significant Development under Part 4 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 Part 3A 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.

2.2.2 Liverpool Local Environmental Plan 2008 (LEP 2008)

The subject area is not included on Schedule 5 - Environmental Heritage - of the Liverpool Local Environmental Plan (LEP) 2008. The Liverpool City 2008 Development Control Plan (DCP) for the DNSDC site does not include provisions or requirements regarding the Aboriginal or non-Aboriginal heritage values of the site.

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-west of the subject area, and is very unlikely to be impacted by the SIMTA 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 3A Projects. Aboriginal Land Rights Act 1983 (NSW).

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

Consultation with the Aboriginal communities with an interest in the subject area has been undertaken for this project in accordance with the DGRs and the Part 3A Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation, July 2005. It also followed procedures set out OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, as best practice prescriptive requirements and because at the time the consultation was initiated, it was unsure whether all subsequent Project approvals would be subject to Part 3A of the EP&A Act. The following procedures were undertaken (a complete log of actions and correspondence regarding Aboriginal community consultation is included in **Appendix C**):

1. Pre-notification - identification of the Aboriginal parties by contacting various State government agencies.
2. Notification - contacting identified Aboriginal parties and advertising in the local print media for interested Aboriginal parties.
3. Presentation of Project - advising the Registered Aboriginal Parties (RAPs) of the project, which may involve meetings and/or site visits.
4. Methodology - providing the RAPs with the proposed field methodology and information on obtaining cultural knowledge.
5. Impacts and Mitigation Options - discussion of potential impacts to heritage and appropriate mitigation options before developing the report.
6. 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 SIMTA proposal. The second is to obtain input on the proposed assessment methodology, and comment on the assessment report and management recommendations.

3.2 Pre-Notification Stage

Description of the consultation process.

The initial stage of the consultation process consists of the identification of Aboriginal people 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.
- Liverpool City Council.
- Sydney Metropolitan Catchment Management Authority.

The responses received are reproduced in **Appendix C**. In summary, the following groups were identified as possibly having an interest in the subject area:

- Tharawal Local Aboriginal Land Council (LALC).
- Gandangara Local Aboriginal Land Council.
- Darug Aboriginal Cultural Heritage Assessments.
- Darug Tribal Aboriginal Corporation.
- Darug Custodian Aboriginal Corporation.
- Cubbitch Barta Native Title Claimants.
- Darug Aboriginal Landcare Inc.

The OEH list identified both the Tharawal and Gandangara LALCs as being relevant to consult with. Clarification with the Gandangara LALC indicated that the subject area was situated only within the Tharawal LALC. Subsequently, only the Tharawal LALC was formally notified of the project as outlined in **Section 3.3.2**.

3.3 Notification and Registration of Interest

On 25 May 2011, notification of the project, and an invitation to register an interest was placed in the *Liverpool City Champion*. The deadline for registration was 10 June 2011. Notifications and invitations to register were also sent to the Aboriginal Parties identified in Section 3.3.1.

Registrations of interest were received from the following Aboriginal Parties:

- Darug Aboriginal Cultural Heritage Assessments.
- Darug Tribal Aboriginal Corporation.
- Cubbitch Barta Native Title Claimants.

Two late registrations were received on 25 July 2011 (Darug Land Observations) and 26 July 2001 (Yarrowalk).

3.4 Presentation of Information/Methodology

On 16 June 2011, a cover letter, detailed SIMTA proposal background and proposed assessment methodology were distributed to the registered Aboriginal parties (RAPs) (Appendix C).

The cover letter and report provided information about the SIMTA proposal, the proponent, the intended approval approach, assessment approaches and processes, timeframes and the proposed field investigation. In addition, the letter requested information from the RAPs about how they wished to be consulted, how they wished cultural information to be managed, and other relevant matters. No meetings were undertaken during this process, although all RAPs were advised that meetings could be arranged if required. A period of 28 days was provided for comments. All responses received have been included in Appendix C. Generally, responses involved endorsement of the methodology or identified minor points of concern that were integrated into the field investigation where possible.

Information about the RAPs, the information provided to them and newspaper advertisements was sent to OEHL on 27 June 2011 (Appendix C).

Representatives of Darug Land Observations and Yarrowalk were provided with this information at the beginning of a site inspection on 28 July 2011 (due to late registration).

3.5 Field Investigation

In addition to the information provided, all RAPs who had registered before the field investigation commenced were afforded the opportunity to participate in the field investigations.

The field survey was undertaken on 26 July 2011. Donna Whillock (Tharawal LALC), Glenda Chalker (Cubbitch Barta Native Title Claimants), Tim Wells (Darug Aboriginal Cultural Heritage Assessments) and John Reilly (Darug Tribal Aboriginal Corporation) participated.

An additional brief site inspection was undertaken with Scott Franks (Yarrawalk) and Gordon Workman (Darug Land Observations) on 28 July 2011.

3.6 Report Review

In accordance with Section 1.2 of the Part 3A *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation, July 2005*, potential impacts and mitigation options were discussed with the RAPs at the completion of the field survey. Any sites identified were discussed in relation to expected and preferred outcomes, and recommendations presented in this report have been based on these discussions.

This report was provided to all RAPs for a period of 28 days between 16 January 2012 and 16 February 2012. Comments were received from Tharawal LALC and Cubbitch Barta Native Title Claimants. All comments received from the RAPs have been integrated into the report wherever possible and included in their entirety in **Appendix C**.

3.7 Ongoing Consultation

Consultation with the RAPs has been ongoing since finalisation of the report, regarding the recommended measures for further investigation and mitigation. The consultation is detailed in the log included in **Appendix C**.

4. ETHNOGRAPHIC INFORMATION

Social/cultural information from archival documentation. This section also includes information regarding the available resources in the landscape.

4.1 Introduction

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 first people known to have an association with the subject area were people of the *Darug* language group. There is considerable ongoing debate about the nature, territory and range of the 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 as a result of European settlement activity. Sydney region archaeologist and historian Val Attenbrow 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' (Attenbrow, 2002:34-35).

4.3 Clans

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]).

4.4 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 (Figure 3) (Attenbrow, 2002:88). Important plants and animals were also found in wetlands, providing medicines, fibres, vitamin and food sources.

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 (Figure 4) (Tench 1793 [1979]:126).



Figure 3. Joseph Lycett c. 1817 'Aborigines Hunting Waterbirds' (Lycett 1830).

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) (Figure 5) or by ambushing them (Mathews in Havard, 1943c:237).

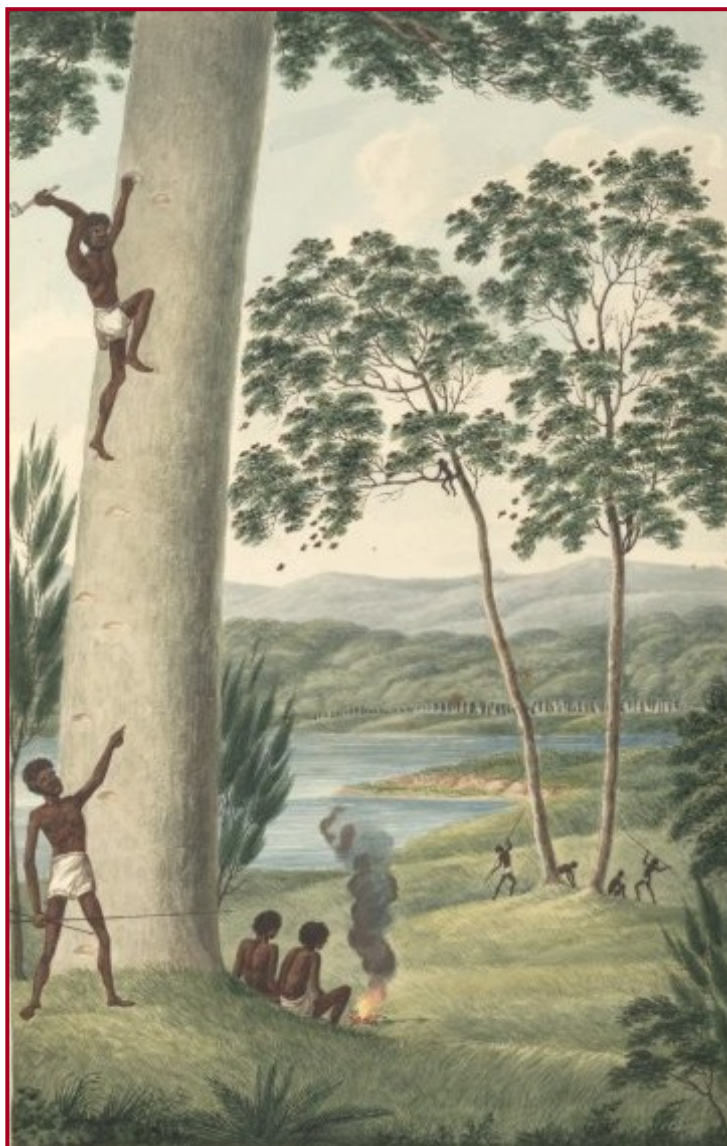


Figure 4. Joseph Lycett c. 1817 "Aborigines climbing a tree, with two Aborigines sitting beside a fire, others spearing birds" (Lycett, J. 1830).



Figure 5. Joseph Lycett c. 1817 'Aborigines using fire to hunt kangaroo' (Lycett, J. 1830).

4.5 Plant Management

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.

4.6 Shelters

Aboriginal groups in the Sydney Basin lived in bark huts and rockshelters formed from natural sandstone overhangs (Figure 6). Tench described how native huts were constructed 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. Joseph Lycett c. 1820 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.

4.7 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).

4.8 Stone

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).

4.9 Contact History

The decrease in population after British colonization 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

An overview analysis of previous archaeological work.

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 J. 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 per cent) and Chert (34 per cent) 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 Moorebank 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 SIMTA 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 & 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, refer to **Figure 7**) (Koettig & Hughes, 1983; Boot, 1990, 1992, 1993, 1994a, 1994b).



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).

Of note was an extensive study of the Holsworthy Military Area (immediately south of the SIMTA 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 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 rail corridor.

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). Importantly, the location of these sites is in a very similar

landform type, and in close proximity to, southern parts of the SIMTA site adjacent to Anzac Creek.

In 2001, Steele and Dallas undertook an assessment of the Moorebank Defence area, which excluded the SIMTA site but included the School of Military Engineering (Steele & Dallas, 2001). The 2001 study concluded the following in relation to the DNSDC lands (subject area):

'Whilst no evidence for Aboriginal occupation or visitation was identified through this study [Dallas, 2000 Cited in Steele & Dallas 2000], it is likely that this outcome is principally the result of the fact that the entire DNSDC [SIMTA site] has been substantially developed through a combination of cutting, levelling, landscaping and construction. Given the extent of the previous land use, the likelihood of intact archaeological deposits surviving within this portion of the Moorebank Defence area has been assessed to be minimal' (Steele & Dallas, 2001: 14.).

Although the referenced Dallas 2000 report was sought, it appears that it has not been lodged with AHIMS, therefore it could not be obtained. While the SIMTA site was considered unlikely to retain Aboriginal archaeology, the 2001 study did highlight the need for further consideration in areas adjacent to the Georges River, and the golf course, parts of which intersect with the proposed rail corridor to which this report refers. Steele & Dallas' figure (Figure 8) indicated that these areas had low or unassessed potential. However, discussion in the report stated that, based on regional models, they were considered likely to retain Aboriginal sites.

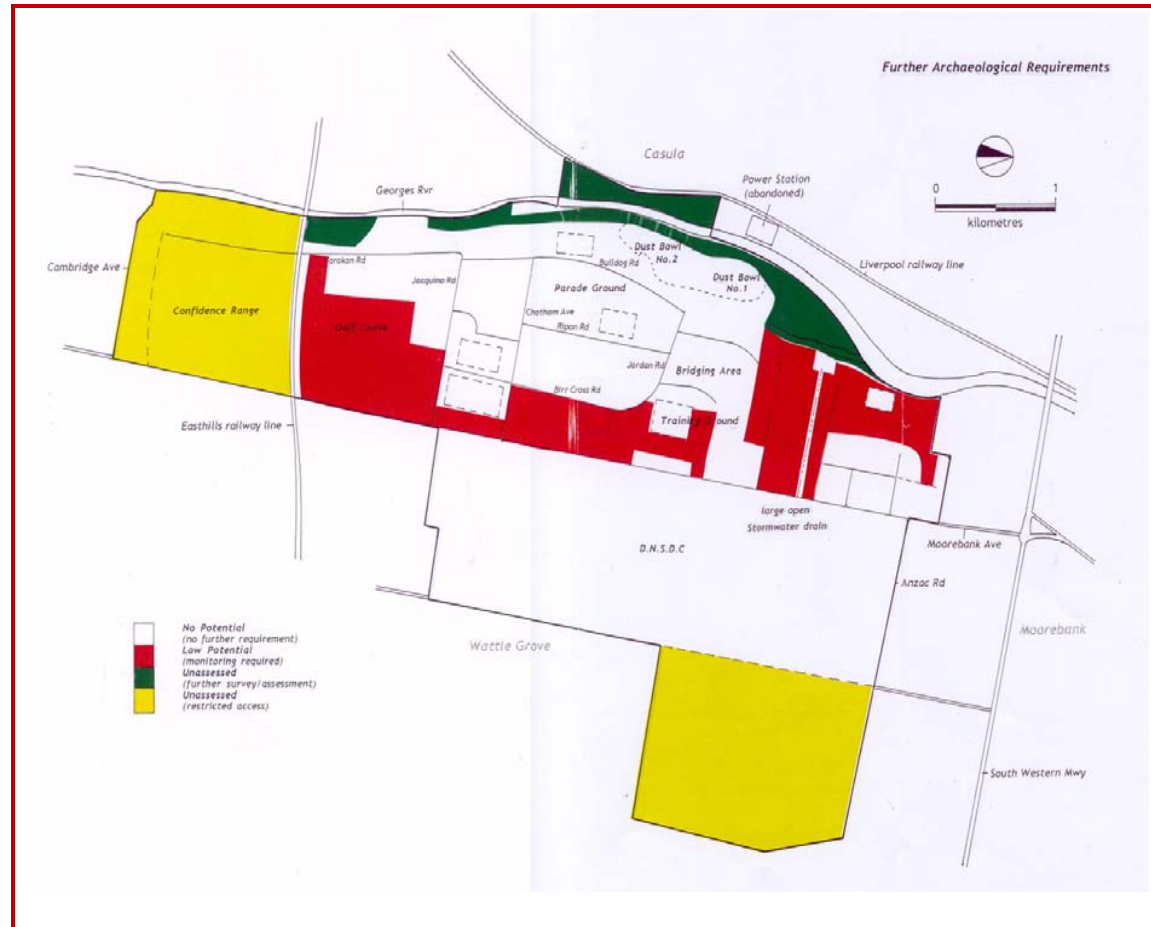


Figure 8. Map of archaeological sensitivity based on a previous study by Steele & Dallas. Note that the SIMTA site was not surveyed as part of this study. Some areas around the Georges River including parts of the proposed rail corridor were mapped as unassessed or low archaeological potential but in the report discussion were considered to be likely to retain archaeological sites (source: Steele & Dallas, 2001: Figure 11).

5.2.6 AHIMS Search Results

A search of the Aboriginal Heritage Information Management System (AHIMS) database, maintained by OEH, was carried out on 16 July 2010. Another search was conducted on 12 July 2011 as the search results are considered to have expired after one year. The 2011 results did not identify any further sites in the search area.

This search identified 30 sites in the local area composed of 21 artefact scatters, six culturally modified trees, three potential archaeological deposits and a rock shelter (Figure 9).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 during by Mary Dallas during an assessment of a proposed sub-division (see Appendix B).² 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.

Five sites are located in, or within 300 meters of, the subject area. The first, *MB 1* (#45-5-2883), an artefact scatter, is located just to the east of Greenhills Road near the north-east corner of the subject area. (see Appendix B for the AHIMS site cards). *Glenfield 1* (#45-5-3531) and *Glenfield ST* (#45-6-2428), an artefact scatter and culturally modified tree respectively, are located slightly south-west of the subject area near the intersection of the East Hills Rail Line and the Southern Sydney Freight Line. *Kiawaka 5* (#45-5-0722), a culturally modified tree, and *Kiawaka 2* (#45-5-0723), an artefact scatter, are both located slightly west of the subject area (Figure 9).

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. As outlined here, where 31 different site types are documented as 30 AHIMS entries – one site consisting of both an artefact scatter and a potential archaeological deposit.

² The site card refers to this site as being documented in Dallas and Steele 2003, however, the title of the report (Aboriginal Archaeological Survey of Department of Defence Lands at Moorebank) could not be relocated and may actually relate to Steele & Dallas 2001, which retains the same title.

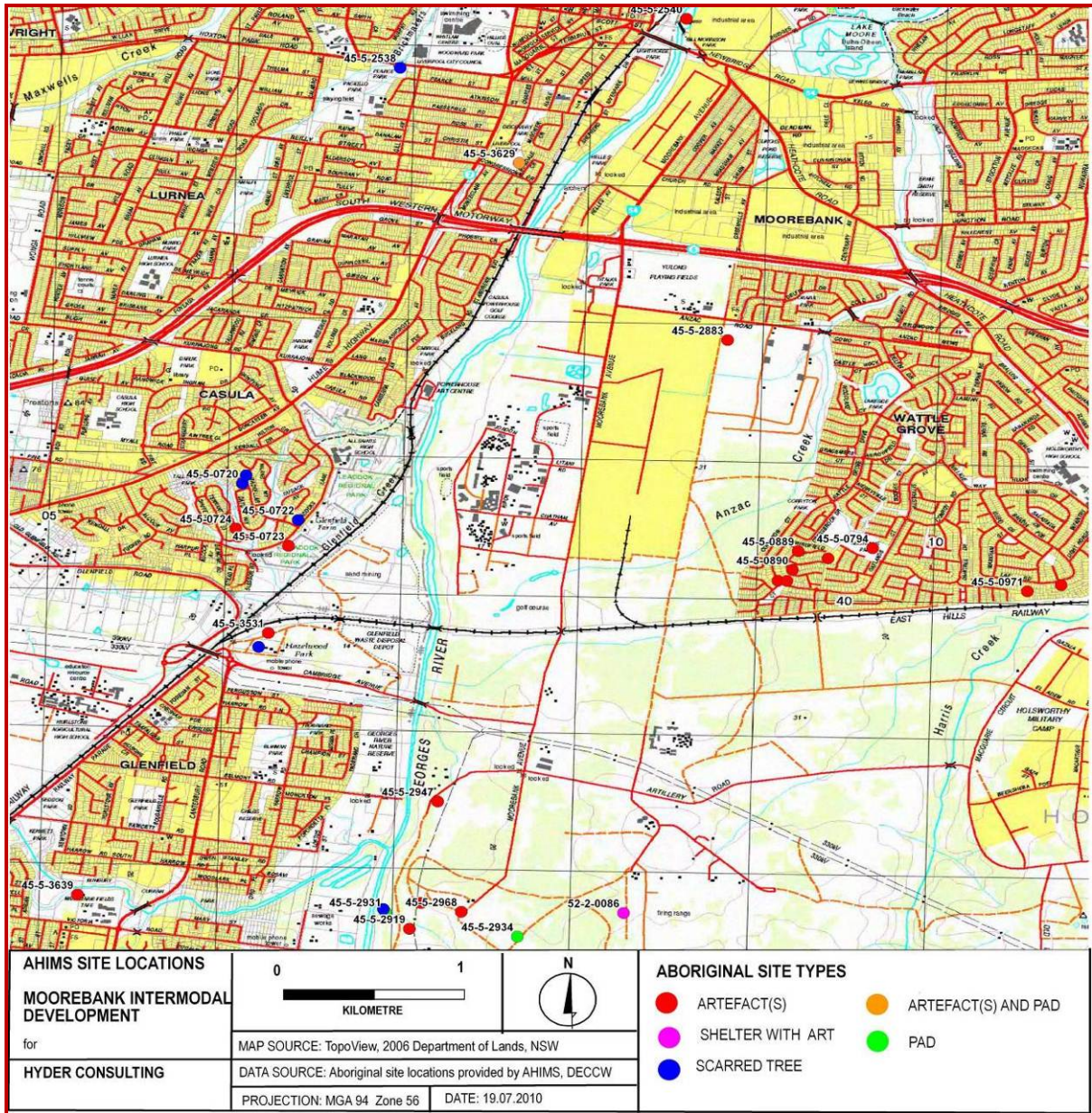


Figure 9. Map of archaeological sites previously recorded in the subject area and documented in OEH's AHIMS database.

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. However, previous studies by Steele & Dallas of several parts of the subject area indicate that due to disturbance, archaeological potential would be constrained to areas adjacent to the East Hills Rail Line.

6. LANDSCAPE CONTEXT

Description of landscape and landform for the area. Specific information regarding the landform and topographic units can be found in Section 9 (Results).

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 straddles 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 Defence and other urban activities have heavily modified the landscape. Specifically, the SIMTA site is relatively flat with evidence of some 1 - 5 meters of modern fill overlying most of the natural soil profile. There is some evidence of cut and levelling works that may have removed original soil profiles to varying depths.

Based on aerial photographs and geotechnical information, the SIMTA site appears to have retained a small rise or hillock in its central eastern portion and gentle undulating slopes descending west towards the Georges River. 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 the site is limited to grassed areas between extensive hard-stands and other structures, and some recent cultural plantings of introduced and native species.

The proposed rail corridor consists of gentle flats and river terraces on both sides of the Georges River. Extensive recent land use includes railway lines and associated infrastructure, a golf course and a large sand/gravel quarry. The latter is situated on the western side of the Georges River and has completely modified the landscape in this area. A small section along Tarakan Road, on the east side of the river, supports a number of

buildings. The construction of these would presumably have disturbed the ground surface to some degree. Outside the area of building disturbance, there are some relatively undisturbed portions of land immediately to north of the East Hills Railway between the Georges River and Moorebank Avenue. Areas in close proximity to the Georges River edge may also retain some undisturbed landforms. Vegetation in these areas appears to consist of a dense *Melaleuca* sp. scrub. The only other area that appears to retain some natural landscape characteristics is an area of vegetation between Moorebank Avenue and the railway spur from the SIMTA site to the East Hills Rail Line. Anzac Creek, which has been dammed by the golf course, bisects this area.

6.2 Geology and Soils

The SIMTA site and proposed rail corridor are located immediately north of (and were formerly part 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. Geotechnical reports indicate that the SIMTA site is comprised primarily of the latter. Specifically, the Douglas & Partners report indicates that the SIMTA site retains predominantly Tertiary sands and clayey sands, with some siltstone and Ashfield shale bedrock in the higher central eastern parts of the site (Douglas & Partners, 2009:5-6).

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 SIMTA site is yet to be specifically demonstrated.

The 1:100,000 Penrith Soil Landscape Series Sheet 9030 indicates that the SIMTA site and most of the proposed rail corridor 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.

The proposed rail corridor also contains a small portion of the Luddenham Soil Landscape type (Bannerman and Hazelton, 1990:63) at the western-most point of the subject area. This is characterised by loams overlying clays, and dark prairie topsoils, and some sandy clays and sandy loams, on undulating low hills overlying Wianamatta Group Shales.

Geotechnical Information

Over 20 geotechnical investigations have been undertaken within the SIMTA site since 1980 (Douglas & Partners, 2009). They indicate that the site is largely underlain by modern fill over fluvially derived deposits of sand, clayey sand, sandy clay, silty clay and clay. In most areas, the fill and other debris is found to depths ranging from 0.7 meters - 4.5 meters, with an average of between 1 and 1.5 meters (Douglas & Partners, 2009). It is unclear whether the fill is composed of introduced material or has been derived from soil originating elsewhere on the site, or a combination of the two. In any of the scenarios, current standard construction practise would have involved the removal or compaction of the original soil profile (most notably the A and A2 horizons, which are of relevance archaeologically) before the laying of the modern fill.

One notable exception to this includes the south-eastern quadrant of the SIMTA site. Geotechnical investigations, most likely in the vicinity of the warehouse-bulk stores, revealed the presence of 1 meter deep clayey soil with no evidence of introduced fill (Douglas & Partners, 2009: 6).

It should also be noted that no geotechnical works appear to have been undertaken in the northern or southernmost parts of the sites. However, visual inspection and historical aerial photographs do indicate that both these areas have been extensively modified over the last 60 years.

No geotechnical information was available for the proposed rail corridor.

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). The SIMTA site, however, has been completely cleared and only partly revegetated. It is dominated by buildings, structures, roads and hard-stands interspersed with grass, cultural plantings, exotic weeds and medium sized shrubs. Specifically, a flora study identified the presence of Sugar Gum (*Eucalyptus cladocalyx*), Forest Red Gum (*Eucalyptus tereticornis*), Scribbly Gum (*Eucalyptus sclerophylla*) and native grasses, including Kangaroo Grass (*Themeda australis*), Sand Couch (*Cynodon dactylon*) and *Danthonia sp.* (LesryK Environmental Consultants, 2000). Areas around the Georges River and also in the south-east of the site may retain some original vegetation.

The Luddenham Soil Landscape originally supported wet sclerophyll forest (Bannerman & Hazelton 1990:63), however, the part of the proposed rail corridor that consists of this soil landscape appears to have been completely cleared of vegetation.

6.4 Previous Land Use and Disturbance

This section summarises the detailed history contained in the *Heritage and Environment Management Plan for Holsworthy Training Area, Sydney, NSW* prepared for the Directorate of Heritage and Biodiversity Conservation, Department of Defence by Woodhead (2009). It also includes information summarised from the *Defence National Storage Distribution Centre Moorebank Defence Site - Heritage Advice* Brian McDonald and Associates December 2002 and the Department of Environment, Water, Heritage and the Arts (DEWHA) Commonwealth Heritage List citation for the DNSDC (SIMTA) site.

6.4.1 Early Grants and Land Uses

The first European land grants in the Liverpool area date from 1798. One of the largest land holdings in the area was that of Thomas Moore, whose grant totalled 6000 acres by 1809, stretching from the eastern bank of the Georges River to Harris Creek. Moore's presence in the area is reflected in the name of the suburb Moorebank.

In 1810 the town of Liverpool was established, following a visit to the district by Governor Macquarie, and in 1835 the area where the Holsworthy Training Area is located was surveyed and proclaimed the Parish of Eckersley. The Old Illawarra Road and Old Coach Road were established to provide transport routes through the area. By 1890 the parish supported around a dozen settlers.

By 1911 the Eckersley area was in decline, with disease and sandy soils preventing successful crops from being established. The selections were abandoned to allow for the proposed military reserve to be established.

6.4.2 Defence Use and Occupation

The SIMTA site was part of the larger Moorebank Defence Site, originally part of Moore's estate. The northern and western boundaries of the site follow boundaries of the 1888 Moorebank Farms subdivision.

In 1913 two parcels were acquired by the Commonwealth, one for a Remount Depot and Veterinary Hospital, and the other, of 16,868 acres, for a training area. The Holsworthy Training Area was officially proclaimed as a military reserve in March 1913.

In 1915, the Federal Government acquired a parcel of land that included the SIMTA site (and the Yulong Precinct to the immediate north, as part of the greater Moorebank military area. Development occurred first in the Yulong Precinct, outside the current boundary of the SIMTA site. These early stores were known as the 'Mobilisation Stores' and a railway siding spur-line from the Liverpool - Anzac Rifle Range- Holesworthy Railway was constructed to service the stores in about 1919. This was known as the 'Moorebank Depot Siding'.

During the Second World War, the SIMTA site and the Yulong site to its north, accommodated the 2nd Base Ordnance Depot and 2nd Base Workshop. In 1972 these units became the 21st Supply Battalion and the 2nd Base Workshop Battalion. In 1990 these two joined to become the Moorebank Logistics Group. During the Second World War about 20 timber post and beam buildings were erected as well as other buildings on the subject site and at Yulong. All these structures reflected the widespread expansion of support facilities during the early part of the war. From the 1940s to the early 1990s there was little development at the site(s), however, services such as the rail line were truncated and removed and several buildings were changed and updated.

The current function as a centralised Department of Defence Distribution Centre was established in the early 1990s. At this time, most of the Second World War buildings were reclad and the original asbestos cement sheeting was removed. A small number of buildings were demolished and replaced. The creation of the DNSDC was an element of the Defence Logistics Redevelopment Project which aimed at rationalising Defence warehousing. DNSDC is the main warehouse for all three of the Australian armed services, and there are maintenance sections as well.

6.4.3 Defence Use Phases of Development and Change

Historical activities within the SIMTA site have been extensive. Aerial photographs presented in **Appendix A** demonstrate the extent of development and change over the last 80 years.

In summary, military activities began in the vicinity of the SIMTA site in the early 1900s. A map from 1930 shows a small series of structures located immediately north of the site (Figure A1). These structures appear to have been situated directly onto the land surface and the photograph shows little evidence of major earthworks. The SIMTA site at this time appears relatively undisturbed with only a few uncleared tracks being evident. Based on vegetation differences, a study by ARUP investigating the same photograph suggests that the southern quadrant of the site was/is situated on alluvium (ARUP 2008: Figure 2.4). This is probable, since closer investigation indicates that a small drainage channel to Anzac Creek once may have run into the south-east quadrant of the SIMTA site. As no recognised watercourse exists at that location now, it is likely to have been diverted or formalised during later cut and fill works.

No photographs were available for the 1940s, but by the 1950s Defence activities within the SIMTA site were extensive (Figure A2). Many of the structures currently present on the site were built during this period, although activities in the south of the subject area were still ephemeral at this time. The small drainage channel is still evident, as is the surrounding vegetation - a large scour appears to be present between Anzac Creek and the former channel, which ARUP suggest was land clearance, but given the location may have been the result of natural modification (through flooding for example).

The 1955 photograph shows that the north-east corner of the SIMTA site and the area surrounding Anzac Creek appear relatively undisturbed. The small water channel to Anzac Creek is still evident and a track and several dams or water pools are located between the

creek and the water channel. By 1961, the SIMTA site had taken on its current appearance - roads and hard-stands are formalised, structures are complete and some landscaping has occurred (**Figure A3**). Both the north-east corner and the southern quadrant of the site area show modifications that were not apparent in the 1955 photograph and fill and levelling of both areas appears to have occurred. The water channel to Anzac Creek appears to have been formalised by a series of small canals running through the southern part of the site. The southern portion of the site has been formalised and appears to be several metres above the surrounding lands.

Little change to the SIMTA site appears to have occurred between 1965 and 1979 (**Figures A4 and A5**). However, by the mid 1980s, extensive earthworks begin to appear in the southern quadrant of the site (**Figure A6**). These works appear to be related to the construction of railway spur between the SIMTA site and the main rail line to the south. By the 1980s, parts of the north-east corner had been modified for use as hardstand and storage areas adjacent the railway.

By 1994, the rail spur to the south was established (**Figure A7**). Further structures and large hard-stand areas had been built in the eastern and northern parts of the site, often requiring the removal of previous structures and rail infrastructure from these areas.

The proposed rail corridor has been subject to late 20th century significant land use impacts. Aside from some vegetation clearance, there is little evidence of activities within the rail corridor lands until 1979, when quarrying began to the west of the Georges River and a golf course was developed to the south-east of the SIMTA site (**Figure A8**). During the 1980s, quarrying to the west of the Georges River had expanded significantly, and the construction of the railway corridor to the south had commenced, leading to landscape and vegetation modifications to the east of Moorebank Avenue (**Figure A9**). By 1994, only a small area to the east of Moorebank Avenue remained undisturbed (**Figure A10**). The extent to which the golf course impacted the extensive river terraces adjacent to the Georges River is unknown. While the very southwest corner of the rail corridor study area appears undisturbed in many of these photographs, **Figure A10** clearly shows that vegetation clearance and landscape modification occurred to the present day fenceline.

7. REGIONAL CHARACTER

Integration of information and description of cultural landscape.

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 Moorebank, 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 Anzac Creek (although how much this is affected by the introduced fill materials is unknown). 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. A study by Dallas to the west of the Georges River found several sites on a spur overlooking Glenfield Creek, which is a similar landform to the area surrounding Anzac Creek. A study by Steele & Dallas (2001) included large parts of the subject area. They identified several parts of the golf course and banks of the Georges River requiring further investigation.

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 and geotechnical information indicates significant disturbance has occurred reducing the likelihood of any such sites surviving. This concurs with Steele & Dallas' earlier assessment of the subject area in 2001.

Historical aerial photographs show that the subject area underwent significant ground disturbance and earthworks in the 1940s and 1950s, which included the levelling, cutting and filling of large sections of ground. While the area of highest potential would have been in the vicinity of Anzac Creek and its associated tributaries, historical photographs show that the subject area has been raised and the creeks heavily modified. Construction of a rail corridor and several roads in the 1980s appears to have caused further impact to these areas. Similarly, the proposed rail corridor was heavily impacted by quarrying and construction activities through the 1970s - 1990s. However, a small area immediately adjacent Anzac Creek, as well as the edges of the Georges River may retain undisturbed archaeological materials.

Geotechnical information indicates that between 1 and 5 meters of fill/levelling material is present across most of the SIMTA site. While geotechnical information from the southern quadrant suggests no evidence of fill, the aerial photographs clearly indicate that extensive land modifications have occurred. No photographs were taken in the 1940s, so it is unclear what method of earthworks or fill introduction was used. However, given the industrial scale of the modifications, it seems unlikely a natural soil profile would have remained intact.

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).³ Furthermore, geotechnical data revealed no evidence of a buried soil profile anywhere in the SIMTA site, although it must be noted that buried A1 horizons (which are frequently compressed or damaged) can be missed in these types of analysis. 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. The low-lying clays and sands referred to in the geotechnical reports are more suggestive of Tertiary deposits, which are considered to pre-date the arrival of Aboriginal people to Australia.

Based on the geotechnical and historical photograph information, the potential for any archaeological material to survive within the SIMTA site is considered low. Any archaeological material that may be present within the subject area is likely to be composed of artefactual material, and will almost certainly be in introduced/re-worked fill and/or in very disturbed deposits. Similarly, the majority of the proposed rail corridor appears to have been heavily impacted, and is unlikely to retain undisturbed archaeological material.

However, a small area of vegetation south of Anzac Creek, the southern parts of the golf course, and the edges of the Georges River appear to be less disturbed, and may have Aboriginal archaeological potential. Similar conclusions were reached by a previous assessment encompassing some of these areas by Steele & Dallas (2001).

7.3 Site Predictions

7.3.1 SIMTA Site

Based on the previous impacts to the SIMTA site, most notably the extensive infrastructure, introduced fill (generally over 1 meter deep) and re-landscaping, the Aboriginal archaeological potential of this area is considered low. While sporadic isolated artefacts may be located within the subject area, it is considered unlikely that intact archaeological sites or landscapes remain.

3 AHMS has recently undertaken excavations at Reserve 4, Rosemeadow and for the proposed Windsor Police Station, Mileham Street. In both cases, an intact soil profile (comprised of A and A2 horizons) were found beneath varying levels (generally <50 cm) of introduced fill.

While the potential for subsurface archaeological material cannot be definitively determined, the introduction of modern fill to depths of up to 5 meters were likely to have had a significant detrimental impact on any Aboriginal objects and/or sites that may have been present on the surface in the past.

It is considered that the proposed development is unlikely to have significant impact on Aboriginal objects and/or sites (if present) within the subject area. However, it should be noted that Aboriginal consultation currently underway may identify items/areas/places of cultural significance that have not been identified as part of this report.

7.3.2 Proposed Rail Corridor

Several areas within the proposed rail corridor have been significantly disturbed and the presence of Aboriginal objects and/or sites is considered low in these places. They include the existing rail corridors, areas immediately adjacent to Moorebank Avenue, and most areas to the west of the Georges River (due to sand/gravel extraction industries). The area in the southwest most corner of the rail corridor, which in modern images appears relatively undisturbed was quarried historically based on the 1994 photographs.

However, an accurate determination of Aboriginal archaeological potential could not be considered in dense *Melaleuca sp.* scrub areas between Moorebank Avenue and the existing north-south rail corridor, the southern edge of the golf course, and the banks of the Georges River (Figure 10). As they could not be inspected, these areas are considered to retain Aboriginal archaeological potential. Potential site types include artefact scatters and culturally modified trees.

7.3.3 Disturbance and Sensitivity

A summary of the previous development impacts to Aboriginal cultural heritage is provided below:

- The SIMTA site has been extensively modified through introduced fill and re-landscaping, and it is, therefore, considered that the presence of, or potential impact to, Aboriginal archaeological material is low.
- Large areas of the proposed rail corridor have been extensively impacted by the construction of the East Hills Rail Line and sand quarrying activities to the west of

the Georges River. The presence of, or potential impact to, Aboriginal archaeological material is considered low in these areas.

- Areas of the proposed rail corridor south of Anzac Creek, within the golf course and in close proximity to the Georges River revealed little evidence of historical impacts, and may contain Aboriginal archaeological material - findings consistent with an earlier assessment of the area by Steele & Dallas.

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 10):

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 10. Map of archaeological sensitivity based on the background review and site inspection. Uncoloured areas within the subject area boundaries are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

8. METHODS

8.1 General

The field survey for the subject area was carried out in two phases. Phase One consisted of a brief site inspection for an overview assessment and to inform the Concept Approval. It was undertaken in order to corroborate documentary sources, and to ascertain which areas (if any) may have Aboriginal archaeological potential. Following the Concept Approval, Phase Two, a detailed survey, was undertaken for areas of Aboriginal archaeological potential identified during Phase One and areas that were not investigated during the Phase One works. The Phase Two survey was undertaken to inform the current assessment. Phase Two was undertaken in consultation (and with the involvement) of the RAPs.

8.2 Field Survey Methods

Description of physical inspection of subject area.

8.2.1 Phase One

Describes Preliminary Assessment.

Phase One, the overview assessment, was undertaken by AHMS in 2010. It involved a brief site inspection of the SIMTA site.

The objectives of the site inspection were to identify landscape integrity and to determine the degree of soil disturbance, erosion and potential for Aboriginal cultural archaeological deposits below the current ground surface. In combination with the background research, the inspection observations would identify whether the site had the potential to contain Aboriginal archaeological deposits. While the overview assessment site inspection included examination of the ground surface of the SIMTA site for Aboriginal objects and/or sites, program constraints did not allow a detailed field survey to be undertaken.

The SIMTA site was investigated by vehicle and on foot. The background research indicated some areas may retain Aboriginal archaeological potential. These areas were inspected briefly on foot.

8.2.2 Phase Two

The Phase Two field survey was undertaken in a series of transects, focussing primarily on the rail corridor and areas adjacent to the Georges River and Anzac Creek, since these were assessed as the least disturbed and had not been part of the original site inspection. However, investigation of the southernmost un-concreted portion of the SIMTA site was also undertaken, as none of the SIMTA site had been surveyed by the RAPs. Access to the waste management facility and a small part of the proposed rail corridor, adjacent to the East Hills Rail Line, was denied, so these areas were not surveyed (Figure 11).

The sample transects were placed to ensure coverage of all landforms that would be subject to impact and to provide an opportunity to characterise the nature of the area identified in the background assessment as having potential archaeological sensitivity. Transects were designed to represent discrete landform and vegetation units.

Transects were also situated where access was available. Due to the presence and ongoing use of the rail corridor and sand extraction, many parts of the study area could not be accessed at the time of the survey. In these instances, survey was undertaken in close proximity (generally on similar landscapes or environments) to the study area. However, in some instances, these transects were situated outside or on the edges of the study area.

The field survey was carried out on foot within the proposed subject area curtilage. Two AHMS archaeologists and four RAPs, spaced approximately 10 to 20 meters apart, walked each transect.

The field survey focussed on answering the following questions:

1. Archaeological and cultural material - Are any Aboriginal objects present? What is their location, type (eg artefact scatter, scarred tree, grinding groove, etc), components (eg number of artefacts, type of artefacts, size of tree scar, etc), integrity and condition (eg within a disturbed context, eroding from a creek bank, a live or dead tree, etc)?
2. Landform characteristics - What types of landforms are being covered (eg lower slopes, floodplains, ridgelines, slopes, etc)? What is their composition, their condition (eg disturbed, naturally eroding, areas of accumulation, etc), their soil profile (eg a duplex soil, an alluvial soil, exposed bedrock, etc), their vegetation

(eg tree and vegetation types present within the landform), etc?

3. Effective coverage - How effective is the field survey? What is the exposure (ie how much bare ground is evident as a percentage of the transect) and visibility (ie how visible is the ground as a percentage of the transect) along the corridor?
4. Disturbance - Are there significant areas of disturbance along the corridor? What is the location and extent of disturbance, what effect might the disturbance have on archaeological material (if present)?

Landform and topographic unit, ground surface visibility, exposure, disturbance and any archaeological or cultural sites along each section/transect were documented (Tables 3 and 4). As well as taking specific GPS co-ordinates and photographs of features/items of interest, a running log of GPS co-ordinates and photographs was collected at intervals of 150 to 300 meters along each transect to thoroughly document the field survey.

All archaeological or cultural sites were documented in detail using written notes, photographs, and sketches (where required). Hand-held GPS readings for all sites identified, were taken, in addition to marking them on detailed aerial photographs and topographic maps.



Figure 11. Map of subject area showing approximate locations of Transects 1 to 8, which were surveyed. Areas in yellow were also investigated as part of the Phase One investigations. All other areas (unshaded) were not due to access issues.

9. RESULTS

9.1 Phase One

9.1.1 The SIMTA Site

A site inspection of the SIMTA site was carried out on the 26th of July 2010 by Alan Williams and Lisa Newell, AHMS. The proposed rail corridor (Figure 2) was not inspected on this date due to access issues.

The 2010 site inspection revealed that the SIMTA was largely flat with only minor evidence of the large gentle hill known to be situated within the eastern quadrant. Frequent surface exposures across the area revealed underlying fill material composed of clay and broken sandstone/ironstone fragments. Some of the fill appeared similar to the natural soil profile, and was only identifiable as fill based on the presence of underlying services. Areas in the south-east revealed the apparent remains of a truncated B soil horizon, which concurred with the geotechnical information provided. It should be noted that archaeological material typically occurs above this level, in the A horizon, so it appears that any potentially artefact bearing sediments have been removed. Areas in the south contained large exposures of sand, which may relate to the original route of Anzac Creek. However, the extremely flat nature of the land surface along with the general lack of vegetation suggests the sand had been introduced (Figure 12 - 14). The remains of the water depression of Anzac Creek were also identified in this area, but as historical photographs suggest, it had been canalised in the last 50 years (Figure 13 and Figure 17).

There was no evidence of original vegetation within the SIMTA site, trees were generally scattered or followed man-made routes, confirming that they were cultural plantings probably associated with DSND occupation (see Appendix A). Treeless areas were either covered with concrete, bitumen or a thin layer of grass (Figure 14 - 16). Although many of these trees were quite large, historic aerial photographs demonstrate that they are all less than 50 years old (Figure 19).

In summary, no evidence of natural landforms or soil profiles was identified within the SIMTA site, therefore the likelihood of archaeological material being present is considered low.

While areas closer to Anzac Creek were considered to have higher Aboriginal archaeological potential, the difference between the SIMTA site's flat lawns in this area in contrast to the *natural* dense *Melaleuca sp.* scrub on undulating slopes (Figure 21) to the

south of the creek, suggest that significant disturbance has occurred within the SIMTA site even close to the creekline. Furthermore, the north-south difference in elevation and the geotechnical reports indicate that the SIMTA site has been raised by fill.

The observations during the 2010 site inspection correlated well with the historical aerial photography already obtained for the SIMTA site (see **Appendix A**). Specifically, the site has been extensively modified for Defence activities by the construction of numerous structures, roads and drainage systems, and cultural plantings (**Figure 13 -17**).



Figure 12. An example of development within the SIMTA site. This structure is located in the south and east of the SIMTA site and the exposures in the foreground represent a mixture of natural truncated B horizon and introduced fill. The trees in the background, despite their size, were planted in the 1950s.



Figure 13. Examples of development and existing impacts within the SIMTA site. This photograph reveals evidence of levelling, as well as the implementation of drainage - a common sight across the SIMTA site.



Figure 14. The south-western quadrant of the SIMTA site, looking east. Note the extremely flat nature of the area and the hard-stands and structures.



Figure 15. Cultural landscape planting in the SIMTA site.



Figure 16. The remains of a railway line, which ran through the subject area and across Anzac Creek. This railway track was installed in the 1980s.



Figure 17. Extensive canalisation and drainage has occurred across the SIMTA site. Based on aerial photographs, this canal may be the remains of a water depression of Anzac Creek.



Figure 18. The southern quadrant of the SIMTA site, looking east. This area revealed extensive sand deposits, although the extremely flat land surface and young vegetation all indicate it has been introduced historically.



Figure 19. The southern quadrant of the subject area, looking south-east. These trees were planted in the 1950s, and provide good indicators of the size and age of trees growing from this period.



Figure 20. This canal evident by the reeds, was a water depression of Anzac Creek before it was modified in the 1960s. There is now no evidence of a natural creek line or associated deposits in this area.



Figure 21. The remains of Anzac Creek near Moorebank Avenue, looking north-east. Note the landscape modification in this area (evident in the undulating nature of land surface) and the dense Melaleuca sp. vegetation in the background.

9.2 Phase Two

Describes the landform and topographic units for each transect surveyed and maps places of interest to the Aboriginal community (Figure 33).

9.2.1 General

The 2011 field survey focussed primarily on the rail corridor and areas adjacent to the Georges River and Anzac Creek, since these appeared to have been the least disturbed. However, investigation of the southern-most portion of the SIMTA site was also undertaken. Access to the waste management facility and a small part of the proposed rail corridor, adjacent to the East Hills Rail Line, was denied, so these areas were not surveyed (Figure 11).

The field survey was carried out in a series of eight transects within the proposed subject area boundary (Figure 11). It was intended that a running log of GPS co-ordinates and photographs would be collected at 500 meter intervals along each transect to document the field survey thoroughly. However, each transect represents a discreet landform unit.

In the field it became apparent that each of these units was less than 500 meters long. Therefore, more than the intended recordings were taken (approximately every 150 to 300 meters; at least one for each transect).

9.2.2 The SIMTA Site

Transect 1

One transect was surveyed within the SIMTA site. It was located at the very south end (Figure 11, Table 3). The land appeared to be very flat, as though graded (Figure 22). Artificial drainage channels were cut through it in several places. It had also been disturbed by heavy vehicle movement (Table 4). This transect was probably originally creek flats and/or swamp, as the original route taken by Anzac Creek was some 50 metres to the south. The original vegetation had been almost completely cleared. It had been replaced with grass and young trees, primarily eucalypts. Exposed areas revealed brown sandy clay containing ironstone nodules, which probably represent the B horizon of the Berkshire Park Soil Landscape. It is unlikely that *in situ* Aboriginal archaeological deposit would be identified this deep; typically they would be located within the A horizon.

A chert core with eight negative flake scars was identified in Transect 1 (numbered 4 in Figure 33). Three possible artefacts were also identified. The first was a water-worn mudstone, possible complete flake (Figure 23 and numbered 1 in Figure 33). The water wear made it difficult to identify definitive artefact features. The second was a possible flake core of mudstone with two negative flake scars (numbered 2 in Figure 33). It is also possible the flaking on this artefact could have been caused by heavy machinery. The third possible artefact was a potential silcrete core with only one negative flake scar (numbered 3 in Figure 33). This also may have been created by heavy machinery. Heavy vehicle tracks were apparent near both of these possible artefacts. Six further items were also identified as artefacts by the RAPs. These were composed of silcrete, quartzite, mudstone and chert. Since the only possible original soil identified in this transect was B horizon (i.e. missing the topsoil), is considered likely that these artefacts are secondary deposits associated with fill.



Figure 22. *Transect 1; Southern part of SIMTA site looking south-west.*



Figure 23. *Artefact number 4, a chert core found in Transect 1.*

9.2.3 Proposed rail corridor

Seven transects were surveyed within the proposed rail corridor. These transects, each representing a landform and vegetation unit, are described below. Information presented includes a discussion of the predicted archaeological potential based on background research, their levels of disturbance, and any sites identified. These factors each contribute to the assessment of archaeological potential, which is also discussed for each transect.

Transect 2

Transect 2 consisted of a heavily vegetated lower slope/creek bank on the eastern side of the Georges River (Figure 11, Table 3). It sloped gently down towards the river at a gradient of some 3 degrees, averaging 22 meters AHD (Figure 24). It was found to be waterlogged in places. The vegetation comprised primarily wattle, eucalypts, casuarinas and grass. Ground surface visibility was fairly low (up to 10%) due to leaf litter and grass. This landform unit was found to be highly disturbed due to digging and fill to construct trenches and a track (Table 4). However, several large trees were identified, which may be more than 100 years old, and several exposed sections of soil showed that, in places, the soil profile remains intact. A flood map produced by Liverpool City Council show this area to be flood-prone (although no definition of 'flood-prone' could be found in association with the map). Documentary evidence describes severe flooding in the Holsworthy Military area, adjacent to the subject area and south-east of it in 1873. The Sydney Morning Herald reports several houses on that land being washed away and that:

'The rush of water displaced large quantities of soil and injured the railway'. (Sydney Morning Herald 27 February 1873 in Brewsher 2004: 14)

This being the case, it is considered likely that the existing soil profile in this area is of modern origin, and has little Aboriginal archaeological potential. No sites were identified in this area.



Figure 24. Transect 2; trench cut into slope on east side of the Georges River. Facing north-east.

Transect 3

Transect 3 consisted of part of a terrace along the east side of the Georges River (**Figure 11, Table 3**). It is elevated several metres above Transect 2. This transect is bisected by a road and a line of power poles running north to south. It has a number of exposed areas within a grassy lawn, which also contained a number of shell cases (**Figure 25**). A line of power poles runs north-south along the western side of this transect (**Table 4**).

Glenda Chalker (Cubbitch Barta Native Title Claimants) informed us that Navin Officer recently recorded an artefact scatter in this location. Several possible artefacts from this scatter were rediscovered eroding out of an exposure on the lawn. It appears that it has not yet been registered on the AHIMS database, as this site was not included in the results of the AHIMS search. One possible broken flake (numbered 6 in **Figure 33**) and one possible flaked piece (numbered 5 in **Figure 33**) were identified in this transect. Three further items were identified as artefacts by the RAPs. Some non-artefactual quartzite was also identified. Regardless of the lack of definitive artefacts identified in this area, its location along a river terrace, and retention of some intact soil profile indicates that it has Aboriginal archaeological potential. It has been designated PAD 1 (**Figure 33**).



Figure 25. Transect 3; terrace along east side of the Georges River, facing south-east.

Transect 4

Transect 4 was located north of the East Hills Rail Line. This transect ran across the golf course approximately from south-west to north-east (Figure 11, Figure 26, Table 3). The soil was found to be sandy overlying clay. Anzac Creek runs across this transect in the form of a number of dams, roughly in a south-west to north-east line. The transect consists of creek flats, and is swampy in places, although exposed areas appear to be eroding (Table 4). This water retention may be due to man-made dams, as Anzac Creek has been cut off from the Georges River, no longer emptying into it. The elevation varies between 17 meters and 21 meters AHD. Construction of the golf course appears to have involved some earthworks, however some areas may retain intact soil profile. This is evidenced by the retention of a number of large eucalypts (some potentially 100 years old). The majority of the original vegetation has been cleared, and replaced with grass.

No Aboriginal sites or objects were identified in Transect 4, however, due to its elevation above the river terrace, and its relatively low level of disturbance, it is considered to have moderate Aboriginal archaeological potential. It has been designated PAD 2 (Figure 33).



Figure 26. Transect 4; golf course facing north-west. Note dammed section of Anzac Creek in background.

Transect 5

Transect 5 consisted of a strip of land running down the west side of Moorebank Avenue from just south of Anzac Creek to the East Hills Rail Line (Figure 11, Figure 27, Table 3). This transect had very low visibility due to dense vegetation, consisting primarily of casuarinas and thick grass. The vegetation appeared very young. This area would originally have been part of the Anzac Creek flats, but had been highly disturbed by the construction of Moorebank Avenue. The road is built up, and drains into this transect, which is aggrading. Power lines and underground services have also disturbed this area (Table 4). No Aboriginal sites or objects were identified in Transect 5.



Figure 27. Transect 5; east side of golf course, west side of Moorebank Avenue, facing north.

Transect 6

Transect 6 ran east to west along the northern boundary of the East Hills Rail Line, inside the golf course (Figure 11, Figure 28). It is swampy with and has been disturbed by the construction of the rail line and subsequent use by heavy vehicles. The rail line has been cut into the landform, creating a ditch on either side of the tracks (Table 4). The southern side is higher than the northern side, possibly indicating that the construction involved a large cut into the landform, which may have originally been a lower slope. The soil appears to be aggrading, although the vegetation has been completely cleared and replaced with thick grass, impeding ground surface visibility (Table 3).

No Aboriginal sites or objects were identified in Transect 6.



Figure 28. Transect 6; East Hills Rail Line facing south-west.

Transect 7

Transect 7 was located south of the SIMTA site along and adjacent to a disused rail line. It ran from the SIMTA site in the north to the East Hills Rail Line in the south (Figure 11, Figure 30, Table 3). It was highly disturbed by the construction of the rail line, and contained piles of fill consisting of concrete, bricks and similar materials. The vegetation has been cleared along this corridor (Table 4). This transect was probably originally part of the Anzac Creek flats. The eastern side of the tracks has been cut by a man-made drainage channel, and most of the original topsoil appears to have been removed.

One stone artefact was identified in Transect 7. This consisted of half of a red silcrete flake snapped longitudinally (location numbered 7 in Figure 33). Two further possible artefacts were identified by the RAPs in this transect. They consisted of a cream chert possible core with one negative flake scar, and a quartzite possible flaked piece. It is considered likely that these artefacts are secondary deposits associated with fill for the rail line.



Figure 29. Artefact number 7, a red silcrete broken flake.



Figure 30. Transect 7; disused rail line in proposed rail corridor south of SIMTA site, facing south-west.

Transect 8

Transect 8 was located west of Transect 7 in heavily wooded, creek flats south of the SIMTA site and north of the East Hills Rail Line (Figure 11, Figure 31, Table 3). The eastern side was found to be swampy, but to the west it was dry. The original route of Anzac Creek runs through the northern-most part of this transect. The whole area was heavily vegetated with eucalypts. Several large paperbarks (that may be as old as 100 years) were identified. Other vegetation included wattle and grasses (Table 4).

Transect 8 appeared to be largely undisturbed, with much of the original soil profile remaining. This being the case, the area has been designated PAD 3 (Figure 33). During the second site inspection a possible feature was identified. This consisted of a circular raised area (some 1 meter in diameter) that supported lichen and very little other vegetation despite the surrounding area being covered in thick grass (Figure 32). It was suggested by Scott Franks (Tomcomwall), that this may be a ground oven, potentially overlying a burial. Alternatively, it may be the broken down remains of a tree stump.



Figure 31. Transect 8; vegetated area south of SIMTA site.



Figure 32. Circular feature in Transect 8 (PAD 3), a possible ground oven.

Table 3. Table showing effective coverage of the subject area.

Transect Number	GPS Co-ordinates ¹	Landform Type	Disturbance	Transect Area (m ²)	Exposure/ Visibility (%)	Effective Coverage (sq m)	Effective Coverage % (m ²) ²
1	Start: E 307269 N 6239760 End: E 307274 N 6239978	Creek flats	Appears graded; drainage channels; vegetation cleared	110300	90/10	9927	9
2	Start: E 307321 N 6239942 End: E 307302 N 6240120	River bank	Flooding, trenches, drains cut it in	24590	20/10	492	2
3	Start: E 307359 N 6239808 End: E 307836 N 6240001	River terrace	Vegetation clearance, power poles	14120	98/10	1384	10
4	Start: E 307880 N 6240001 End: E 307847 N 6239765	Creek flats	Minimal landscaping (golf course), damming of Anzac Creek	106900	90/15	14432	14

Transect Number	GPS Co-ordinates ¹	Landform Type	Disturbance	Transect Area (m ²)	Exposure/ Visibility (%)	Effective Coverage (sq m)	Effective Coverage % (m ²) ²
5	Start: E 307816 N 6239769 End: E 307345 N 6239762	Highly disturbed creek flats	Construction of Moorebank Avenue (cut and fill), power poles, underground services	20550	50/20	2055	10
6	Start: E 308306 N 6240572 Mid: N 308570 E 6240572 Mid: N 308570 E 6240487 Mid: N 308539 E 6240328 Mid: N 307985 E 6240369 End: E 308436 N 6240453	Highly disturbed creek flats	Cut and fill for East Hills Rail Line, heavy vehicle tracks, fencing	24010	95/50	11405	48
7	Start: E 308245 N 6240250 End: E 308223 N 6239868	Highly disturbed creek flats	Cut and fill for rail line, cut for drainage ditch, possibly flooding	37520	50/40	7504	20

Transect Number	GPS Co-ordinates ¹	Landform Type	Disturbance	Transect Area (m ²)	Exposure/Visibility (%)	Effective Coverage (sq m)	Effective Coverage % (m ²) ²
8	Start: E 308185 N 6240181 Mid: E 307999 N 6240101 End: E 308188 N 6239868	Creek flats	Possible flooding, vegetation clearance	82850	90/10	7457	9
Total				420,840	-	54,656	13

¹ All co-ordinates are presented as MGA employing the GDA 94 datum.

² Effective coverage is a relationship of the visibility and exposure, specifically it is the percentage of *visible exposed* area, and can be worked out through area divided by visible percentage and then by exposure percentage.

Table 4. Artefact and PAD Descriptions.

Site Name	Transect No.	Description
PAD 1	3	River terrace running along the eastern side of the Georges River; largely undisturbed; vegetation cleared; eroding; grassy with exposures; 10% ground surface visibility; stone artefacts 5 and 6 identified here
PAD 2	4	Golf course between Anzac Creek and East Hills Rail Line; grassy but possibly some original soil profile; scattered large eucalypts; 15% ground surface visibility; no artefacts identified on surface
PAD 3	8	Wooded area bounded by SIMTA site to north, disused rail line to east and Moorebank Ave to south; some very old paperbarks identified; much original soil profile remaining; just south of Anzac Creek; ground surface visibility 10%; no artefacts identified here; possible ground oven identified
Artefact 1	1	Mudstone complete flake; found in sandy clay, flat cleared area along Transect 1
Artefact 2	1	Mudstone possible flake core; found in south of Transect 1 near vehicle track in mud.
Artefact 3	1	Red/ black silcrete possible core with one negative flake scar; found in south of Transect 1 near vehicle track in mud.
Artefact 4	1	Chert core with 8 negative flake scars; found in south of Transect 1 near vehicle track in mud.
Artefact 5	3	Red silcrete possible flaked piece found on sandy exposure west of road in Transect 3
Artefact 6	3	Poor quality grey chert/ silcrete; possible medial flake; found on sandy exposure west of road in Transect 3
Artefact 7	7	Red silcrete proximal flake; found in gravel along rail corridor



Figure 33. Map showing archaeological findings. Isolated artefacts (shown by numbers) and 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. It is, however, outside of the study area.

10. ASSESSMENT OF SIGNIFICANCE

This section presents an integration of information, which informs the identification of heritage values within the subject area. Sections 12 and 13 provide further syntheses of information.

10.1 Basis for Assessment

The significance of Aboriginal archaeological sites is assessed using three criteria: scientific archaeological (scientific), cultural (Aboriginal) and public significance. These criteria recognise that Aboriginal sites are valuable in a number of ways. Namely:

- To the Aboriginal community as an aspect of their cultural heritage and as part of continuing traditions.
- To the broader community, for educational, historical and cultural enrichment values; and
- To the scientific community for potential research value.

The guidelines outlined in the DECCW (now OEH) (2010) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* refer to the *Burra Charter* (1999), which provides the basis for evaluating significance.

10.2 Cultural Significance

Unmodified natural features in the landscape can signify sacred sites/places of significance to the Aboriginal community. They are archaeologically invisible, so can only be identified with the aid of Aboriginal interpretation. Where such sites are known to exist, 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 or later may be so important to the local Aboriginal communities that they are considered significant. If these events relate to a specific place in the landscape, then that place may become sacred or highly significant to the local Aboriginal communities.

The cultural significance of the subject area was discussed with the RAPs during the field survey. All comments received following the distribution of this report will be included in **Appendix C**. During field survey, they indicated that PAD 1 and PAD 3 were culturally significant. They further indicated that the artefacts in Transect 1 are culturally significant, and that PAD 2 and Area 1 may be culturally significant.

Comments received from Glenda Chalker (Cubbitch Barta Native Title Claimants) indicate that Aboriginal heritage in the Holsworthy area is of cultural significance due to its rarity as a result of large scale impact to the area from previous housing developments.

PAD 1

PAD 1 is considered culturally significant by the RAPs as it contains recorded (as yet unregistered) sites. Glenda Chalker (Cubbitch Barta Native Title Claimants) provided information that a site in the area had been recorded during another survey. However, this site did not appear on the AHIMS search, so it appears not to have been registered. The site was rediscovered, and was considered by the RAPs to be culturally significant as the remains of the material culture of their ancestors.

PAD 3

Glenda Chalker indicated that several very old paperbarks (*Melaleuca sp.*) in PAD 3 were culturally significant (see cover photo). Although they did not appear to be culturally modified, mature examples of this species are now rare in the area. They were used traditionally by Aboriginal people for food. The bark was also used for wrapping babies and starting fires.

Scott Franks (Tocomwall) identified a feature in PAD 3 that he believes to be culturally significant. He indicated that it was potentially a ground oven that may even contain a burial underneath. Mr Franks advised that he had encountered a similar feature elsewhere. He explained that this area was frequented by Aboriginal people in recent history.

Transect 1

The RAPS did not indicate that Transect 1 was culturally significant as a place, as it was found to be highly disturbed. However, RAPs indicated that the stone artefacts identified

there were indicated to be culturally significant as the remains of the material culture of their ancestors.

PAD 2

The RAPs voiced concern that PAD 2 may contain stone artefacts, as it is very near recorded artefact scatters, and close to the river. If this is the case, they advised they would consider them culturally significant as the remains of the material culture of their ancestors.

Area 1

Area 1 is considered potentially culturally significant, as it is a wooded area adjacent to the western side of the Georges River, and Aboriginal cultural sites have been identified in a similar landform on the eastern side of the river. It may contain stone artefacts, which are culturally significant to the RAPs as evidence of the material culture of their ancestors.

10.3 Scientific Significance

Scientific value is assessed according to the research potential of a site. Rarity and representativeness are primary considerations. Research potential or demonstrated research importance is assessed according to the contribution that a heritage site can make to our understanding of human society in the past. Heritage sites, objects or places of high scientific significance are those which provide an uncommon opportunity to inform us about the specific age of human occupation in an area, or provide a rare glimpse of artistic endeavour, or provide a rare chronological record of changing life through deep archaeological stratigraphy.

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 region, but very common in another. One type of artefact may be common in one region, but outside its known distribution in another. In this sense, context is important.

The integrity of a site is also a consideration in determining scientific significance. While