



**Riverstone East Growth Centre Precinct
Aboriginal Cultural Heritage Assessment
Final**

For

Department of Planning and Environment, NSW

March 2015

AHMS
ARCHAEOLOGICAL & HERITAGE
MANAGEMENT SOLUTIONS



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GLOSSARY

Aboriginal Cultural Heritage Assessment (ACHA)	A document developed to assess the archaeological and cultural values of an area, generally required as part of an Environmental Assessment (EA).
Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010	Guidelines developed by OEH to guide formal Aboriginal community consultation undertaken as part of an Aboriginal Cultural Heritage Assessment (ACHA).
Aboriginal Heritage Impact Permit (AHIP)	The statutory instrument that the Director General of the Office of Environment and Heritage (OEH) 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 where project approval under the state-significant provisions of Part 4 (Division 4.1) 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 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'.
Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales	Guidelines developed by OEH to inform the structure, practice and content of any archaeological investigations undertaken as part of an Aboriginal Cultural Heritage Assessment (ACHA).
Department of Planning and Environment (DPE)	The Consent Authority for state significant development applications made in accordance with Part 4 (Division 4.1) of the <i>Environmental Planning and Assessment Act 1979</i> .
Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales	Guidelines developed by OEH, outlining the first stage of a two stage process in determining whether Aboriginal objects and/or areas of archaeological interest are present within a subject area. The findings of a due diligence assessment may lead to the development of an Aboriginal Cultural Heritage Assessment.
Environmental Assessment (EA)	A document summarising the assessment of environmental impacts of a development which supports an application for approval of a state significant development under Part 4 (Division 4.1) of the <i>Environmental Planning and Assessment Act 1979</i> .
<i>Environmental Planning and Assessment Act 1979</i>	Statutory instrument that provides planning controls and requirements for environmental assessment in the development approval process. The Act is administered by the DPI.
Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW	Guidelines developed by OEH to inform the structure and content of an Aboriginal Cultural Heritage Assessment (ACHA).
Isolated Find	An isolated find is usually considered a single artefact or stone tool, but can relate to any product of prehistoric Aboriginal societies. The term

“object” is used in the ACHA, to reflect the definitions of Aboriginal stone tools or other products in the *National Parks and Wildlife Act 1974*.

National Parks and Wildlife Act 1974

The primary piece of legislation for the protection of Aboriginal cultural heritage in NSW. Part 6 of this Act outlines the protection afforded to and offences relating to disturbance of Aboriginal objects. The Act is administered by OEH.

Office of Environment and Heritage (OEH)

The OEH is responsible for managing the Aboriginal Heritage (and other) provisions of the *National Parks and Wildlife Act 1974*. Now integrated into the Department of Planning and Environment.

Potential Archaeological Deposit (PAD)

An area assessed as having the potential to contain Aboriginal objects. PADs are commonly identified on the basis of landform types, surface expressions of Aboriginal objects, surrounding archaeological material, disturbance, and a range of other factors. While not defined in the *National Parks and Wildlife Act 1974*, PADs are generally considered to retain Aboriginal objects and are therefore protected and managed in accordance with that Act.

Proponent

A corporate entity, Government agency or an individual in the private sector which proposes to undertake a development project.

ABBREVIATIONS

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AHMS	Archaeological and Heritage Management Solutions
ASL	Above Sea Level
BP	Before present (AD 1950)
DECCW	Department of Environment, Climate Change and Water (now OEH)
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>
ERS	Eastern Regional Sequence
ILP	Indicative Layout Plan
ka	Abbreviation for thousands of years ago (e.g. 1 ka equals 1,000 years ago)
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
NPW Act	<i>National Parks and Wildlife Act 1974</i>
OEH	Office of Environment and Heritage (formerly DECCW)
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party

EXECUTIVE SUMMARY

Archaeological and Heritage Management Solutions Pty Ltd (AHMS) was commissioned by the NSW Department of Planning and Environment (DPE) to undertake an Aboriginal Cultural Heritage Assessment (ACHA) of the Riverstone East Growth Centre Precinct in accordance with Office of Environment & Heritage (OEH) guidelines (see DECCW 2010a,b,c; DECCW 2011). The total study area was 659 hectares not all of which was accessible for survey.

The ACHA included the review of background and existing information, predictive modelling, field survey, and consultation with Aboriginal stakeholders. The project included both on-site archaeological investigations and a series of meetings to specifically identify cultural values within the site. Due to the lack of detailed development design, the report concludes with a consideration of constraints and opportunities for future development of the precinct. All works were undertaken in accordance with the OEH (DECCW 2010b) Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW.

The ACHA was developed in consultation with 11 Registered Aboriginal Parties (RAPs), namely Deerubbin Local Aboriginal Land Council, Darug Custodian Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments, Darug Land Observations, Tocomwall, Gunjeewong Cultural Heritage Aboriginal Corporation, Philip Khan, Shane Williams, Tony Williams, Darren Williams and Andrew Williams. All consultation was undertaken in accordance with OEH's (DECCW 2010c) Aboriginal Cultural Heritage Consultation Requirements for Proponents, and all RAPs participated in both the archaeological and cultural mapping of the study area.

The background review identified the precinct as occurring within the Cumberland Plain bioregion. Major landforms of interest included First Ponds Creek and its associated tributaries; and the widespread presence of natural silcrete cobbles and boulders, a known raw material used by Aboriginal people in the past.

A review of previous studies in the region, which have been extensive; and a search of the OEH Aboriginal Heritage Information Management System (AHIMS) database, identified 101 Aboriginal objects/sites in the general region, of which 17 were located within the study area. Those within the study area consisted of (note some sites had multiple attributes): two isolated Aboriginal objects, 10 artefact scatters (ranging from two to 290 objects), seven potential archaeological deposits and two scarred trees. These sites were primarily situated along Windsor Road and/or First Ponds Creek, the most notable being the 'A7 Archaeological Complex', a series of sites along the banks of the river near Guntawong Road; and 1006-46, a large artefact scatter on a tributary of the Killarney Chain of Ponds in Rouse Hill Regional Park.

A predictive model of the region indicated that the most likely cultural materials would be stone artefacts, and some of these could be isolated artefacts which may be found in any location. However, complex and significant archaeological sites are usually found within 250m of larger-order creeklines. Cultural materials are frequently buried, with no observable surface expression; and historical disturbance can significantly impact the integrity and survivability of these cultural deposits.

The archaeological survey investigated 22 accessible properties within the precinct, totalling ~109 hectares. These areas were selected primarily based on good surface visibility, and correlation with landforms of interest. The investigations identified nine previously unrecorded archaeological sites, which consisted of isolated Aboriginal objects and low density artefact scatters.

A second site inspection was undertaken specifically to explore traditional and contemporary cultural values. This latter inspection identified no additional sites within the study area, but several in the vicinity. Previous investigations have identified the cultural importance of the A7 Archaeological

Complex, although perceptions of this site are changing following recent excavations that have determined that the site extent is smaller in size than previously anticipated.

Overall, the assessment identified 26 Aboriginal objects/sites within the study area, of which eight had been previously destroyed (and a further one destroyed, but newly discovered portions of it re-listed). These sites were all composed of various densities of stone artefacts, potential archaeological deposits and/or scarred trees. Of these sites, six were considered of high local significance (of which one has been previously destroyed), two of moderate local significance, and the remaining 18 of low significance.

For the purposes of this report, the study area has been divided into areas of high, moderate and low archaeological probability or potential based on a detailed predictive model developed by AHMS in 2009, and the findings of the assessment outlined above. It should be noted, however, that the areas mapped are a preliminary indicator of the Aboriginal cultural heritage since no archaeological testing was carried out as part of this current study (due to both access issues, and the nature of the precinct planning process). Such works should be undertaken to refine the model prior to development.

An overlay of the proposed Indicative Layout Plan (ILP) (Stages 1 and 2) found the following:

- Eleven of the eighteen identified Aboriginal objects/sites (61%) are within the ILP curtilage. Of these four would be subject to low (if any) impacts being situated within parkland, riparian corridor, water management, and/or environmental management.
- Of the four sites that remain unaffected/minimally impacted, two were considered of high local significance (of four that were identified during this assessment). This includes two Aboriginal sites prominently documented in the literature, namely the A7 Archaeological Complex site (45-5-4311) on the banks of First Pond Creek. A small section on the periphery of the A7 Archaeological Complex site would, however, be zoned, medium density residential.
- One site of high significance, a scarred tree (1019-7/#45-5-4080) and associated PAD (1020-6/#45-5-4081) situated on Guntawong Road is currently situated within proposed low density residential, and may be impacted through the ILP.
- All remaining sites within areas of high potential impact were generally composed of low densities of Aboriginal objects and considered of low significance.
- Areas of high archaeological probability (~16.5ha) situated in the northwest of the precinct would largely be unchanged by the ILP, being situated outside of the curtilage and generally within riparian corridor areas.
- Areas of moderate-high archaeological probability are extensive across the precinct (~317ha) and would be subject to impact from residential development. However, a significant proportion of this zone (137ha or 43%) along the banks of First Ponds Creek and the tributaries of Killarney Chain of Ponds would be situated in parkland, riparian corridor, water management, environmental management and/or the Rouse Hill Regional Park and remain relatively unaffected.
- Areas of moderate and low archaeological probability encompass much of the study area, and would be impacted by a range of activities proposed in the ILP.
- Opportunities exist to reflect contemporary Aboriginal values through a range of possible initiatives that have been identified by the Aboriginal community. Consultation in later design

stages is recommended to maximise these opportunities however general recommendations are provided below.

In addition to planning level recommendations, the following general and specific recommendations were also proposed:

- The draft ACHA should be submitted to the Registered Aboriginal Parties for their review. Any comments, corrections and recommendations received should be incorporated into the final versions of the reports.
- Any impact, harm or destruction to Aboriginal objects/sites would require an Aboriginal Heritage Impact Permit from OEH prior to any development.
- Any development proposed for properties in which areas of moderate, moderate-high, or high archaeological probability are identified would first require further sub-surface investigations to characterise any Aboriginal objects present, determine their extent and significance. An Aboriginal Heritage Impact Permit may also be required from OEH depending on the findings of further works.
- Consultation with the Registered Aboriginal Parties should be maintained as the planning and development of the precinct progresses.
- Targeted test excavations should be implemented across the entire study area (with a focus on high and moderate potential zones) to further characterise the archaeological and cultural resource. These works should ideally occur prior to finalising the Indicative Layout Plan, and certainly before any development occurs.
- All Aboriginal objects/sites newly identified, or not previously recorded on the AHIMS database, should have a site card compiled and lodged with the OEH AHIMS registrar.
- As planning and design work progresses consideration should be given to the recommendations that emerged from the cultural values assessment including: the development of open spaces that reflect the natural vegetation, the naming of open spaces and streets to recognise local Aboriginal history and culture, retaining artefacts collected in such a way that children and future generations could see, feel and experience them for themselves

1 INTRODUCTION

1.1 Background

The Department of Planning and Environment (DPE) has commissioned Archaeological and Heritage Management Solutions Pty Ltd (AHMS) to undertake an Aboriginal Cultural Heritage Assessment (ACHA) of the Riverstone East Growth Centre Precinct. DPE is currently developing an Indicative Layout Plan (ILP) for the precinct to allow the future residential development of the precinct. The ACHA is developed to inform the ILP of any archaeological and cultural values within the precinct, and allow for their integration and management as the project progresses.

This document provides an Aboriginal Cultural Heritage Assessment (ACHA) of the Riverstone East Precinct, which includes:

- A review of existing and former environments to determine the likely resources in the vicinity the study area.
- A search of the Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) database.
- A review of regional and local archaeological studies to identify the potential for Aboriginal objects/sites to be present within the study areas.
- Field survey with Registered Aboriginal Parties to identify Aboriginal archaeological sites, and to determine areas of cultural and archaeological sensitivity, as well as to identify areas of disturbance.
- Consultation with Aboriginal stakeholders about the cultural values of the study area.
- Assessment of significance of any Aboriginal objects/sites identified within the precinct.
- Mapping of areas of cultural heritage sensitivity within the precinct.
- Management recommendations for the future management of any Aboriginal objects/sites present within the precinct.

1.2 Authorship and Acknowledgements

This report was written by Alan Williams (Manager NSW - Aboriginal Heritage), Liz Foley, Michelle Lau, Fenella Atkinson and Nalisa Neuendorf (Consultants, AHMS). Susan McIntyre-Tamwoy (Associate Director, AHMS) provided technical and quality assurance of the report.

We gratefully acknowledge the assistance of Evelyn Ivinson (DPE).

1.3 Study Area

The study area is currently zoned as 'General Rural', under the Blacktown Local Environment Plan 1988, and comprises predominantly farm land and residential housing. The study area comprises the

Riverstone East Precinct within the Blacktown LGA, and forms one of the northerly group of precincts that make up the North West Growth Centre (NWGC) (**Figure 1**). The precinct is 659 hectares in total, with a northwest-southeast running axis. It is immediately surrounded by the Alex Ave Precinct to the south west, Area 20 to the south east, Box Hill and Box Hill Industrial to the north east and Riverstone to the west.

Killarney Chain of Ponds runs to the north of the study area. First Ponds Creek forms the western boundary of the study area, and Windsor Road forms the north-western boundary. Second Ponds Creek lies approximately 1km to the south east.

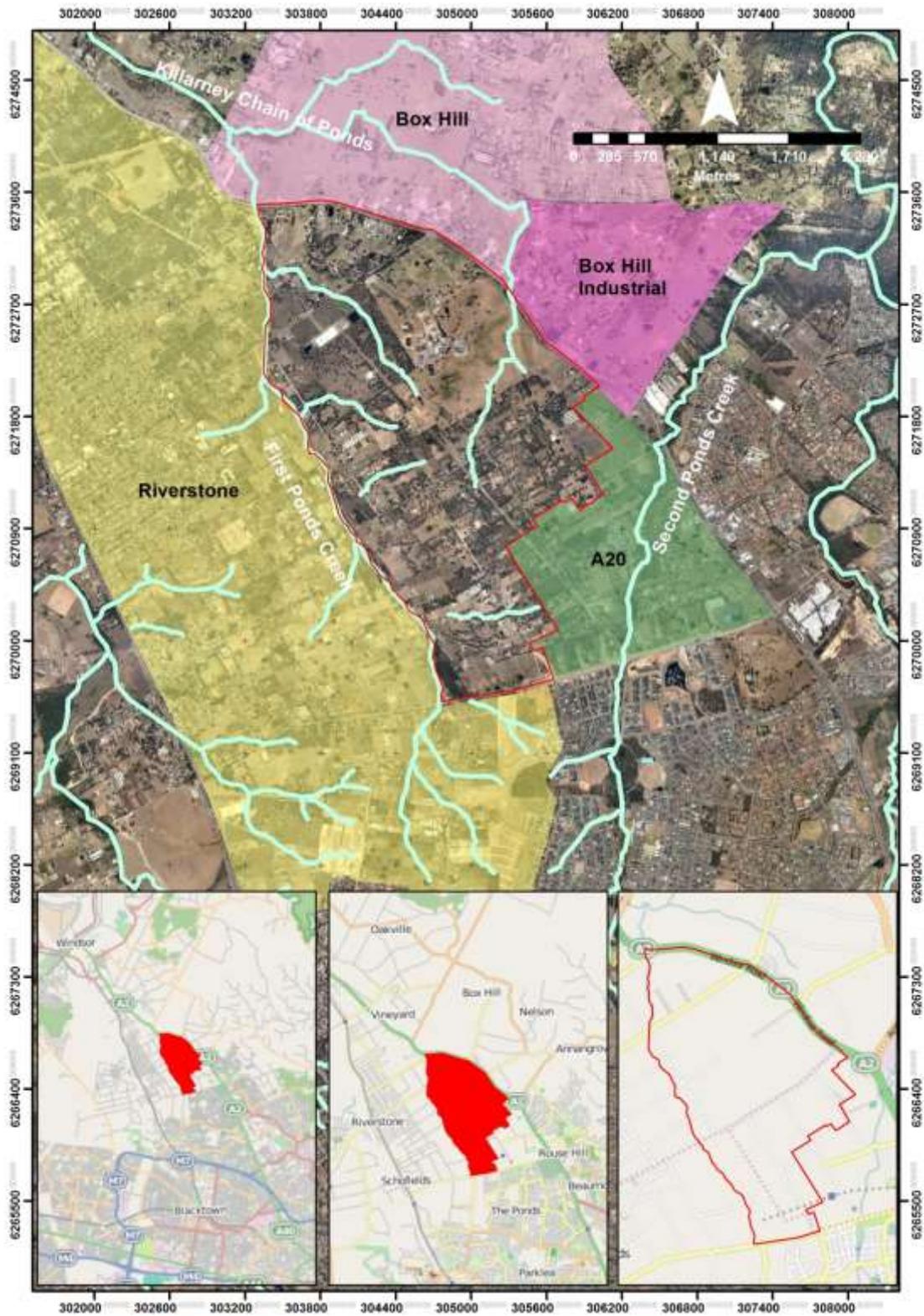


Figure 1. Plan of the Riverstone East precinct. The map also shows nearby Growth Centre precincts, and main drainage lines.

2 STATUTORY CONTEXT

Archaeology in New South Wales is protected by a number of pieces of legislation at Commonwealth, State and local levels. Legislation of relevance to the project includes:

- *Environment Protection and Biodiversity Conservation Act (Cwlth) 1999;*
- *Aboriginal and Torres Strait Islander Heritage Protection Act (Cwlth) 1984;*
- *Native Title Act (Cwlth) 1993;*
- *Environmental Planning and Assessment Act, NSW 1979;*
- *National Parks and Wildlife Act, NSW, 1974;* and
- *Aboriginal Land Rights Act, NSW, 1983.*

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* 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 have been assessed as being of heritage significance.

Places listed on the NHL can be assumed to be of State and local heritage value, even if various State or local heritage lists do not specifically include them. The Minister administering the EPBC Act must assess any action which has, will have, or is likely to have, a significant impact on the heritage values of a listed place. The approval (or rejection) follows the referral of the matter by the relevant agency's Minister.

No Aboriginal sites or places within the study areas are currently listed on the NHL or CHL.

2.1.2 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* 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. 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. 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.

2.1.3 Native Title Act 1993

The *Native Title Act 1993* provides recognition and protection for native title. The Act established the National Native Title Tribunal to administer native title claims to rights and interests over lands and waters by Aboriginal people. The Tribunal also administers the future Act process that attracts the right to negotiate under the *Native Title Act 1993*.

The Act also provides for Indigenous Land Use Agreements (ILUA). An ILUA is an agreement between a native title group and others about the use and management of land and waters. ILUAs were introduced as a result of amendments to the Native Title Act in 1998. They allow people to negotiate flexible, pragmatic agreements to suit their particular circumstances.

An ILUA can be negotiated over areas where native title has, or has not yet, been determined. They can be part of a native title determination, or settled separately from a native title claim. An ILUA can be negotiated and registered whether there is a native title claim over the area or not.

The study areas are not currently encompassed within any active or finalised claim.

2.2 NSW State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act), together with the *National Parks and Wildlife Act 1974*, form an integrated system for managing environmental heritage in NSW.

The *Environmental Planning and Assessment Act 1979* (EP&A Act) requires that environmental and heritage impacts are considered by consent authorities prior to granting development approvals. The relevant sections of the EP&A Act are:

- Part 4: Development that is state significant and requires consent under consideration of environmental planning instruments.
- Part 5: An assessment process for activities undertaken by Public Authorities and for developments that do not require development consent but an approval under another mechanism.

Should the future development of the Riverstone East Precinct be assessed under Part 4 of the EP&A Act, the development would be subject to local approval, integrated approvals, and permits and/ or consents under the *National Parks and Wildlife Act 1974*, in relation to Aboriginal heritage. The development would also remain subject to the provisions of local and regional planning instruments (such as Local Environmental Plans, Development and Control Plans and State Environmental Planning Policies).

2.2.2 National Parks and Wildlife Act 1974

The *National Parks and 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 the Environment, under Section 84 of the Act.

It is an offence to disturb Aboriginal objects or places without a permit authorised by the former Director-General of the OEH. In addition, anyone who discovers an Aboriginal object is obliged to report the discovery to OEH.

The operation of the NPW Act is administered by OEH. With regard to the assessment of Aboriginal cultural heritage, OEH has endorsed the following guidelines:

- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010).*
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (2010).*
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010).*
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (2011).*

The NPW Act also established the Aboriginal Heritage Information Management System (AHIMS), a database of known Aboriginal heritage places and sites in NSW.

2.2.3 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* allows for the transfer of ownership to a Local 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.

There were no landholdings classed as crown land within the Riverstone East precinct.

2.3 State Environmental Planning Policies

The preparation of a Precinct Plan for the study area involves amendments to the Sydney Growth Centres State Environmental Planning Policy (SEPP) in order to rezone areas within the Blacktown LGA.

3 EXISTING ENVIRONMENT

This section explores the landscape and landforms within the study area. The type of landscape, geomorphic history and extent of disturbance within a given area all play a role in the presence and/or preservation of Aboriginal objects. As outlined in OEH's Code of Practice, this section aims to assist in the determination or prediction of:

- The potential of the landscape, over time, to have accumulated and preserved objects.
- The ways Aboriginal people have used the landscape in the past, with reference to the presence of resource areas, surfaces for art, other focal points for activities and settlement.
- The likely distribution of the material traces of Aboriginal land use based on the above.

To investigate these three aims, this section focuses on environmental variables, including hydrology, geology and soils, landforms, flora and fauna, and previous disturbance, which impacts on the likely survival of Aboriginal cultural remains.

3.1 Landscape Characteristics

3.1.1 General

The study area is located in the Cumberland Plain sub-region of the Sydney Basin Bioregion. Bioregions are relatively large land areas characterised by broad, landscape-scale natural features and environmental processes that capture large-scale geophysical patterns at an ecosystem scale. Sub-regions delineate significant geomorphic patterns within a bioregion, and are based on finer differences in geology, vegetation and biophysical attributes (Thackway & Cresswell, 1995).

The Cumberland Plain is characterised by the gently undulating shale-based landscape of western Sydney that naturally supports grey box, forest red gum, narrow-leaved ironbark woodland with some spotted gum on the shale hills and swamp oak in low-lying flood-prone areas (National Parks and Wildlife Service, 2003).

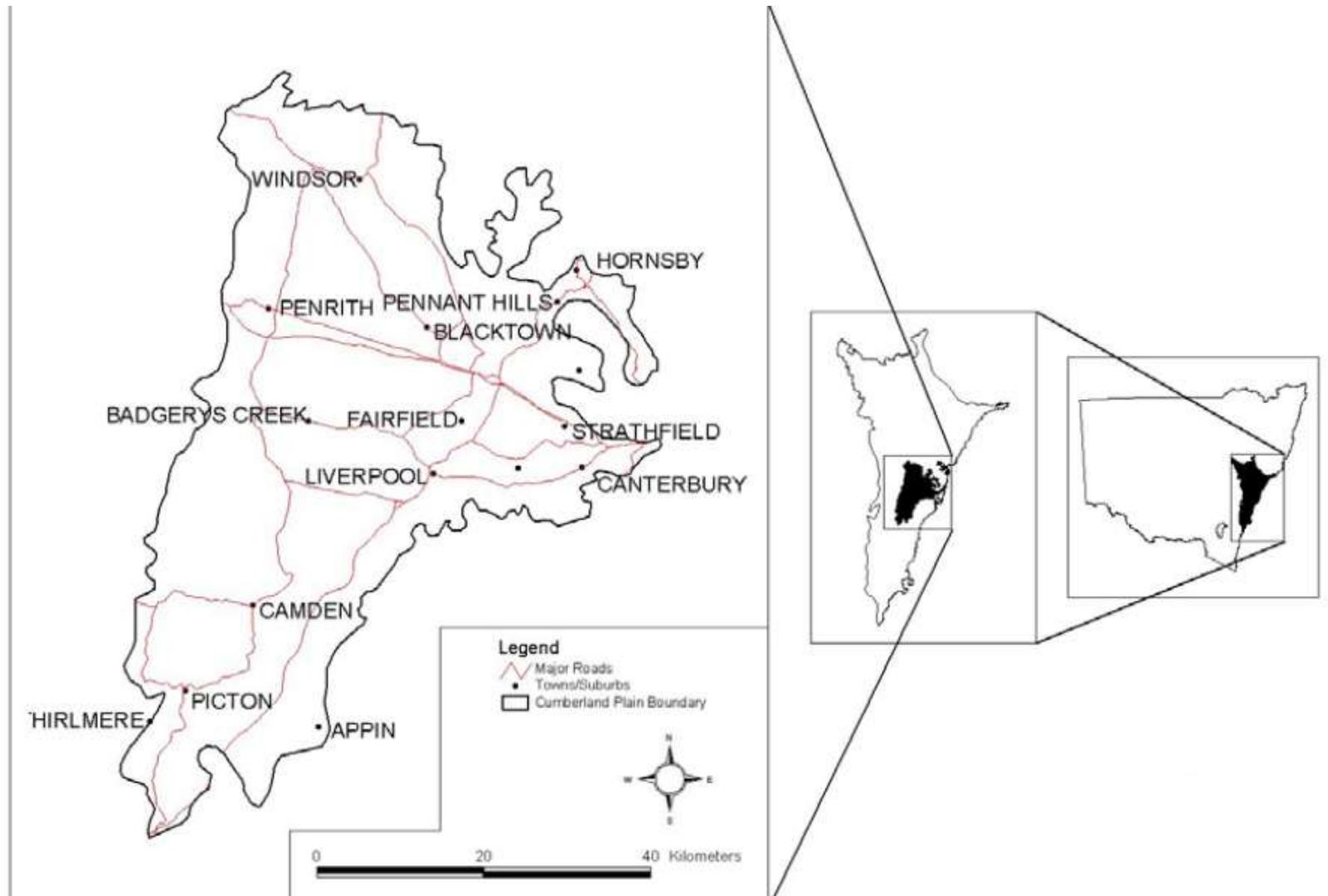


Figure 2. The Cumberland Plain sub bioregion. (Source: NSW NPWS May 2002).

3.1.2 Hydrology

The Cumberland Plain is drained by four major creeks: Second Ponds Creek drains the north eastern portion of the lowlands, South and Eastern Creeks drain the central area and Rickabys Creek crosses through the north western corner. The majority of the Cumberland Lowlands is within easy access (less than 500m) of water. First Ponds Creek, which flows in a northerly direction towards the Hawkesbury River, forms the western boundary of the study area (**Figure 3**). Second Ponds Creek flows parallel with First Ponds, located approximately 1km east of the study area. Several minor low order drainage channels and tributaries are located throughout the study area, which either represent ephemeral flood channels, or man-made drainage lines designed to drain the swampy soils.

As well as providing drinking water, First Ponds Creek would have supported diverse plant and animal resources. Flooding may have had significant impacts on any archaeological material present within the fluvial deposits adjacent to this water source. Depending on the extent and strength of the floodwaters, they may have led to burial, displacement and/or erosion or scouring of cultural materials on or near the surface.

3.1.3 Geology and Soils

The dominant geology in the western Cumberland Plain area is fairly consistent and the subregion is characterised by common geological attributes (Bannerman & Hazelton 2011). Triassic Wianamatta shales form the undulating to low hilly landscapes that characterise the subregion. There are minor proportions of Triassic sandstones, Cainozoic sedimentary deposits and Quaternary alluvials.

The soil landscapes of the Cumberland Plains are also fairly consistent. The soil profiles can be broadly described as red acidic texture contrast and acidic yellow mottled duplex. The study area is characterised by two soil genesis types: fluvial (South Creek landscape) and residual (Blacktown landscape) (Figure 4). The soil landscape data available further supports the results indicated by the hydrology, i.e. that the Riverstone East Precinct contains (or would have, prior to modern farming drainage practices) regularly inundated fluvial land (**Figure 4**). Such soil landscapes indicate that the distribution of archaeological material is likely to be highly complex due to the impact of flooding on erosion and the re-working of sediments.

These geomorphic features are common across the northwest Cumberland Plain, and restrict the type and form of Aboriginal sites potentially present within the subject area. Specifically, there is low potential for sites associated with sandstone geology, such as rockshelters or rock engravings, since this type of geology is not present.

Conversely, the presence of a large amount of silcrete boulders and fragments is commonly found on the ridges and terraces associated with these soil landscapes, as silcrete is a key raw material for stone tool production. Sites consisting of surface and buried artefactual material are prevalent in these areas. Approximately 70% of known potential raw material sources are located in the northern and north-western suburbs of the Sydney region (AHMS 2009), comprising silcrete, quartz, quartzite, silicified wood, indurated mudstone/tuff/chert, and igneous materials. Sources local to the study area include silcrete quarries at Plumpton Ridge and Riverstone.

3.1.4 Landforms

This section provides information on the landforms that occur within the study area. Landforms are a combination of geomorphological, vegetation, slope, aspect and elevation features, which provide a series of discrete units that can be used to delineate the assessment areas. Landform types may include:

- Flats: generally a landform occurring adjacent to creeks and retaining less than 3% slope angle. Frequently these types of landforms consist of deeper soil profiles through the ongoing deposition on these landforms from the associated creeklines;

- Slopes: are a wide ranging landform that can be further delineated into lower, mid and upper slopes. Slopes are differentiated through slope angle, with lower slopes being of key archaeological interest, since they are depositional rather than erosional;
- Ridgelines: a flat or very gentle linear landform, which is identified through elevation above the general landscape and its position at the top of a series of slopes:
- Spurs: a landform that is defined through elevation and being surrounded by slopes. Unlike ridgelines, these landforms reveal a clear change of angle between the spur and surrounding slopes. Frequently, this landform is associated with adjacent ridgelines and/or adjacent creeklines; and
- Creeklines: a linear landform that retains and moves water through the assessment areas, generally found in low lying areas, in the base of valleys and within hill depressions.

As will be discussed in other sections of this assessment, landform types (such as slopes, flats, ridgelines) are important features in predicting archaeological site distribution patterns. The landscape of the western Cumberland Plain is generally gently undulating to low hilly landscapes with dissected plateaus in the south. The average altitude for the ASL for the Cumberland Plain is less than 100 m ASL. The study area is composed predominantly of flat land and lower slopes ranging from 30-60m ASL in association with minor waterways and drainage channels. There are some prominent ridgelines and hill crests.

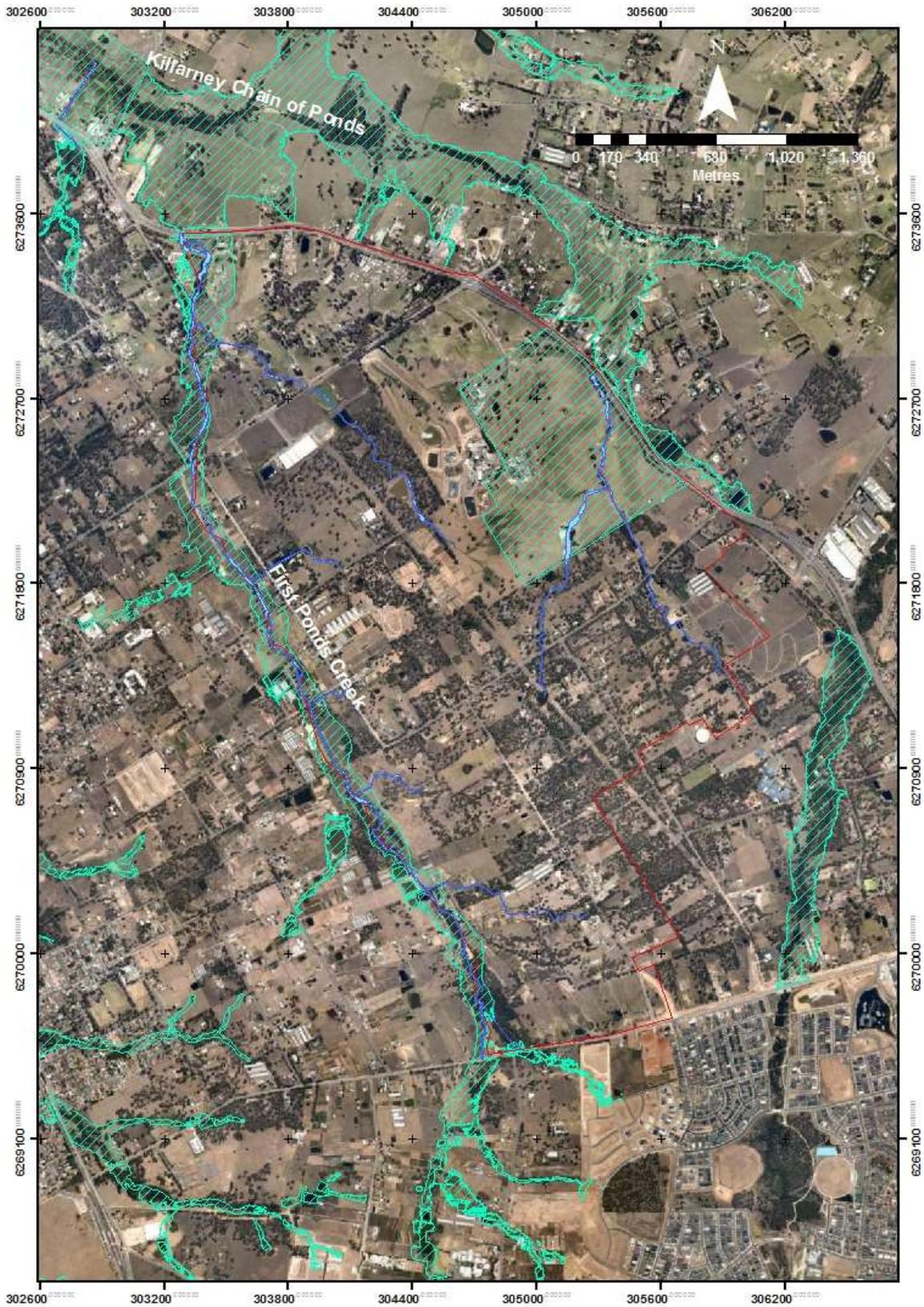


Figure 3. Hydrology of the Riverstone East Precinct.

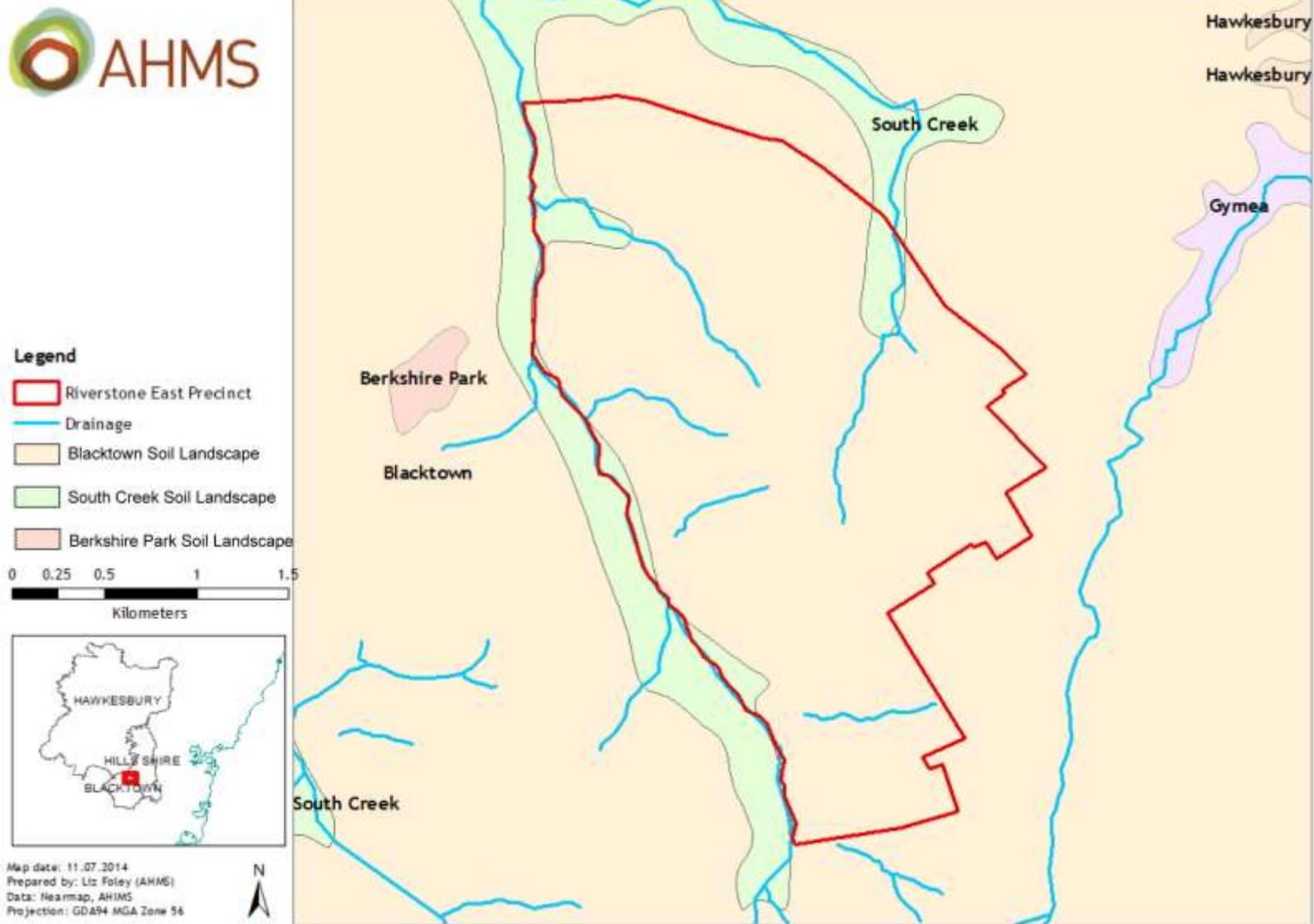


Figure 4. Mapped soil landscapes and drainage lines within the study area.

3.1.5 Flora and Fauna

The natural vegetation of a landscape is an important consideration, because it provided Aboriginal people with resources. Bark from trees could be stripped to make canoes, shields and other items. The vegetation itself provided food resources such as edible plants and also habitats for animals such as possums and birds which could be hunted. First Ponds Creek, within the west of the study area, would have supported diverse floral and faunal populations, providing resources for the local Aboriginal people.

A range of native vegetation communities typical of the Cumberland Plain have been mapped through a combined approach of aerial photography and computer modelling, supported by a representative sample of site surveys.

There are three communities that have been mapped as occurring within the Riverstone East Precinct (NPWS 2002). These include the following:

- Shale Plains Woodland. Key species: *Eucalyptus moluccana* and *E. tereticornis* with frequent small trees and shrubs. This is the most common vegetation community within the Cumberland Plain region and is typical of Shale derived and alluvial soils on landforms that are subject to frequent flooding.
- Alluvial Woodland. Key species *E. amplifolia*, *E. tereticornis* and *Angophora floribunda*, with some smaller trees and sparse shrubs. Alluvial Woodland is associated with minor waterways and Wianamatta Shale soils. This community is most prevalent within the study area along First Ponds Creek.
- Shale Sandstone Transition Forest. Key species *E. punctata*, *E. crebra*, *Corymbia gummifera* and *Syncarpia glomulifera*, with a diverse range of shrubs. This community occurs on the edges of the Cumberland Plain near the boundary between shale and sandstone based geologies. The presence of this vegetation in the south east part of the study area surrounding an unnamed creek indicates the potential for some landforms associated with sandstone country, i.e. sandy rises and rockshelters.

Clearing of native vegetation in the Cumberland Plain region has been extensive since European settlement. It has been estimated that only 2% of the modelled pre-contact vegetation distribution remains intact within the Blacktown LGA (NPWS 2002).

Areas of remnant vegetation provide an indication of areas that have not been extensively cleared or used in the historical period. These vegetation areas can therefore be considered as undisturbed, and have greater potential for Aboriginal objects to survive. However, due to the focus of computer modelling for mapping the distribution of remnant vegetation, NPWS promote ground-truthing in order to corroborate the presence or absence of native vegetation for site specific studies.

3.2 Previous Disturbance

The historical development and previous disturbance of the subject area was analysed as part of a review of aerial photography in combination with information provided by the DPE. It was found that disturbance of the subject area had been extensive, and included:

- Vegetation clearance and subsequent land de-stabilisation across much of the subject area.
- Use of the subject area for pastoral and grazing activities for over 150 years. This included the installation of fences, ditches, tracks, farm dams, and other activities. As part of this process, many of the minor drainage lines throughout the study area have been dammed, and previously swampy ground would have been drained;
- Use of parts of the study area for agriculture and horticulture, particularly the development of market gardens;
- Residential expansion, particularly within the last decade, including service installations such as road upgrades, sewerage pipes and power-lines;
- Minor industrial works such as poultry sheds and an abattoir.

3.3 Conclusions and Archaeological Implications

Based on the information presented in **Sections 3.1-3.2**, a number of conclusions in relation to the cultural deposits of the subject area can be made:

The landscape characteristics suggest that the area would have been attractive to Aboriginal people for two main reasons:

1. the geology and soil profile have extensive silcrete nodules and boulders, a raw material widely used for stone tool production; and
2. the permanent water supply of First Ponds Creek running adjacent to the entire western border of the precinct.

The geology and soil profile reduce the likelihood of site types associated with sandstone geology, such as rockshelters and rock engravings, to be present. The removal of vegetation in the 19th/20th Centuries also makes the survival of any culturally scarred trees unlikely, although there are cases of culturally scarred trees remaining as sole surviving trees in cleared paddocks elsewhere in the state. Given the dominance of natural silcrete outcrops, it is considered that prevalent surviving cultural materials would include stone tools and dominated by this raw material type.

The soil profile of the study area is likely to comprise of shallow duplex soils (<70cm deep). In these types of profile, cultural material is usually constrained to the upper A horizon, which is prone to heavy disturbance and truncation through even minor historical disturbance. Extensive parts of the subject area have been flooded in the past, and this would likely have led to deposition, re-working and erosion of the soil profile and any associated cultural materials.

4 ABORIGINAL COMMUNITY CONSULTATION

Consultation with the Aboriginal communities within the region has been undertaken in accordance with procedures set out in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (the guidelines), developed by OEH. The Guidelines have six broad phases:

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

The consultation process for this project has two aims: 1) to comply with the OEH notification and consultation procedures to obtain input on our proposed assessment methodology and comment on our assessment report and management recommendations (**Section 4.1**); and 2) to identify cultural places and values that may be affected by the proposed future development of the site through consultation with knowledge holders (**Section 4.2**).

To enhance an understanding of cultural places and values within the Riverstone East Precinct, a more targeted consultation aimed at achieving this second aim was undertaken. This included a series of focussed discussions to elicit information about individual experiences of the area, and broader discussions on cultural significance pertaining to the broader Aboriginal community within these areas. A detailed account can be found within **Sections 4.2** and **5.2** of this report.

4.1 Aboriginal Community Consultation Stages

A complete log of actions and correspondence regarding Aboriginal community consultation is included in **Appendix 2**.

4.1.1 Pre-Notification Stage

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. On 18 March 2014, the following organisations were contacted with a request for information:

- Office of Environment and Heritage.
- Deerubbin Local Aboriginal Land Council (LALC).
- Office of the Registrar, Aboriginal Land Rights Act 1983.
- National Native Title Tribunal.
- NTSCorp.

- Blacktown City Council.
- Hawkesbury City Council.
- Hawkesbury-Nepean Catchment Management Authority.

In summary, the following groups and individuals were identified as possibly having an interest in the subject area:

- Deerubbin Local Aboriginal Land Council.
- Darug Custodian Aboriginal Corporation.
- Darug Tribal Aboriginal Corporation.
- Darug Aboriginal Cultural Heritage Assessments.
- Darug Land Observations.
- Darug Aboriginal Landcare.
- Gunjeewong Cultural Heritage Aboriginal Corporation.
- Tocomwall.
- Amanda Hickey Cultural Services.
- Warragil Cultural Services.
- Wurrumay Consultancy.
- HSB Heritage Consultants.

4.1.2 Notification and Registration of Interest

On 15 April 2014, a notice was placed in the *Blacktown City Sun*; and on 16 April 2014, a notice was placed in the *Hawkesbury Gazette*. The adverts provided notification of the project, and an invitation to register an interest. On 4 April 2014, notifications and invitations to register were also sent directly to the Aboriginal Parties identified in the first stage of consultation, listed above.

Registrations of interest were received from the following Aboriginal Parties:

- Deerubbin Local Aboriginal Land Council.
- Darug Custodian Aboriginal Corporation.
- Darug Aboriginal Cultural Heritage Assessments.
- Darug Land Observations.
- Tocomwall.
- Gunjeewong Cultural Heritage Aboriginal Corporation.
- Philip Khan.
- Tony Williams.
- Shane Williams.
- Darren Williams.
- Andrew Williams.

In accordance with Section 4.1.6 of the Guidelines, details of the Registered Aboriginal Parties (RAP) were provided to OEH and Deerubbin LALC on 2 May 2014.

4.1.3 Presentation of Information and Proposed Methodology

On 30 April 2014, in accordance with Sections 4.2 and 4.3 of the Guidelines, project information and the proposed ACHA methodology were distributed to the RAPs. The cover letter and report provided information about the proposal, the proponent, assessment approaches and processes, timeframes and the proposed field investigation. In addition the letter sought 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.

A period of 28 days was provided for comments in accordance with the Guidelines. All responses were supportive of the methodology, and are included in **Appendix 2**.

4.1.4 Field Investigation

Field investigation was undertaken by AHMS in conjunction with RAP representatives between the 5th and 12th June 2014. Representatives from all RAP organisations or family groups participated in the field program (**Table 1**). The site investigation is described in detail in **Section 7**.

Table 1. Representatives from the Registered Aboriginal Parties that participated in the field survey

Registered Aboriginal Party			Field representative/s	Dates present
Darug Aboriginal Heritage Assessments	Cultural		Gordon Morton Tim Wells	Thursday 5, Friday 6, Wednesday 11 & Thursday 12 June 2014
Darug Land Observations			Gordon Workman Paul Goddard Jamie Workman	Thursday 5, Wednesday 11, Thursday 12 & Friday 13 June 2014
Gunjeewong Aboriginal Corporation	Cultural Heritage		Cherie Carroll Turrise Bruce Turrise	Wednesday 11 – Friday 13 June 2014
Tocomwall			Ricky Fields	Thursday 5, Friday 6, Thursday 12 & Friday 13 June 2014
Deerubbin Local Aboriginal Land Council			Steven Randall Kayne Moreton Steven Knight Rivers McEwan	Tuesday 10 June 2014
Darug Corporation	Custodian Aboriginal		Justine Coplin	Thursday 5, Friday 6, Thursday 12 & Friday 13 June 2014
Shane Williams			Shane Williams	Wednesday 11 June 2014
Kamilaroi-Yankuntjatjara			Philip Khan	Friday 6 June 2014

4.1.5 Report Review

On 21 June 2014, a summary report of the results of the field investigations was provided to all RAPs.

This report was provided to the RAPs on 18 December 2014 and a period of 28 days provided for comment. Two sets of comments were received from Tony Williams and DCAC, both supportive of the report and recommendations.

4.2 Cultural Values Recording

The original intent behind the separation of the assessment documents into two components – the Archaeological Technical Report and the Aboriginal Cultural Heritage Assessment – was to ensure that an Aboriginal ‘voice’ was present and heard by the regulators and decision makers. However this has not always been achieved, especially in areas such as western Sydney where Aboriginal groups have become accustomed to focussing on archaeological sites (Byrne and Nugent 2004).

To help identify Aboriginal cultural places and values within the Riverstone East precinct, an invitation was extended (email 20 June 2014), to RAPs to contribute their knowledge through an interview/focussed discussion and mapping exercise. This further consultation sought to develop an understanding of places of significance within the area, as well as associated cultural values and stories attached to the area, ranging from historical events to more contemporary connections. Following registration of interest, a series of individual and group interviews were organised to discuss cultural values and map significant places within and around the Riverstone East precinct. While respondents were given the option of meeting as a focus group or being interviewed individually, in most cases they chose to participate in pairs. These discussions were conducted as detailed below:

Registered Aboriginal Party		Field Representatives	Dates	AHMS Representatives
Darug Cultural Assessments	Aboriginal Heritage	Celestine Everingham Gordon Morton	Wednesday 9 July 2014	Michelle Lau Nalisa Neuendorf
Darug Observations	Land	Gordon Workman Shauna Locke	Monday 7 July 2014	Michelle Lau Nalisa Neuendorf
Gunjeewong Heritage Corporation	Cultural Aboriginal	Cherie Carrol Turrise Bruce Turrise	Friday 4 July 2014	Michelle Lau Nalisa Neuendorf
Darug Aboriginal Corporation	Custodian	Leanne Watson Justine Coplin	Thursday 10 July 2014	Michelle Lau Nalisa Neuendorf Billy Griffiths
Tony Williams		Tony Williams	Tuesday 8 July 2014	Michelle Lau Nalisa Neuendorf

The results of these discussions are further discussed in **Section 5.2**.

5 ETHNOGRAPHY AND CULTURAL VALUES

5.1 A Further Approach to Ethnographic Research

To assist in the development of Aboriginal Cultural Heritage Assessments, AHMS has initiated a mapping project to explore early historical texts and diaries to identify spatial locations where Aboriginal activities were observed. The AHMS project 'Mapping Sydney's Aboriginal Past' provides a spatial understanding of Aboriginal activity around the temporal point of contact. It consists of an interactive map, a searchable database of site-specific ethnographic evidence, and a range of other tools which bring a spatial perspective to the primary sources.

The database was created by systematically reviewing the early primary sources for the Sydney region and plotting any site-specific ethnographic evidence on an interactive map. The area of study extended from the Hunter River in the north to Jervis Bay in the south, and as far west as the Lachlan River. The sources consulted range from James Cook's visit to Botany Bay in 1770 through to Missionary James Backhouse's visit to the colony in 1835-1837. In total, this project reviewed over fifty primary sources, including all major First Fleet journals and all relevant volumes of the Historical Records of Australia.

The criteria for adding information to the database was threefold. It needed to:

- i. be from a primary source;
- ii. contain evidence of Aboriginal activity; and
- iii. be able to be pinned down to a specific point or a small area on a map.

Each entry was recorded using the same structure, including a quick summary remark, key words, location information, quotes and references, and additional details and interpretation.

The survey produced over two hundred and seventy plotted markers, with an average length of five hundred words per entry. These included seven Aboriginal tracks, covering a combined distance of over one hundred kilometres, and thirty-five historical paintings and engravings. The database also includes sixteen historical maps overlaid onto the Sydney area, archaeological site data, and the locations and 'boundaries' of particular 'tribes' and 'clans' as interpreted by Val Attenbrow (2010), Arthur Capell (1970), Mulvaney & White (1987), James Kohen (1993) and Anne Ross (1988).

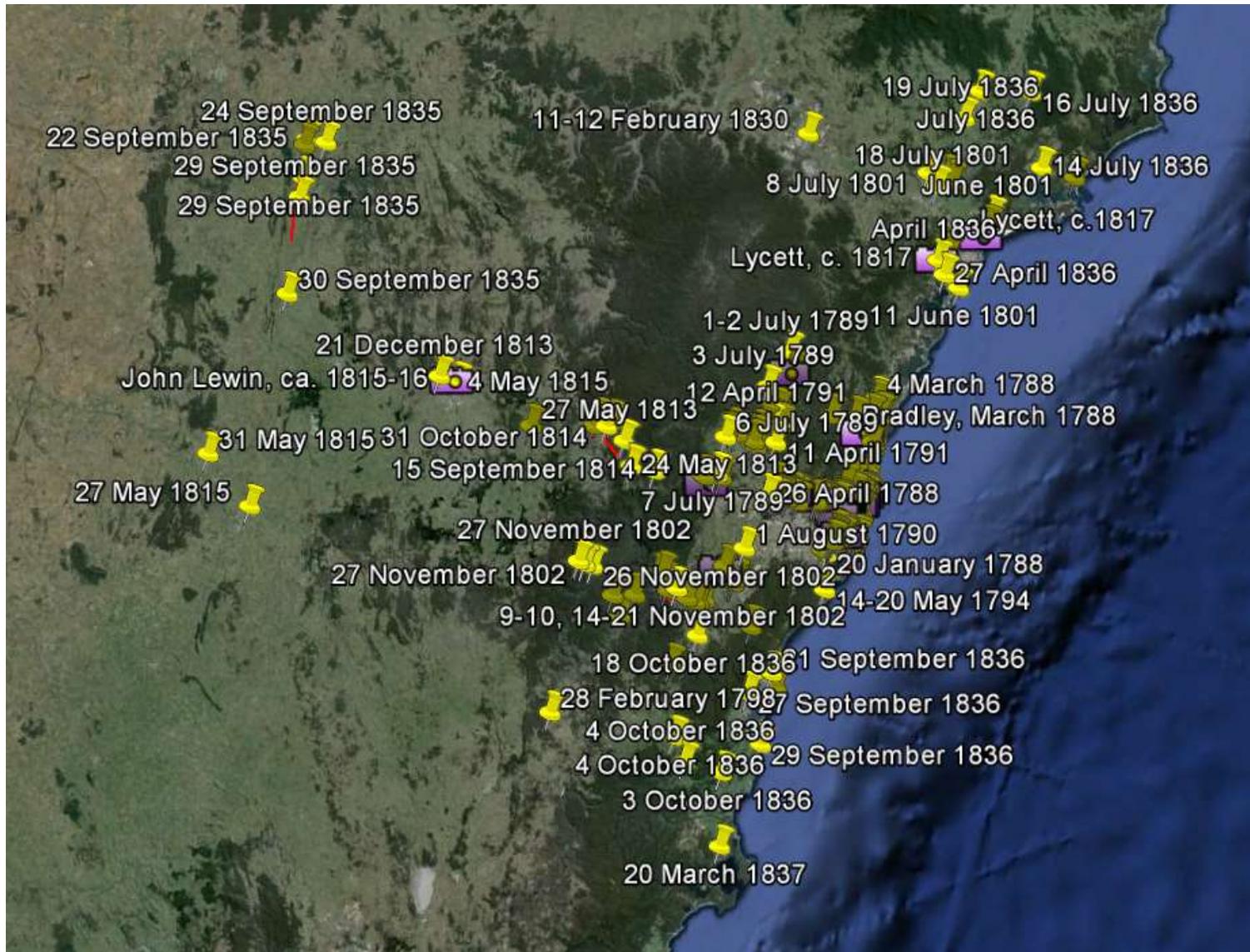


Figure 5. An overview of AHMS' ethnographic mapping program.

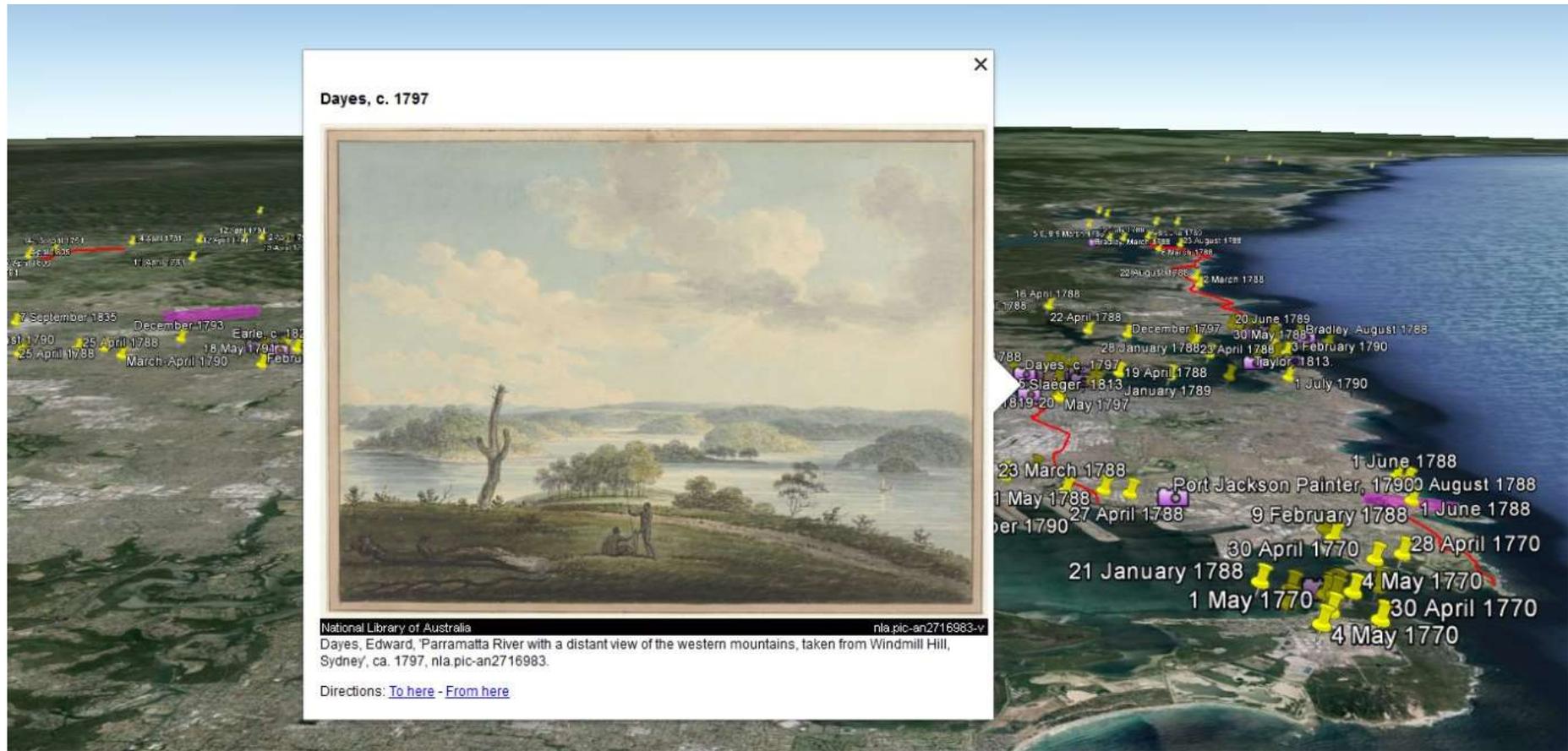


Figure 6. An example of some of the information within the AHMS' ethnographic mapping program.

5.1.1 A Summary of Findings

Over thirty separate Aboriginal groups populated the wider Sydney area in 1788, each with their own country, practices, diets, dress, and dialects. We now know of these groups as 'clans' and each identified with broader cultural-linguistic groups known as 'tribes': Darug, Darkinjung, Gundungarra, Tharawal, Guringai (Coastal Darug), Eora (Coastal Darug) and Awabakal.

Each clan of thirty to fifty people lived within their own territory, occasionally converging with other clans to trade, hunt, fight, feast, arrange marriages, conduct ceremonies, resolve disputes, and share information. The database includes details of a gathering of three clans on their way to Camden to learn a new song (Backhouse, 1843), Burramattagal people venturing out to Manly to feast on a beached whale (Tench, 1793), and groups of hunters near Carabeely cooperating on a large-scale kangaroo hunt (Barrallier, 1802). There was often tension between neighbouring groups and the boundaries between territories were not lightly traversed (White 1788). On an expedition north-west of Parramatta, Watkin Tench records that his guides Colebee (Gadigal) and Ballederry (Burramattagal) quickly found themselves in 'country unknown' and that they described those who lived there as 'enemies'. When the party finally reached the Hawkesbury River, Tench (1791) surmised that 'Our natives had evidently never seen this river before'.

The interactive map reveals a landscape criss-crossed with Aboriginal paths, many of which later became roads. Missionary James Backhouse was amazed by the speed and sophistication of communication between clans; on 23 October 1835 he encountered Aboriginal people in Richmond who knew of his brief visit to Wellington, over three hundred kilometres away: 'Our persons, costume, and many other particulars, including our manner of communicating religious instruction, had been minutely described' (Backhouse, 1843, p. 339).

The same paths that wove these communities together rapidly spread the small pox virus throughout the region in 1789. The devastating outbreak of small pox forced major reorganisation amongst clan groups. When William Bradley sailed into Sydney in May 1789, he recorded the 'dreadful havock' that small pox had wrought amongst Aboriginal communities: 'we did not see a Canoe or a Native the whole way coming up the Harbour & were told that scarce any had been seen lately except laying dead in & about their miserable habitations' (Bradley, 1969). Traditional burial practices broke down and clans merged together as entire communities were taken by the virus (Hunter, 1793). Bodies were found in caves and by streams, around the harbour and all along 'the path between Port Jackson & Broken Bay' (Bradley, 1969). The impact of small pox continued to ripple across the country, reducing communities in the Hunter 'from about 200, to 60' (Backhouse, 1843, p. 401).

The primary sources offer only glimpses of the ceremonial life of these Aboriginal communities. Europeans recorded some Aboriginal customs, such as the avulsed teeth and 'scarifications' of certain initiated men, and the kangaroo teeth necklaces and the missing little finger joints of 'mountaineer' and coastal women. But, due to the secrecy surrounding ceremonial events, there are serious limitations to even the most richly described accounts like the 'Yoo-long Erah-ba-diang' initiation ceremonies Collins records at the head of Farm Cove and in the 'middle harbour' (Collins, 1798); the contests and dances conducted on 'a clear spot between the town and the brickfield' (Collins, 1798); and the operation performed by Yellomundee, a 'caradyee', on Colebee's wound on the banks of the Hawkesbury (Tench, 1791).

Those clans that lived along the coast were saltwater people. They harvested shellfish from the shore; men fished from the shallows with long four-pronged spears, while the women fished in bark canoes using turban shell hooks and lines. The hunters' toolkit included clubs, boomerangs, womeras, spears tipped with shell, and, of course, fire. At times they stayed for several months in the one area: Joseph Banks (1998) records finding 'a small village consisting of about 6 or 8 houses' on the south shore of Botany Bay in April 1770, and in December 1790, Watkin Tench describes a similar 'little village (if five huts deserve the name)' on the north side of the bay. Botany Bay was a focal point of Aboriginal activity; it has the highest density of plotted ethnographic sources in the Sydney area.

The inland clans fished for mullet and eels in rich lagoons, but much of their food came from yams dug out from the river banks and worms known as 'cah-bro' extracted from river driftwood. Colebee and Ballederry called these people the 'climbers of trees' after their practice of skilfully ascending gums in pursuit of animals, cutting footholds in the trunks with a stone axe. More hunting traps were plotted in the area from Parramatta to Richmond than any other part of Sydney. These included 'bird decoys' full of feathers, hollowed-out trees, and a tapering chute at the foot of Richmond Hill 'between forty and fifty feet in length', constructed of earth, weeds, rushes, and brambles (Collins, 1798).

Fire was a constant presence in early Sydney, from the 'moving lights' seen on the harbour at night (Banks, 1998, p. 243) to lone trees burning on the Cumberland Plain, 'the smoke issuing out of the top part as through a chimney' (White 1788). 'In all the country thro' which I have passed,' wrote Arthur Phillip in May 1788, 'I have seldom gone a quarter of a mile without seeing trees which appear to have been destroyed by fire' (Phillip, 15 May 1788). The first Australians became known as the 'fire-makers' (Cox, 1815). They used fire to open paths and to clean country; to drive animals into the paths of hunters and then to cook the kill; to keep warm at night and to carry as a torch the next day; to treat wood, melt resin and crack stone for tools; to gather around and dance and share stories.

The interactive map gives us an insight into local burning regimes. On a hot dry day in September 1790, for example, David Collins observed Aboriginal people 'burning the grass on the north shore opposite to Sydney, in order to catch rats and other animals' (Hunter, 1793). Almost exactly twelve months later, on 31 August 1791, they were again 'firing the country' in the same place on a hot day ahead of heavy rains. While Collins regarded this to be another 'remarkable coincidence', it suggests a connection to the land and an understanding of the seasons which the settlers could not fathom. This dismissive approach proved devastating during 1799 flood of the Hawkesbury. Settlers who ignored the flood warnings given by Aboriginal people were engulfed by a destructive torrent as the 'river swell'd to more than fifty feet perpendicular height above its common level' (Collins, 1798).

After contact, early Sydney remained, in the words of historian Grace Karskens, 'an Eora town' (Karskens, 2009, p. 351). Crowds of Aboriginal people would flow through the settlement at Sydney Cove, eating in the yard of Government House, sharing a table with the Governor himself, or gathering at Bennelong's hut. Large parties of convicts paid regular visits to an Aboriginal family in Woolloomooloo, 'where they danced and sung with apparent good humour' (Collins, 1798). A short-lived fish trade sprang up in Parramatta, with Aboriginal people selling fresh bream and mullet for bread and salted meat (Collins, 1798). Fierce warfare broke out on the Hawkesbury. And clans came 'not less than one Hundred Miles' to attend Governor Macquarie's 'Annual Meeting of the Natives' at Parramatta. Each of these events makes up a single plotted marker in the ethnographic database. Combined they knit together a rich tapestry of Aboriginal activity around early Sydney.

All of the Hawkesbury Local Government Area lies within the traditional country of the Darug language group of Aboriginal people. The extent of the traditional territory of the Darug people can be interpreted as largely co-incident with the Cumberland subregion of the Sydney Bioregion (Brown, 2010; Attenbrow, 2002).

The Cumberland Plain Woodland, particularly when it would have had a fire managed understorey dominated by grasses, had greater game resources (grazing and browsing mammals such as kangaroos and possums) than in surrounding sandstone areas. The freshwater creeks (such as Eastern and Second Ponds), wetlands and rivers (Hawkesbury-Nepean in the west and north and Georges in the south) were also known to be fundamental to the Darug subsistence economy. The existence of different foraging strategies used by people identifying as a separate cultural group to those on the coast was described in some detail by David Collins in the early years of European settlement (Collins, 1798, pp. Vol 1, Appendix IV):

The natives who live in the woods and on the margins of rivers are compelled to seek a different subsistence [to those on the coast], and are driven to a harder exercise of their abilities to procure it. This is evinced in the hazard and toll with which they ascend the tallest

trees after the opossum and flying squirrel [gliders]. At the foot of Richmond Hill, I once found several places constructed expressly for the purpose of ensnaring animals or birds.

...By the sides of lagoons I have met with holes which, on examining, were found excavated for some space, and their mouths so covered over with grass, that a bird or beast stepping on it would inevitably fall in, and from its depth be unable to escape.

In an excursion to the Hawkesbury, we fell in with a native and his child on the banks of one of the creeks of that noble river. We had Cole-be with us [a Cadigal clansman from the coastal sandstone country of Sydney's east], who endeavoured, but in vain, to bring him to a conference; he launched his canoe, and got away as expeditiously as he could, leaving behind him a specimen of his food and the delicacy of his stomach; a piece of water-soaked wood (part of the branch of a tree) full of holes, the lodgement of a large worm, named by them cah-bro [cobra or Teredo spp.; a type of burrowing mollusc known as shipworm]

...They resort at a certain season of the year (the month of April) to the lagoons, where they subsist on eels which they procure by laying hollow pieces of timber into the water, into which the eels creep, and are easily taken.

These wood natives also make a paste formed of the fern-root and the large and small ant bruised together; in the season they also add the eggs of this insect.

Within the considerable territorial extent of the Darug, area-specific knowledge was held and transmitted within separate clan groups. On the basis of a review of historical documents presented by Attenbrow (2010), Hunter (1791), Kohen (1993) and Goodrum (1987), two different clan groups may have been active in the study area – the Gomerrigal or Gomerigal, also referred to in the literature as the 'South Creek Tribe', described as inhabiting the land to the west of the Riverstone East Precinct. Historic records also refer to the 'Buruberongal' to the south east, and the north east of the study area.

Western Sydney is also currently home to a large contemporary Aboriginal community, most of whose pre-1788 ancestors were from outside of the Sydney area, but whose current sense of community and engagement with Aboriginal cultural heritage is often directed at their local area as well as places that they may identify in their traditional country. The Blacktown LGA, which includes the study area, has a population of more than 7,000 people identifying as either Aboriginal or Torres Strait Islander, representing 2.7% of the total community (Australian Bureau of Statistics). Through the *Aboriginal Land Rights Act 1983*, representation of much of this community in Aboriginal cultural heritage matters is through the system of Local Aboriginal Land Councils. Consequently, Aboriginal stakeholders considered to be important in the process of community consultation may be involved either as traditional owners (in this case Darug) or through the LALC (Deerubbin).

5.1.2 The Study Area

A search of AHMS' ethnographic database reveals no specific observations within the Riverstone East Precinct. However, it does indicate that a number of explorers travelled through the area in the 18th Century, including John Hunter and Watkin Tench in April 1791 (**Figure 7:blue line**); and a later trip by Watkin Tench and William Dawes in May 1791 (**Figure 7:purple line**). During the earlier expedition on the 15 April 1791 (see **Figure 7**), Aboriginal people were observed in the area immediately north west of the study area. Hunter (1793, p. 15 April 1791) records the event as follows:

It was high water in this creek at forty minutes past twelve o'clock, and at half past three, they found it divide into two branches, either of which might have been crossed on a tree; but by this time the party were tired, and threatened with heavy rain, which would make their night

very uncomfortable, as they had no tent; they therefore took up their residence at a spot where a quantity of timber, from trees, which had already been burnt down by the natives, promised them good fires with little labour.

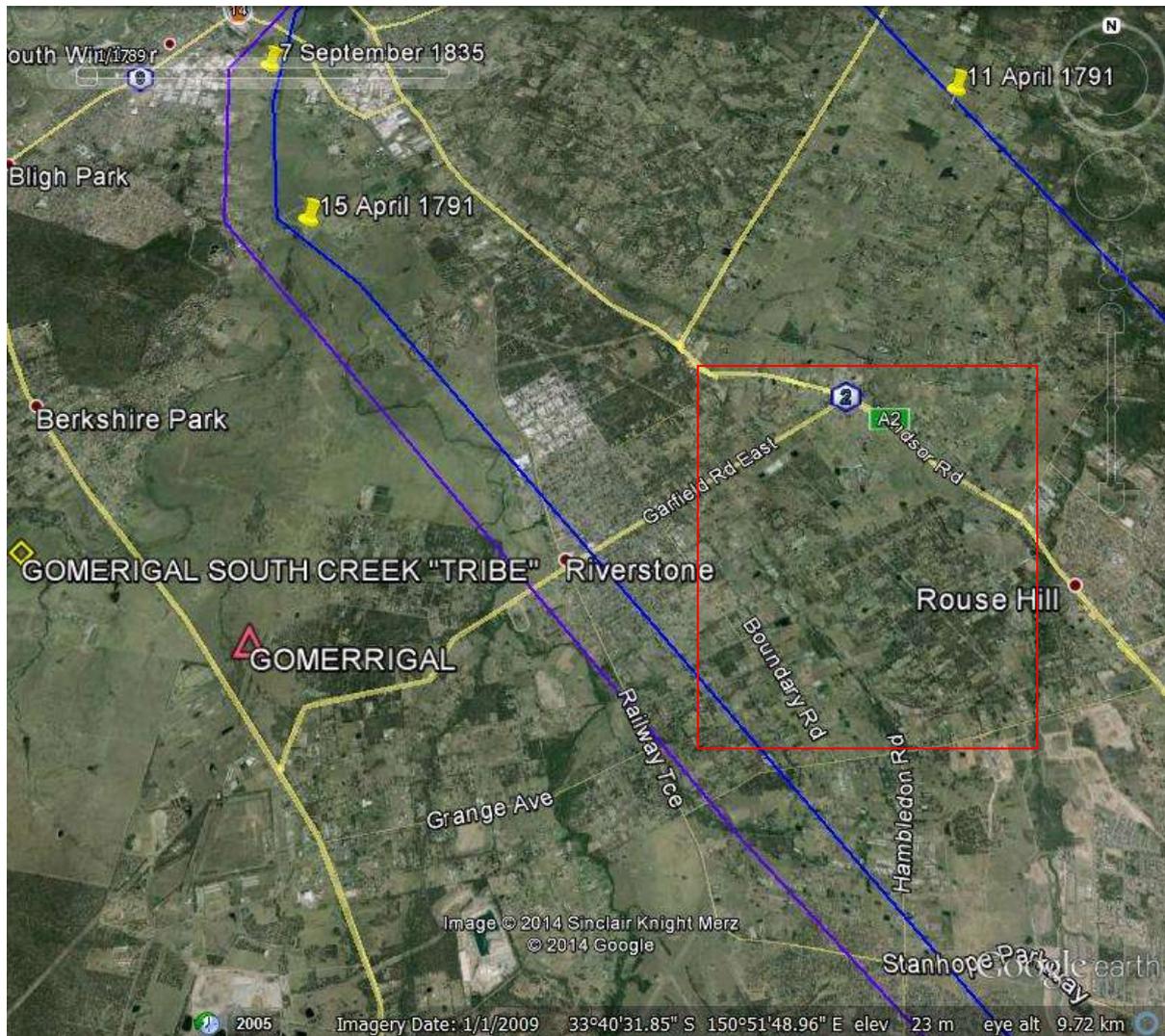


Figure 7. Map of ethnographic observations in proximity to the subject area (shown in red).

5.2 Cultural Values of the Study Area

To enhance an understanding of cultural places and values, a series of focussed discussions to elicit information about individual experiences of the area, and broader discussions on cultural significance were undertaken with interested members of the Registered Aboriginal Parties. As a result of the focus discussions, the individuals interviewed highlighted a historical and continued contemporary connection to the area, particularly with the landscape in and around the Riverstone East Precinct. These connections are varied in nature and highlight the dynamic significance of the landscape to Aboriginal people past and present.

5.2.1 Historical Significance

The Aboriginal history of the area was generally acknowledged by the participants. This included an understanding and acknowledgement of the natural landscape as being rich in resources, diverse in natural wildlife and plant life and particular features such as creeks that were used by ancestors and used by some individuals in recent history, for walking tracks. One particular creek identified by several individuals within the focus discussions was South Creek. South Creek was identified as a walking track and camping area for past Darug and other Aboriginal peoples and as a source of fishing and hunting. South Creek is located approximately 8km west of the precinct.

5.2.2 Contemporary Connections

Contemporary connections have been identified through lived experiences within the area and in relation to their identifying as members of the Darug tribe, associated with the region, and other Aboriginal groups. We have grouped these into several themes that reflect the nature of the connections that the RAPs articulated.

Experiential connection to place

Cherie and Bruce Turrise (Gunjeewong Cultural Heritage Aboriginal Corporation) had specific connections to the area. Neither are Darug people, however both had grown up in the area and Cherie, a Ngunnawal woman, related:

...we used to roam through all this bush here – we used to own the place – cause there was a lot of us. Cousins... we were always together you know, close, one looked after the other...

Cherie's memories help populate the landscape with stories and experiences. Research on the landscapes of childhood reveal that "...almost all adults identify the most significant place in their childhood with the outdoors." (Sebba:1991:395). This is partially because "Children experience the natural environment in a deep and direct manner, not as a background for events, but, rather, as a factor and stimulator... The theoretical analysis suggests that the environment which an adult remembers as significant in childhood was personally experienced without adult mediation and the related experiences were only found in childhood". (*op., cit.*).

A particular feature identified by Cherie Turrise was Marsh's dam in the Riverstone paddocks near the Riverstone meatworks. She remembered:

We used to spend all our summer in that ... us and the dogs, we'd all go up there, you know.

Cherie and Bruce Turrise have strong contemporary connections to the Riverstone area in general however the specific site locations that Cherie and Bruce recall as especially significant to them in Riverstone are close to, but fall outside of the current Riverstone East Precinct boundary.

A site visit to the property owned by Cherie's Uncle Fremo identified that landmark features were still standing in the landscape. A house built by Uncle Fremo's parents in the 1930s is still standing at 151 Perth Street (Lot 40) (**Figure 8, Figure 10**). Cherie remembered Uncle Fremo had built a huge concrete well in the bush across the road from the house that was almost the size of a swimming pool. Evidence of the well could not be found when we revisited the site.

Further west along Perth Street, a large gum tree with a large hollow at the base marks where Cherie and her cousins played on Uncle Fremo's property (**Figure 9, Figure 10**):

I knew we were here when I saw the old tree still standing out the front there on the road ... it used to have a big termite mound in the bottom.

Cherie recalled that the bushland was still, *“just like it used to be, apart from all the tracks and rubbish”, “it even smells the same”, “only difference is the noise from the road”, “still a few birds around”*.

Cherie and Bruce used to rent a property on Hamilton Street (near Ashford Road). They lived there in a tin house and the lady (landlord) they rented it from, lived out the back of the property. Cherie and Bruce used to take a shortcut to the train through the bush across the road (Hamilton Street - Figure 10) to the old Vineyard Station. The track was still visible in the bush from Hamilton Street to the railway, although Vineyard Station has been relocated further north along the railway line.

Cherie recalled where her (non-Aboriginal) grandparents lived on O’Connell Street (near Perth Street) and her aunt’s place on Camberwell Road. Cherie and Bruce also identified that the same neighbours were still living in the place across the road, although some of the children had moved away.

Ecological Knowledge

Gordon Workman (Darug Land Observations) spoke of a *‘spiritual’* connection to the land which is a feature of many indigenous cultures.

Leanne Watson (Darug Custodian Aboriginal Corporation) emphasised that, *“to get the stories from here [Riverstone and Vineyard] you need to follow the seasonal calendar ... it shows you the movements and what people were doing ...”*

Although many of the individuals identified that they did not directly live in the area there were various references to use of the general landscape in and around Riverstone East:

We used to walk across the paddock – it was a shortcut (Justine Coplin, Darug Custodian Aboriginal Corporation).

All of the individuals consulted also made reference to the area being a floodplain and prone to high waters during periods of high rainfall:

...the Jolly Frog ... There was flood water up to the second storey window. (Justine Coplin and Leanne Watson, Darug Custodian Aboriginal Corporation)

The discussions with all of the individuals consulted highlighted a concern for the loss of connection to the land through development impacts to Aboriginal sites and the environment, especially to wildlife, creeks and bushland. Many individuals expressed a connection to the land and culture through their rural upbringing:

And that’s how your place, you know, you just start to lose it – bit by bit by bit, until it goes, really fast now ... but all our good memories and that, when I was a boy, we used to spend our life in the bush (Bruce Turrise, Gunjeewong Cultural Heritage Aboriginal Corporation).

my paddock was a playground with 250 acres ... I was running around ... uncle made me catapults and my other uncles taught me how to fish, and me other uncles showed me about the bird life, like the finches, kookaburras, rosellas ... pewee, magpies, kingfishers, diamond finches, blue wrens ... all the different nests in the hollows of trees (Gordon Morton, Darug Aboriginal Cultural Heritage Assessments).

Impacts to or loss of Aboriginal sites through development was not a desirable outcome and more conservation of significant sites was called for by all individuals consulted.

I don’t like destroying the sites, but I like having the control... [through archaeological participation] (Justine Coplin, Darug Custodian Aboriginal Corporation).

Both Bruce and Cherie remember there being a lot of green frogs, bandicoots in the Riverstone East area. Cherie expressed in relation to the green frogs:

at least we've got memories of them, but, other people haven't even seen them!

The cultural and social significance of artefacts for maintaining connections to the area were highlighted in the discussions. There was concern expressed for the long term protection of artefacts and mixed views were expressed about preference for reburial of excavated artefacts in the ground or lodgement with a museum. However, all individuals consulted agreed that the artefacts have an educational value and can be used to promote Aboriginal culture to new people moving to the Riverstone East area and for younger generations (school children). The artefacts were identified during the discussions as being tangible evidence of the long occupation of Aboriginal people in the area and have contemporary social significance for all the individuals consulted.

My uncle said to me, 'hey 'Chiddley', that was me nickname, 'hey, that's old people's tools, them sharp stones on the creek bank ... [this was] the old people's tools, the old peoples land. (Gordon Morton, Darug Aboriginal Cultural Heritage Assessments).

I like the stories that they tell. But a lot of Elders tell me we shouldn't be touching them. (Leanne Watson, Darug Custodian Aboriginal Corporation).

I don't really go along with burying [excavated artefacts] all the time, because young people don't get to see it. You've got white people that don't even know what they [artefacts] are. Even I'd like to come and have a look at them [the artefacts] myself. (Cherie Turrise, Gunjeewong Cultural Heritage Aboriginal Corporation).

Suggestions were made during the discussions by all individuals consulted for informative/interpretation displays of artefacts, an accessible Aboriginal 'keeping place' for any excavated or collected artefacts that derive from future investigations undertaken as part of this project, and other educational resources such as plain-English reports or books about Aboriginal culture and archaeological excavations in the region.

Reconnections

The focus discussions also highlighted that there has been limited physical connection to the land in recent years due to a history of forced removal and relocation. This has caused a physical discontinuity to the land that should not disregard a connectivity that is being revived through archaeological and other works. As Shauna Locke (Darug Land Observations) stated:

Well, for myself, since being a part of the archaeological digs and meeting other people ... you know – more or less leading myself back home to what I haven't been taught or learnt about. And with artefacts and things like that, it brings to life absolutely what may have been – what was, many years ago and things like that, and just hearing stories through other people...

Leanne Watson has deliberately sought out her connection to the area by researching the Darug seasonal calendar and through family history research with Paul Irish (2010) for the 'Aboriginal Connections to Rouse Hill House & Farm and the Rouse Family' project for the Historic Houses Trust of New South Wales, she explained:

[in relation to Leanne's grandmother and mother] ... she had terrible life. Mum can't talk about it.

I had a go at Mum the other day. How did you let them go? Where are all the stories? And she said, "you think I like not having them?!" But they are all there.

...once I was disappointed that the all the stories from here seemed to be gone ... but once I started doing the seasonal calendar it sort of starts to link it all back together and the stories are still there it's a lot of work to do ... but I really enjoy doing it.



Figure 8. Uncle Fremo's house built by his parents in the 1930s.

5.2.3 Summary of Contemporary Connections

No additional sites or places of significance to the Aboriginal participants were identified through this process. However several sites were noted in close proximity to the study area. The participants also articulated what was important to them about the landscape as a whole and this included:

- The smells and sounds of the surrounding bush
- The feeling of familiarity with the semi-rural landscape that they remembered and the way this facilitated an understanding of the Aboriginal past
- Evidence partially handed down directly and partially from ethnographic records of traditional ecological Knowledge and the seasonal movements of Aboriginal communities through the landscape;
- The sense of loss in the stories that remain untold and unlearnt due to disruptions to Aboriginal society since colonisation;
- A sense of loss based on the increasing urbanisation and the loss of natural wildlife;
- The sense of reconnection through the archaeological process of discovery of Aboriginal sites and artefacts;
- The 'healing' effect of handling the artefacts discovered in the study area which serves to provide a direct link to the ancestors and the Aboriginal past.

On reflecting on these connections participants had several suggestions about how the Aboriginal heritage of the area could be recognised. These included:

- retaining artefacts collected in such a way that children and future generations could see, feel and experience them for themselves
- ensuring that a reserve or parkland was included in the development which reflected the natural vegetation of the area as it would have been when Aboriginal people lived and travelled through this area prior to European colonisation.
- Reflecting the local Aboriginal heritage in street names and park names.



Figure 9. Tree marking Uncle Fremo's property.



Figure 10. Locations visited as part of the cultural values recording.

6 ARCHAEOLOGICAL CONTEXT

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.

6.1 Regional Context

6.1.1 Early Occupation

The study area falls within the Cumberland Plain sub-region. 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 and Charles Streets Parramatta (c.25,000–30,000 BP) (McDonald, 2005a; Kohlen, 1986; Nanson & Young 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, 2002; JMcD CHM, 2005b; Bowdler 1976; Lampert 1971;). More recently, AHMS has obtained luminescence ages of between 12,000 and 15,000 years BP for PT12, an artefact scatter within a sand dune overlooking Hawkesbury River in Pitt Town (Williams, et al 2012). The dating of Cranebrook Terrace has been called into question (Williams et al., 2012), so at this time the George and Charles Streets site is considered as the oldest reliable date for Aboriginal occupation in the Sydney region, although these dates also 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 loss of older sites in such a heavily urbanised environment must also be considered.

6.1.2 Intensification during the Holocene

The vast majority of dated sites in the Sydney region are less than 5,000 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 5,000 years may also be a result of the last significant rise in sea level, approximately 7,000 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 V. , 2004). That study found significant changes in site patterning during the Holocene. She concluded that population was unlikely to have changed, but that the use of sites did, most notably in the last 2,000 years.

Holdaway et al. (2008), similarly suggest that populations did not increase in the late Holocene, but that the changes seen in the archaeological record instead reflect taphonomic change, i.e. that more

recent sites are less likely to have been destroyed through modifications to the landscape than older sites which have been subject to a greater degree of geomorphic change. Conversely, Smith et al. (2008) and Williams (2013), both suggest that populations were in fact larger in the last 2,000 years than in 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, including the Cumberland Plain, are dominated by late Holocene sites.

6.1.3 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 (~15-20%) are rockshelters with midden deposit, rockshelters with art, rock art engravings and open artefact scatters (Attenbrow, 2002). Less common site types (~5-15%) include rockshelters 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. Rockshelters 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 total of 6,999 sites have been recorded for the western Cumberland Plain sub-region. The majority of these sites are artefacts (open camp sites or isolated finds) (n=3,756 or 54%) followed by Potential Archaeological Deposits (PADs) (n=1,212 or 17%), grinding grooves (n=936 or 13%) and other undefined site types (n=1,056 or 15%). These findings are similar to the frequency of site types recorded for the Sydney region. The absence of rockshelters with art or deposit for the western Sydney area may be accounted for by the geology of the area which lacks sandstone escarpments and shelters. Other site types in western Sydney include stone quarries, non-human bone or organic material, shell, and water holes.

A study of the regional archaeology of the Cumberland Plain by Kohen(1986) 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 (1986) found that 65% of open artefact scatter sites were located within 100 metres of permanent fresh water. Only 8 per cent of sites were found more than 500 metres away from permanent fresh water (Kohen 1986). In short, Kohen(1986) argued that open artefact scatters are larger, more complex and more densely clustered along permanent creek and river lines. Kohen's(1986) study also found that silcrete (51%) and chert (34%) are the most common raw materials used to manufacture stone artefacts. Other raw materials include quartz, basalt and quartzite.

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

The character and composition of the excavated sites in McDonald's study could not be properly predicted on the basis of the 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 a predictive model for the distribution of Aboriginal objects. In a recent publication, White and McDonald (2010, p. 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 metres from 4th order streams. Upper slopes have sparse discontinuous artefact distributions but artefacts are still found in these landscape settings.

6.1.4 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 (1948) 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). The ERS phases are as follows:

- Capertian – 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 siliceous 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 siliceous materials, however quartz becomes more frequent. Generally dated from 2800 to 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.

6.2 AHIMS Results

A search on the Aboriginal Heritage Management Information System (AHIMS) database was undertaken on 18 March 2014 (ID 128692). The search covered 24km², centred on the study area and returned 101 listings (see **Table 2**, **Table 3** and **Figure 11**). A number of archaeological reports have also been put together for studies undertaken within the Riverstone East Precinct. As a result of a review of these studies, several sites that are not listed, or incorrectly plotted on the AHIMS database, have also been included in the table below. These include sites identified during assessments by AHMS for Sydney Water Corporation and Transgrid under Part 3A of the EP & A Act.

Seventeen registered and unregistered sites were identified within the Riverstone East Precinct (Table 3). Several soil exposures containing eroding silcrete gravels have also been located in the area that may have been used as a source for stone tools, although these have not been registered on the AHIMS database.

Table 2. Results of AHIMS search: Site types present in the area captured by the Extensive Search

Site type	Number of Sites	%
Art	1	1.0
Artefact Scatter	49	48.5
Artefact/Scatter and PAD	7	6.9
Artefact, PAD and Scarred Tree	1	1.0
Isolated Artefact	23	22.8
Potential Archaeological Deposit (PAD)	15	14.9
Rockshelter	3	3.0
Rockshelter with Art	1	1.0
Scarred Tree	1	1.0
Total	101	100.0

Table 3. Results of AHIMS Search: AHIMS sites located within the Riverstone East Precinct.

Site ID	Site name	Context	Site status	Site features	Reference
45-5-2869	WMB3 (1005-4 scatter)/1005-4	Open site	Destroyed	Artefact	Therin 2002
45-5-2870	WMB4	Open site	Destroyed	Artefact	Therin 2002
45-5-3024	WMB Area 3	Open site	Salvaged destroyed	and Artefact : 290	Therin 2004
45-5-4066	1004-46 artefact scatter PAD	Open site	Valid	Artefact, Archaeological (PAD)	Potential Deposit AHMS 2013
45-5-4067	1006-46	Open Site	Valid	Artefact, Archaeological (PAD)	Potential Deposit AHMS 2013
45-5-4079	PAD 1018-6	Open site	Valid	Potential Archaeological Deposit (PAD)	AHMS 2013
45-5-4080	Scarred Tree 1019-7	Open site	Valid	Scarred Tree	AHMS 2013
45-5-4081	PAD 1020-6	Open site	Valid	Potential Archaeological Deposit (PAD)	AHMS 2013
45-5-4082	PAD 1021-6	Open site	Valid	Potential Archaeological Deposit (PAD)	AHMS 2013
45-5-4112	SCR/UPG3 PAD	+ Open site	Destroyed	Artefact : 2	GML & JMcD CHM 2012
45-5-4188	Schofields Road AS	Open site	Destroyed	Artefact : 6	GML 2011
45-5-4311	A7 Archaeological Complex	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD): 1, Modified Tree (Carved or Scarred): 1	ENSR 2008
45-5-4065	RV 30/1003-6	PAD	Valid	Potential Archaeological Deposit (PAD)	ENSR 2008
NA	RV2	Open site	Salvaged destroyed	and Artefact: 29	AHMS 2007
NA	RV Pole 26	Open site	Salvaged destroyed	and Artefact: 40	AHMS 2007
NA	RV Pole 30	Open site	Salvaged destroyed	and Artefact:5	AHMS 2007
NA	RV Pole 39	Open site	Salvaged destroyed	and Artefact:3	AHMS 2007

Sites identified within the study area comprise a range of types, including isolated artefacts, artefact scatters, PADs and two scarred trees. These sites have been identified in a range of investigations undertaken by the cultural resource management sector over the past 25-30 years. The majority of sites are surface scatters, although it is worth noting that low density scatters or PADs, where excavated, have revealed extremely high densities in some cases.

Seventeen registered and unregistered sites were identified within the Riverstone East study area. Of these, nine have been previously destroyed through development:

- WMB3 (1005-4) (45-5-2869): A scatter of two artefacts identified by Therin (2003), later re-identified by AHMS (2011b). The location of this site was at least partially destroyed through the Windsor Road Upgrade.
- WMB4 (45-5-2870): A scatter of artefacts identified by Therin (2003). The location of this site was destroyed through the Windsor Rd Upgrade.
- WMB Area 3 (45-5-3024): an artefact scatter identified through survey and excavation by Therin (2004), consisting of approximately 290 artefacts. This site has been salvaged and the location destroyed through the Windsor Rd Upgrade.
- 1004-46 (45-5-4066): This site constituted a level area on three sides of a large dam situated just South of Garfield Road East. The ground on either side of the dam was examined as the area had been identified as PAD from outside the property boundary and areas of exposed ground were identified near the dam. Upon inspection it was noted that numerous Aboriginal objects were located on both the eastern and western sides of the dam and a hammerstone was located at the northern end between the dam edge and Garfield Road East.
- 1006-46 (45-5-4067): This site consists of the banks of, and alluvial flats adjacent, Killarney Chain of Ponds in the north-east sector of the Riverstone East Precinct within the Rouse Hill Regional Park, recorded by AHMS (2011b). A large number of silcrete artefacts were located within the site boundaries. The majority of these were located on an exposed area within the northern portion of the site however at least one piece was noted in the southernmost area of the site. This site was re-investigated as part of a second survey in January 2011 and revealed that the lower slope deposits and associated archaeological material were present to the east of the creek and extending up the lower slopes towards the pet food factory. An artefact scatter of primarily small silcrete flakes in the early stages of reduction was found between the two dams on a large (500 m²) exposure. It must be noted, however, that while the lower slopes and flats present on both sides of the creek (and recorded as this site) were relatively undisturbed, there were several minor areas of significant disturbance (such as the two dams and several access tracks) that bisected the site.
- 1018-6 (45-5-4079): This area consists of a terraced area overlooking a first order tributary of Killarney Chain of Ponds, recorded as a PAD as part of a survey of water-related infrastructure for the growth centres (AHMS 2011b).
- 1019-7 (45-5-4080): A scarred tree recorded by AHMS (2011b) as part of a survey of water-related infrastructure for the growth centres. The scar was considered to have potential to be the result of traditional Aboriginal bark removal.
- 1020-6 (45-5-4081): A PAD associated with 1019-7 that is within 20m of a small creekline/chain of ponds identified as part of a survey of water-related infrastructure for the growth centres. (AHMS 2011b).
- 1021-6 (45-5-4082): A PAD recorded by AHMS (2011b) as part of a survey of water-related infrastructure for the growth centres. The site comprised of a low alluvial flat on the eastern bank of First Ponds Creek.
- SCR/UPG3 + PAD (45-5-4112): An isolated artefact and PAD located as part of assessments for the Schofields Rd Upgrade (JMcDCHM/GML 2011). This site was later excavated by Kelleher Nightingale (2012b) who identified a further three artefacts. The location of this site was destroyed through the Schofields Rd Upgrade.
- Schofields Road AS (45-5-4188): an artefact scatter located within a disturbed area that had been used for market gardening, originally identified by GML (2011) and later reassessed by Artefact (2013) as being of low significance. An AHIP was approved for impact to this site as part of the Schofields Road Upgrade project.
- A7 Archaeological Complex (45-5-4311): an artefact scatter and PAD comprising a low alluvial flat directly east of First Ponds Creek, identified by ENSR AECOM (2008) as part of a survey of

water-related infrastructure for the growth centres. Later the subject of test excavation and salvage, in which the site revealed high artefact densities of $>42/m^2$ (AHMS in prep).

- RV2: a single surface artefact was expanded to include 24 sub-surface artefacts following excavation. This site was recorded by AHMS (2007) as part of a transmission line upgrade, and is located within 100m of a low order waterway. This site was destroyed under a Part 3A consent, although there may be additional potential for artefacts in the surrounding area.
- RV Pole 26: The area was identified as a PAD during survey by AHMS (2007) as part of a transmission line upgrade. Subsequent test excavation recovered forty artefacts. The site is located within 100m of First Ponds Creek. This site was destroyed under a Part 3A consent, although there may be additional potential for artefacts in the surrounding area.
- RV Pole 30: A cleared, upper slope landform, approximately 500m from First Ponds Creek, the site was a PAD, which when excavated, revealed five artefacts manufactured from tuff (AHMS 2007). This site was destroyed under a Part 3A consent, although there may be additional potential for artefacts in the surrounding area.
- RV Pole 39: The area was identified as a PAD during survey, which when excavated, revealed five artefacts manufactured from tuff (AHMS 2007). This site was destroyed under a Part 3A consent, although there may be additional potential for artefacts in the surrounding area.
- RV 30 (#45-5-4475)/1003-6 (#45-5-4065) was situated around the junction of Garfield Road East and Clarke Street. This area contained a series of flats around a relatively unmodified part of First Ponds Creek. While situated outside of the study area curtilage, elements of this site extend into the study area.

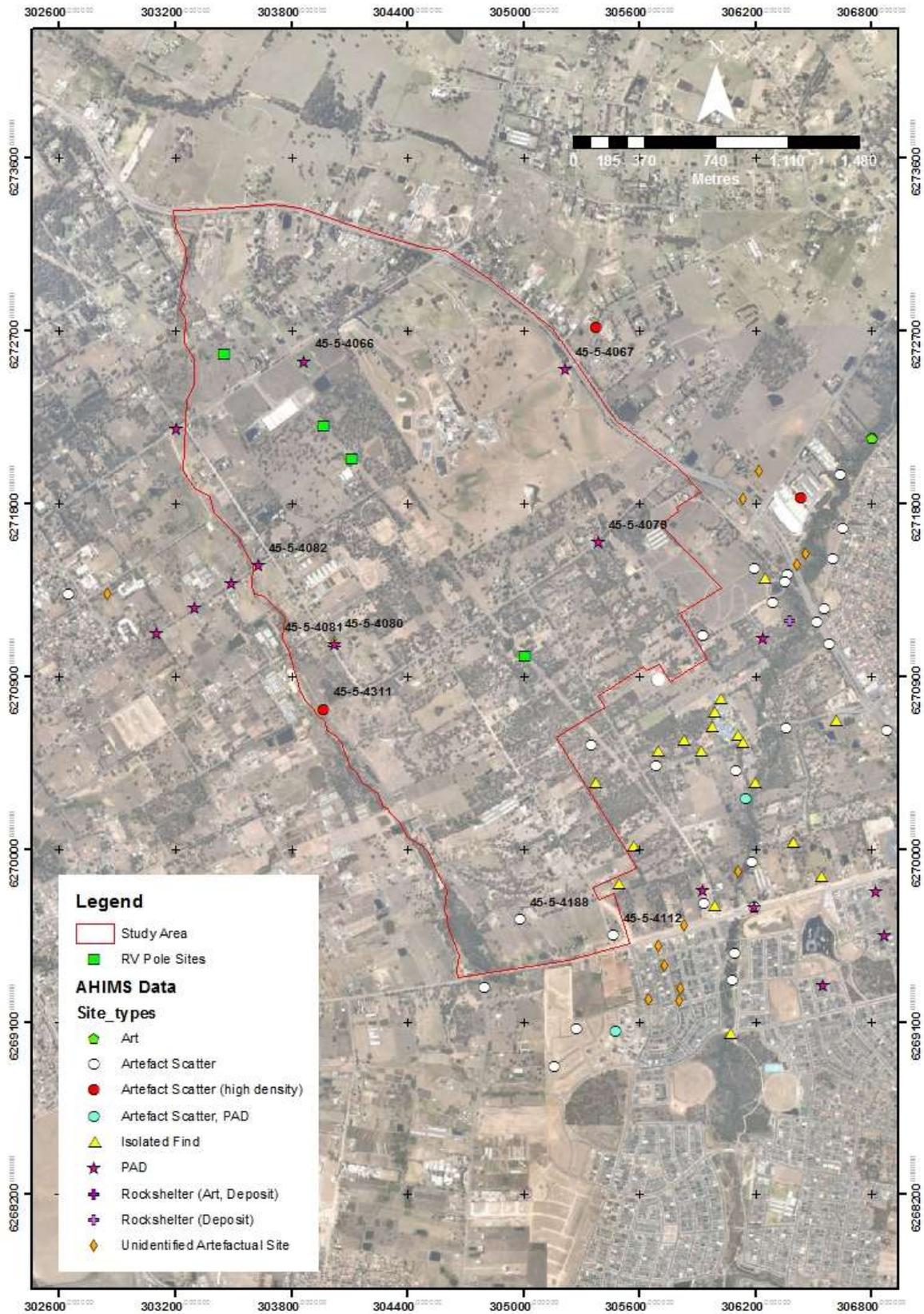


Figure 11. AHIMS Search results within and surrounding the study area, including the four RV pole sites (AHMS 2007) that were not found on the AHIMS database

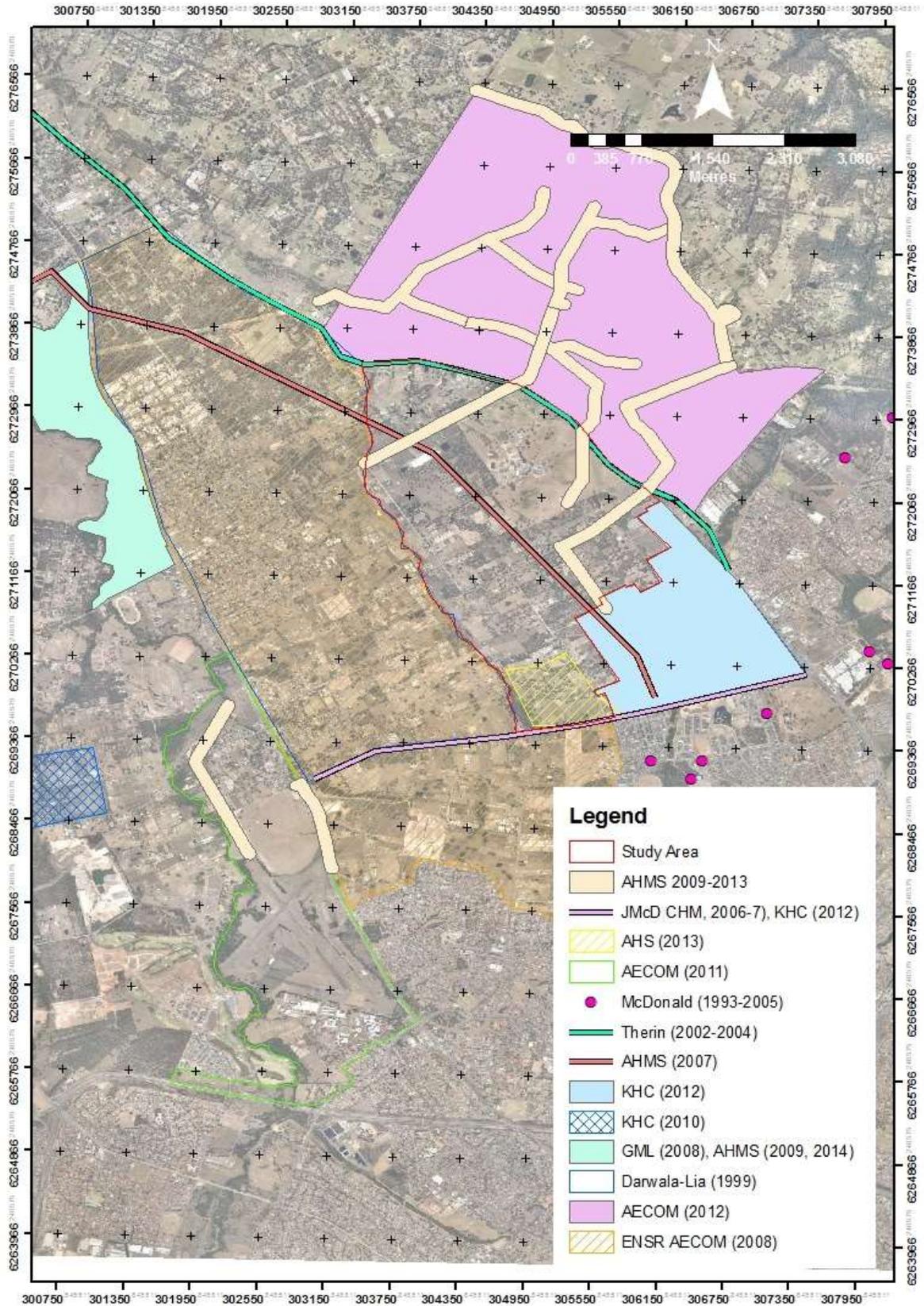


Figure 12. Previous archaeological studies undertaken in the local area.

6.3 Previous Local Studies

This section provides a brief summary of Aboriginal sites and archaeological investigations undertaken within the local area to provide an indication of local site patterning and the nature of the local archaeological resource. A large number of studies have been undertaken in the vicinity of the Riverstone East area, and as a result, only the most relevant of those are summarised here. Several landscape-based models have been produced and tested for North West Growth Centre precincts in the local area (Haglund 1980, Kohlen 1986, White and McDonald 2010). In addition to this, a few smaller site-specific studies have been undertaken within the study area boundaries. The results and implications of these are discussed below.

6.3.1 AHMS: Water Related Services for North-West and South-West Growth Centres (2009-2013)

In 2009, Archaeological and Heritage Management Solutions Pty Ltd (AHMS 2009a) in conjunction with Business Latitude Pty Ltd was engaged to undertake an Aboriginal archaeological literature review and develop a predictive model for Aboriginal archaeological resources in the North West Growth Centre (NWGC) and South West Growth Centre (SWG), Sydney (an area of over 30,000 hectares). The North West (NW) assessment area comprised all or part of 15 precincts in the NWGC, including Marsden Park, Box Hill, Riverstone West, Riverstone, Vineyard, Alex Avenue and Riverstone East.

The aim of the literature review and the predictive model was to provide Sydney Water with a desktop assessment of the likely Aboriginal heritage potential in areas associated with potential water related services for the NWGC and SWGC. Since no specific information was available about the specific location of the infrastructure, the modelling developed a number of archaeological probability zones for the two regions and provided generic management recommendations for each of them.

The background review of previously documented archaeological sites and studies identified the potential sensitivity of flats and lower slopes within 250m of the high order creeklines in the NW assessment area. The review also concluded that historical and modern development has had a significant negative effect on the survival of archaeological resources. According to this assessment, First Ponds Creek was considered a high order stream, therefore, dependent on disturbance levels, was classified as moderate/high through to very high in archaeological sensitivity (**Figure 14**).

A Due Diligence Assessment undertaken within the umbrella of this project, assessed parts of First Ponds Creek and the unnamed creek located within the Riverstone East Precinct. This assessment identified that significant ground disturbance had occurred within some areas, indicating a moderate likelihood for Aboriginal Cultural Heritage in these places, and a high likelihood in the relatively undisturbed areas (AHMS 2011a).

The main component of the assessment was the development of a detailed archaeological predictive model for the two assessment areas. Initially, the model was developed using previously documented sites and their underlying environmental variables (including soils, geology, elevation, slope, hydrology and remnant vegetation) within a mathematical and GIS framework. However, to overcome severe limitations in data, a variant of this approach was developed using both underlying environmental variables (specifically vegetation and soil landscape as surrogates for disturbance) and a series of GIS layers utilising landform, hydrology, slope and elevation data and the literature review to highlight areas of archaeological interest.

Flood prone areas were considered to retain a complex sedimentary/geomorphological history, and therefore archaeological probability values within these areas were not altered. However, due to the potential for deposition, erosion and disturbance by flooding, a series of recommendations related to

the underlying probability classifications were proposed. These include the further investigation to corroborate or refute the model's archaeological classification of a particular area, and then the adoption of the recommendations for that probability classification. Parts of the First Ponds Creek floodplain were classified in this way.

In the NW assessment area, the predictive model identified areas of very high (5.6%), high (20.4%), moderate (34.1%) and low (39.9%) archaeological probability. Areas of very high and high archaeological probability were focused on higher order streams, including South Creek, First Ponds Creek, Killarney Chain of Ponds and Second Ponds Creek. The model was further refined in a subsequent study (AHMS 2010), suggesting that flats and lower slopes, which did not show evidence of prior disturbance, within 250m of high order creeklines (including First Ponds Creek) were the most likely areas to contain significant Aboriginal cultural heritage.

The predictive model was tested during field assessments (AHMS 2010, 2011b, 2012) within specific components of the area covered by the Desktop Assessment. Testing indicated the model over-represented those areas that would have a high and very high probability of retaining Aboriginal objects, sites and places. This was most likely because detailed land use disturbance maps were not available for much of the assessment area and many areas that had assessed on the basis of tree cover to be undisturbed, had actually have been cleared and the subject of modern re-growth.

The field assessment identified 27 Aboriginal objects/sites/places across 38 km of pipe alignments within the NW Field Assessment Area. These sites included one artefact scatter, six artefact scatters with associated Potential Archaeological Deposit (PAD), 15 PADs, one scarred tree and four isolated finds. The sites were primarily found in close proximity to the major creeklines, including Eastern Creek, Killarney Chain of Ponds and First Ponds Creek.

Six of these Aboriginal sites are located within the Riverstone East Precinct study area: AHIMS ID#s 45-5-4066, 45-5-4067, 45-5-4079, 45-5-4080, 45-5-4112, 45-5-4188, 45-5-4311. Of note was the identification of a group of artefact scatters and PADs situated on the banks of First Ponds Creek, and collectively called the 'A7 Archaeological Complex' site (45-5-4311) (**Figure 13**). This site first identified by ENSR AECOM (2008b) was considered of high archaeological and cultural significance, most notably due to a dense artefact scatter individually identified as RV27; at which several Aboriginal people identified a spiritual connection. A further site, 1006-46 (45-5-4067), consisting of a large number of surface artefact scatters along the banks of a tributary of the Killarney Chain of Ponds within the Rouse Hill Regional Park was also highlighted as of archaeological significance and importance. This site contained >500 artefacts on a series of alluvial flats and terraces along the creek, and in some areas appeared relatively undisturbed, although extensive pastoralism and dam installation had resulted in significant impact to some parts of the site. This site was almost certainly a continuation of an earlier site, WMB Area 3 (45-5-3024) identified and excavated by Michael Therin (see **Section 6.3.10**).

AHIMS #45-5-4311, also referred to as the A7 complex, has been subsequently subject to test excavation and salvage in advance of water infrastructure for the North West Growth Centre (AHMS, in prep). These excavations revealed a high density, highly significant site, with more than 1200 artefacts recovered thus far. From a regional perspective, the A7 deposits are not as intact or as archaeologically dense as other sites excavated close to Eastern Creek and Second Ponds Creek. However, the preliminary results from this site demonstrate that First Ponds Creek formed a significant component within the occupation of the region.

Ongoing Work

More recently, AHMS (in prep) has been working on behalf of Lend Lease to further investigate and/or mitigate cultural materials from the various pipe alignments approved under the assessment outlined in **Section 6.1.1**. Of relevance to this assessment is the works undertaken within the curtilage of RV 30 (#45-5-4475)/1003-6 (#45-5-4065) and the A7 Archaeological Complex site (45-5-4311).

In relation to RV30/1003-6, excavations across the site identified a relatively undisturbed duplex soil, which contained a very low density of Aboriginal objects ($n=1/m^2$). The project re-assigned the site to a background scatter and reduced its high significance ranking to low.

Due to the significance of the A7 Archaeological site, its management formed a stand-alone condition in the overall project's approval. This involved exploring construction options with Lend Lease, Sydney Water and the Aboriginal stakeholders that minimised or removed harm from the site. Ultimately, the construction was undertaken through a series of under-bores in which the pipe was pushed through the geology beneath the site, and thereby not impacting the over-lying archaeological deposit. Each under-bore was archaeological salvaged to 100% of its footprint prior to works. Indirect impacts were subsequently managed through surface protection.

The results of the works are still being analysed, however, they indicated that several areas contained high densities of Aboriginal objects ($>42/m^2$) within a shallow ($<50\text{cm}$) duplex soil profile (**Figure 13**). These areas were primarily situated around RV27, and did not extend the full extent of the site's curtilage. It is considered that the north-south curtilage of the site is overly large and should be reduced; although no information on the east-west delineation of the site was possible through these works. The artefactual assemblage was dominated by silcrete and quartz artefacts, and was considered of late Holocene age. No absolute dating could be obtained from the shallow soil profile, but OSL ages from other parts of the project (mainly around Eastern and Caddies Creek) all show similar types of assemblage (i.e. silcrete and quartz dominated; microliths, etc) to be ~2ka.



Figure 13. Map showing the location and archaeological foci of the A7 Archaeological Complex site (45-5-4311). Areas highlighted in brown reflect extant artefact scatters.

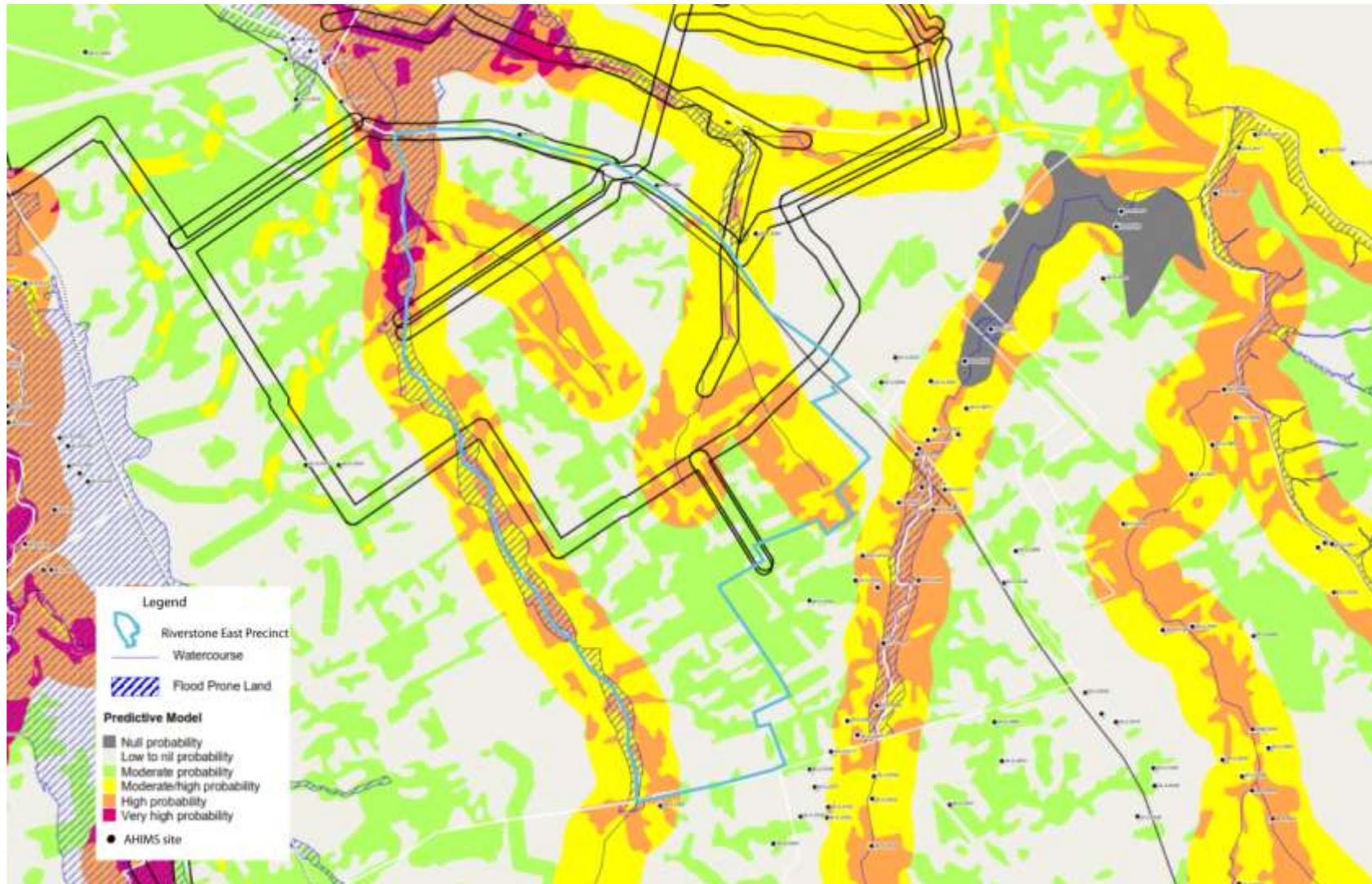


Figure 14. Predictive map (AHMS 2011b), showing modelled areas of varying levels of archaeological sensitivity throughout the North West Growth Centre. The Riverstone East Precinct overlain in blue.

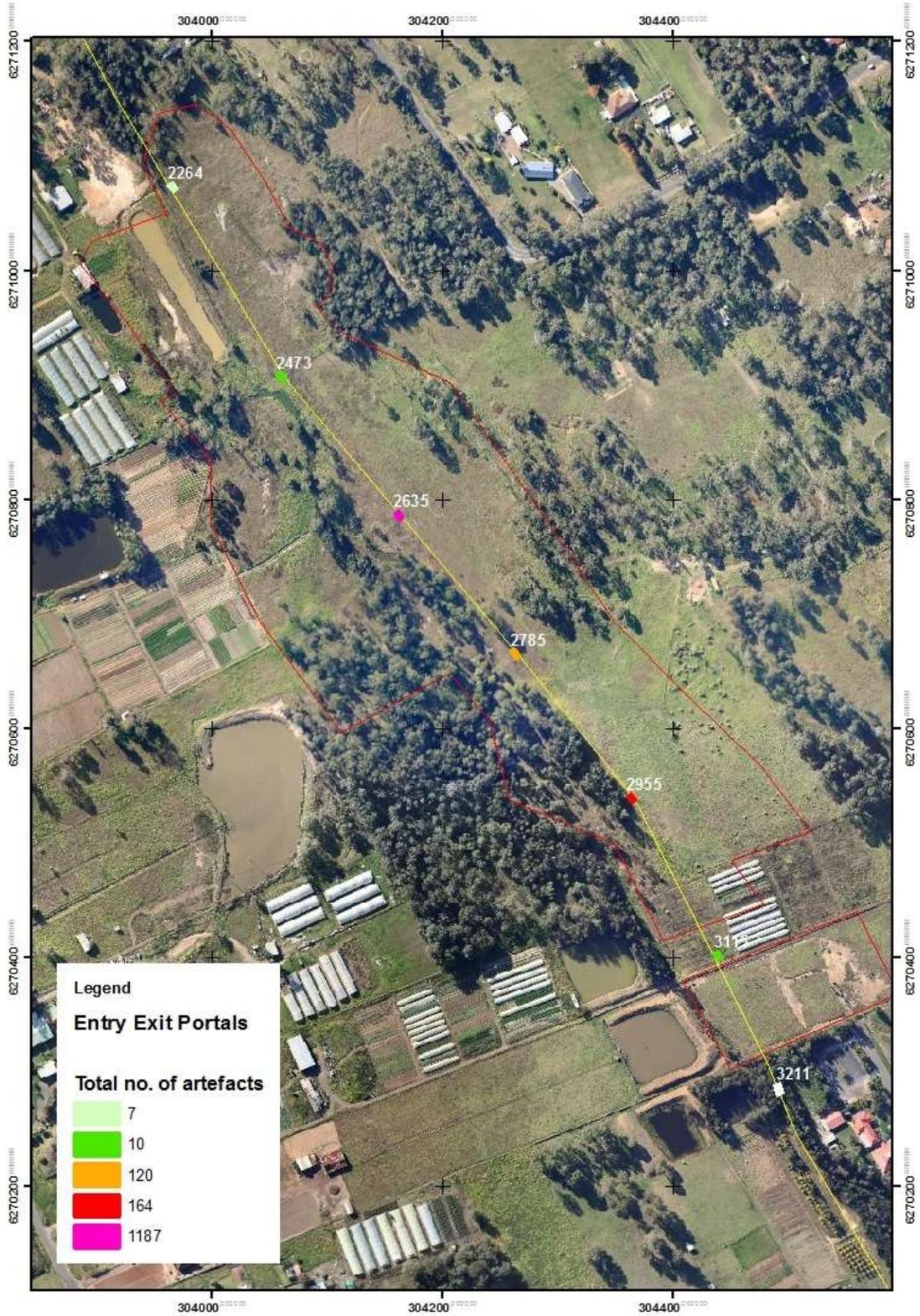


Figure 15. Map showing the preliminary findings of excavations at the A7 Archaeological Complex site as part of a pipeline installation. Each location here represents a 28m² under-bore entry/exit pit that was completely salvaged prior to development. Note one numbers indicated chainages of the pipe alignment, and are not relevant to this assessment.

6.3.2 AECOM: Box Hill and Box Hill Industrial Precincts (2012)

A Desktop assessment and archaeological survey were conducted of the Box Hill and Box Hill Industrial Precincts within the North West Growth Centre. The study re-identified 23 out of 27 previously registered sites, as the remaining four had been destroyed through road upgrades. In addition, 11 new Aboriginal archaeological sites, comprising nine artefact scatters and two isolated artefacts, were located. A natural outcrop of silcrete gravels was also located on the banks of an unnamed creek.

The majority of sites were located within 200m of water sources, predominantly tributaries of Killarney Chain of Ponds. The survey recognised several areas of disturbance along the watercourses due to intensive use over the last 200 years, lowering the archaeological sensitivity of the floodplain area.

6.3.3 ENSR AECOM: Alex Avenue and Riverstone Growth Centre Precincts (2008a, 2008b)

An archaeological survey was undertaken which investigated 303ha (a sample of 19%) of Alex Avenue and Riverstone Growth Precincts. The study identified 37 Aboriginal archaeological sites, 25 within Riverstone and 12 within Alex Avenue. These sites comprised 18 isolated finds, five low density artefact scatters, four artefact scatters, five archaeological deposits, four potential archaeological deposits, three natural silcrete occurrences and two potential scarred trees. The survey found artefact scatters and other site types on landforms in the vicinity of First Ponds Creek.

Sites considered to be of high scientific significance occurred in two areas, either surrounding RAA23 adjacent to First Ponds Creek and/or within a large clearing around First Ponds Creek near the corner of Clarke Street and Guntawong Road (referred to as the A7 Archaeological Complex site). These sites were considered highly significant due to the rarity of good preservation along First Ponds Creek.

Part of the A7 Archaeological Complex site is located within the Riverstone East precinct (see **Section 6.1.1**). This site comprises 300 x 150m of lower slopes and creek flats. The site is made up of a series of surface artefact scatters, potential archaeological deposits and potential scarred trees, and was interpreted as representing a large scale occupation site. Investigation of this site has been more recently undertaken by AHMS (see **Section 6.3.1** above).

ENSR AECOM (2008b) also undertook an assessment for water-related infrastructure within Riverstone and Alex Avenue Precincts. As part of this assessment, survey was undertaken of the proposed area impact, which included several major watercourses, namely First Ponds Creek, Killarney Chain of Ponds and Eastern Creek. A total of 21 sites were identified, comprising seven isolated finds, five background scatters, three artefact scatters, four PADs and eight scarred trees. Two of these sites (RV21 and A7 Complex) were identified within the Riverstone East Precinct, on the eastern side of First Ponds Creek. RV21 was identified as an isolated find and PAD, although this was not identified during the AHIMS search. The study recommended avoidance of the A7 Archaeological Complex Site, as well as RV 21.

6.3.4 Darwala-Lia: Riverstone Land Release Area (1999)

In 1999 Darwala-Lia conducted an assessment of the Riverstone Land Release Area for the Blacktown City Council. The study area extended from Bandon Road, Vineyard, along the eastern side of the railway to Schofields, east to First Ponds Creek and then back to Bandon Road along the western side of First Ponds Creek and Windsor Road.

Darwala-Lia located or relocated nine Aboriginal sites during her survey of this area. Of the nine sites, eight were open campsites and one was an isolated find. Two of the open campsites were located on ridge tops, three were located on slope features and two were located on creek terraces or flats. The isolated find was located on a slope feature overlooking a creek flat.

Most of the sites were composed primarily of debitage flakes and flaked pieces with occasional cores, 56 utilized flakes and a small quality of blade flakes. A broken backed blade and stone axe were also recorded. The vast majority of the stone artefacts found were silcrete. Subsequent investigations of the Riverstone area by ENSR AECOM (2008a), suggested that some of the scatters of silcrete recorded by Darwala-Lia, were in fact naturally occurring and non-purposefully fractured silcrete nodules.

6.3.5 Godden Mackay Logan/AHMS: Riverstone West Precinct, Sydney (2008/2009/2014)

Godden Mackay Logan Pty Ltd undertook an Aboriginal heritage assessment of the Riverstone West Precinct, approximately 2km west of the Riverstone East Precinct, in the NWGC in late 2008. More recently, AHMS (2009b, 2014) has undertaken Section 87 Aboriginal Heritage Impact Permit (AHIP) investigations in a development area located within the Riverstone West Precinct.

Ninety-two 1 m² test pits were excavated in linear transects, 20 m apart across a study area encompassing floodplains, slopes and hill tops. The study area could be characterised by these three landform types with shallow or disturbed duplex soils being identified on the slopes and hilltops, and a deeper fabric contrast soil on the floodplains of Eastern Creek. The floodplains revealed little evidence of extensive deposition or scouring with only 20 – 30 cm of the upper part of the profile being considered flood deposit from the European period. A small, now in-filled, creek line was also present running through the study area.

The excavations recovered 636 artefacts dominated by silcrete (83%), a not unexpected result given that a known silcrete quarry source was located on a ridgeline within the northern part of the study area. Very low densities of artefacts were found in most test pits (between 0 and 10 artefacts per m², and generally less than 5 per m²). High concentrations, however, were found in only three areas. Specifically, 363 (57%) of the artefacts were found within three areas encompassed by two different landform features as follows:

1. Two areas of a large sandy levee bank located within 100 m of Eastern Creek retained higher than background artefact densities. One area, located within 50 m of the creek retained the highest concentration of densities with some 321 artefacts (50% of the total assemblage recovered) coming from 5 test pits; and
2. A small levee bank located immediately adjacent a dam that would have originally formed part of the now in-filled minor tributary.

This project has more recently been re-activated (AHMS, 2014) following the discontinuance of the development in 2009. A more recent assessment has been developed using these results, and ultimately found that 15 Aboriginal object/sites (separately recorded with 23 AHIMS numbers) were situated across the study area. Of these, two were considered of moderate-high significance, both situated on the banks of Eastern Creek. A zone of moderate and high potential was also identified for all banks of Eastern Creek within 100m.

6.3.6 Kelleher Nightingale Consulting: Area 20 Precinct – North-West Growth Centre (2010)

Kelleher Nightingale Consulting (KHC) conducted an Aboriginal Heritage Assessment for the Area 20 Precinct, located immediately south-east of the study area. The study comprised desktop research, field survey and significance assessment. As a result of the survey, 19 Aboriginal archaeological sites were located, as well as eight PADs. The composition and extent was also able to be updated for many of the previously recorded sites located during the desktop phase.

The majority of Aboriginal sites were located on slopes or flats in the vicinity of Second Ponds Creek. Sites were also frequently located on ridge lines and slopes adjacent to ridge crests and were more

commonly located in areas that had been subject to minimal or no ground disturbance in the historical period.

A number of the artefact sites and PAD extents identified by KHC were defined by the edge of individual properties, some of which lie at the border of the A20 and Riverstone East precincts. It can be reasonably expected that several of these sites would therefore extend into the Riverstone East study area (**Figure 16**).

The AHIMS ID#s for Aboriginal sites located within 200m of Riverstone East are: 45-5-3925, 45-5-3934, 45-5-3919, 45-5-3924. These sites comprise isolated stone artefacts or low density artefact scatters of “some” (low) significance. AHIMS results were not able to be located for the PADs in **Figure 16**, suggesting that these have not yet been registered. These PADs were delineated by landform extent, and are considered sensitive due to their location on elevated crest landforms.

Large, high density sites along Second Ponds Creek were assessed as being of high significance. These, and other, sites within the creek corridor were conserved within a riparian zone within the Indicative Layout Plan.

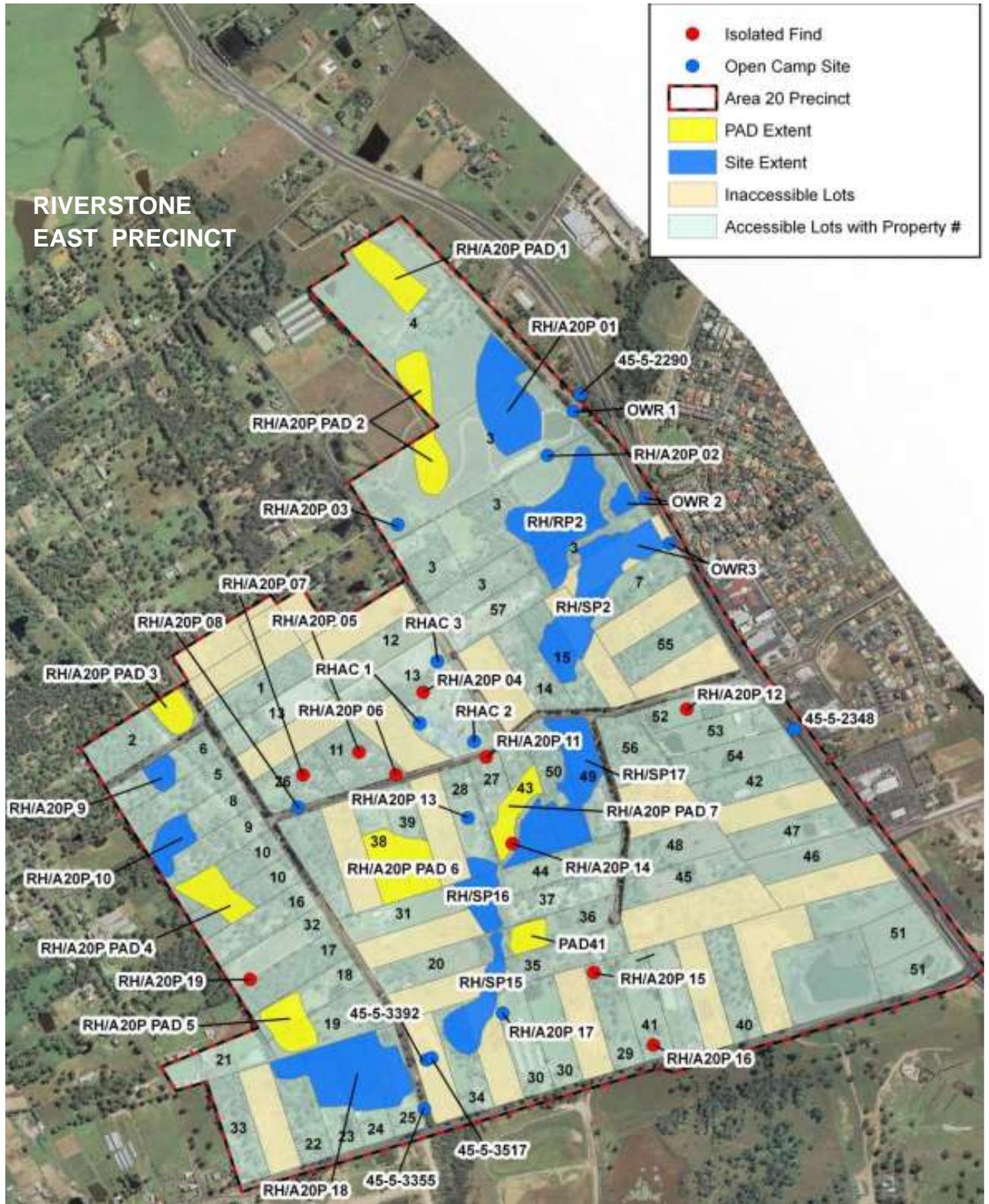


Figure 16. Map of an assessment of Area 20 showing the distribution of sites near the border of the Riverstone East Precinct.

6.3.7 KNC: Marsden Park Precinct – North-West Growth Centre (2012a)

KHC undertook a desktop assessment and survey for the Marsden Park Precinct, located approximately 10km south east of the study area. During the desktop phase, several potential areas of archaeological sensitivity were identified. Rickabys Creek Gravels were identified as a potential source of silcrete nodules and chert clasts throughout the centre of the precinct, and the floodplains of the high order stream South Creek were predicted to contain high densities of artefactual material. The primary type of disturbance identified was clearance of native vegetation. Therefore, the sub-surface potential of the Marsden Park Precinct was considered to be high.

A survey of the precinct was undertaken, utilising a sampling technique that assessed all landforms within the study area, with additional focus on high sensitivity landforms such as those related to the high order creeks, as well as spur and ridge crests.

Sixty-seven Aboriginal archaeological sites were located as a result of the survey, comprising open artefact scatters, isolated artefacts and two scarred trees. All sites within the precinct were assessed as being between low and moderately significant at a scientific level, with moderate significance indicating the presence of a probable sub-surface component to the site, and low indicating that the site was located in a disturbed context. No sites of extreme rarity or high significance were identified.

6.3.8 AHMS: Vineyard to Rouse Hill Electricity Upgrade (2007)

Integral Energy engaged AHMS and Cultural Heritage Connections Pty Ltd to undertake an Aboriginal archaeological survey and excavation in advance of Integral Energy's proposed Electrical Transmission Line Upgrade between Vineyard and Rouse Hill, NSW. The area investigated comprises an 8.3 kilometre stretch of land which runs from Vineyard, through Riverstone, to Rouse Hill.

The density of artefacts across the landscape was extremely low, and was interpreted as 'background scatter' created during transitory use of the landscape. This interpretation is consistent with regional findings regarding low density, where artefact densities lessened with distance from high order waterways. This model is repeated along the Vineyard to Rouse Hill easement, where artefacts occur in lessening densities with distance from water courses.

Artefact densities recorded during excavation were highest on lower slope landforms close to creeks. The highest densities (13 artefacts/m²) were recorded at the Pole 26 site, located within 200 metres of two creeks (First Pond Creek and a tributary), which falls inside the northern part of the Riverstone East study area. Artefacts were also recovered during survey and excavations from Pole locations 30, 31, 32, 33, 38 and 39 within the study area (Site RV2). Three 1m x 1m test trenches were excavated at each pole location, on hill crest and upper slope landforms. Sterile clay B-horizon soils were typically reached at depths of 25-35cm.

The slightly higher density recorded at Pole 26 tentatively suggests that lower slopes close to creeks were targeted as areas of occupation by Aboriginal people in the past. This conclusion is consistent with McDonald's findings that areas on lower slopes within 50 metres of a creek will display evidence of complex and intensive occupation.

6.3.9 McDonald/ JMcDCHM: Rouse Hill Infrastructure Development (2005b)

A series of archaeological investigations associated with various stages of the Rouse Hill Infrastructure Development were undertaken from 1993 to 2005 (e.g. JMcDCHM, 2005b). The investigations covered a large area of urban release land in the vicinity of Kellyville and Rouse Hill. The sites were located near Caddies, Seconds Pond, Smalls and Cattai Creeks. More than 1,800 square metres were excavated during the project, yielding almost 68,000 stone artefacts. The landform types investigated included alluvial floodplain along high order creeklines, creek terraces

adjacent to high order creeklines, a creekbank adjacent to a low order streamline and low hillslopes adjacent to low order creeklines.

Some key findings were made regarding Aboriginal site patterning in relation to these landforms and stream orders. They are:

- The results tended to indicate that irrespective of the landform types investigated, the density of stone artefacts recovered was lowest along low order creek lines and higher densities were associated with high order creek lines;
- While lithic assemblages decreased in scale and repetition further away from water, the composition of assemblages remained fairly consistent across the entire landscape;
- Occupation density was likely to be more a result of the proximity to steady resource areas such as higher order creeklines with access to fresh water and food, as opposed to preference of certain landform types;
- Sites on alluvial floodplains and creek terraces adjacent to higher order creeklines provided evidence of a wide range of activities;
- Occupation evidence on alluvial flood plains and creek terraces indicated the sites were used for short-term residential occupation over an extensive period of time, starting possibly as early as 9,000 BP;
- Low hill slopes and creek banks adjacent to low order creek lines showed evidence for casual to short term occupation; and
- Some stratification was evident on the creek banks indicating transient use of the landform through time. Recent use (4,000BP to 1,000 BP) showed evidence of knapping activities.

Other findings regarding the stone tool assemblages for the area included:

- Many sites had little or no indication of artefacts on the ground surface, yet subsurface testing revealed artefacts were present even when surface artefacts were not seen. Therefore it was concluded that potential archaeological deposits should be identified on the basis of low levels of previous land use disturbance not the presence of artefacts on the surface;
- Indurated mudstone was the dominant raw material in the northern end of the study area;
- Silcrete (mostly heat-treated) was dominant toward the southern end of the study area;
- There was an absence of obvious conservation strategies in the stone tool assemblage and a lack of identified local stone sources. This was deemed problematic for explaining the variation in preferred stone types across the area;
- Most artefacts were small which was deemed to indicate that people prepared and “heat-treated” stone near sources and carried selected materials back to residential sites;
- Backed artefacts (commonly found across the landscape) had considerable variation in their morphology suggesting this artefact type was not standardised;
- Functional analysis of the backed artefacts indicated they were multi-functional – used as spear barbs and as hand-held tools for plant / animal processing;
- McDonald identified that areas with sparse lithic scatter represented low levels of accumulated activity. Areas with greater than 20 lithics per m² were likely to contain in situ knapping concentrations;
- The presence of silicified tuff may indicate pre-Bondaian occupation; and
- Fluvial deposits on a lower order tributary of Second Ponds Creek yielded a Pleistocene date. Although the date was not associated with cultural activity, it indicated significant changes in hydrology over time and suggests there is potential for investigating Pleistocene occupation on lower-order drainage lines.

In summary, the excavations at Rouse Hill and Kellyville had a number of key findings relating to site patterning for the area. It was found that sites were located in proximity to several creek lines. The order of the creekline had a bearing on the density of artefacts found on various landforms tested.

Higher artefacts densities were found on higher order creeks and lower densities along low order creeks. Consideration of changing hydrology should also be made during assessment, with lower order drainage lines having potential for intact older (Pleistocene) deposits to be found.

6.3.10 Therin – Windsor Road Upgrades, Rouse Hill to Vineyard (2002-2004)

Therin conducted a survey in association with Hyder Consulting for the proposed widening and upgrade of Windsor Road between Mile End Road, Rouse Hill and Henry Road, Vineyard. The area investigated by Therin encompassed a corridor of both sides of Windsor Road within the suburbs of Rouse Hill, Box Hill, Riverstone and Vineyard. Investigations were conducted in three phases:

- **Therin 2002:** Desktop analysis and survey between Henry Road, Vineyard to Boundary Road, Vineyard. Areas and sites referred to in this part of Therin's study area are referenced with the prefix WBH;
- **Therin 2003:** Desktop analysis and survey between Boundary Road, Vineyard and Mile End Road, Rouse Hill, encompassing part of the northern extent of the Riverstone East Precinct study area. Areas and sites referred to in this part of Therin's study area are referenced with the prefix WMB;
- **Therin 2004:** Targeted test and open area excavation of areas of archaeological potential as identified in Therin 2002, 2003.

As a result of these investigations, fourteen surface archaeological sites were identified, comprising six isolated artefacts, seven open campsites (artefact scatters) and one quarry. Of these sites, WMB3-4 was located within the Riverstone East Precinct. In both survey areas, Therin considered the entire road corridor to have potential for archaeological deposits. The surface survey also aimed to detect areas of ground disturbance that would impact on the integrity and significance of the archaeology, and as a result, as part of the sub-surface investigations, it was recommended that geotechnical work be undertaken prior to archaeological excavation, in order to identify areas of imported fill.

The geotechnical work concluded that sites WBH1-3 were all located in disturbed contexts with no residual topsoil. However, five other areas of archaeological potential were found to be mostly intact, apart from general stock grazing and ploughing disturbance. Four of these areas were chosen for archaeological excavation, all located on alluvial landforms in the vicinity of drainage lines associated with either Killarney Chain of Ponds or Second Ponds Creek. Excavation was undertaken in 4m² test pits, located at 20m intervals. A total of 969 stone artefacts (approximately 80% manufactured from silcrete) were recovered.

The highest densities (105.4/m²) were recovered from an excavation area on Windsor Rd in the north of the Riverstone East precinct. Due to the proximity of the whole site to the creek, little intra-site variation between artefact densities and distance to water was identified. However, artefact densities were found to be higher in areas of higher elevation. Salvage was recommended for this site (AHIMS ID# 45-5-3024) before road upgrade works be initiated.

6.3.11 AECOM: Schofields Precinct (2011)

AECOM undertook desktop review, survey and significance assessment for Aboriginal cultural heritage within the Schofields Precinct, located approximately 2km west of the Riverstone East study area. The survey aimed to confirm aspects of the desktop review, through an assessment of a sample of landforms concentrated on those landforms identified as archaeologically sensitive, and a reassessment of previously recorded sites.

The survey relocated a total of eight previously recorded sites (three of which were not yet registered), and located an additional eight previously unrecorded sites. These sites comprised a high density artefact scatter and PAD located adjacent to Eastern Creek, three high density scatters with

PAD located on the floodplains between Eastern creek and a tributary, four low density artefact scatters, a scarred tree and seven isolated finds. Four previously recorded sites (two artefact scatters and two isolated artefacts) could not be relocated and were presumed to be heavily disturbed or destroyed.

The high density artefact scatter associated with Eastern Creek was assessed as having exceptional scientific significance, and was recommended to be conserved within a riparian corridor. Further investigation was recommended for sites with a potential archaeological deposit, as well as for sensitive landforms that did not have surface material present. These landforms were identified as sandy rises and land adjacent to Eastern creek.

6.3.12 JMcD CHM – Schofields Road Upgrade (2006-2007)

JMcD CHM undertook a heritage assessment of 3,730m long stretch of Schofields Rd, encompassing the southern boundary of the Riverstone East Precinct. Prior to survey, the land was assessed for the impact of previous use through analysis of aerial photography. This analysis identified that the southern part of Schofields Rd was generally less disturbed than the north. The majority of the area of overlap between the JMcDCHM study area and the present study were assessed as being subject to high disturbance, with the exception of a small area of low disturbance in the vicinity of First Ponds Creek.

The length of Schofields Rd was traversed as part of the archaeological survey, and covered a variety of landforms including hill slopes, flats, floodplain and creek banks associated with First Ponds and Second Ponds Creeks. The survey identified one isolated artefact, approximately 800m from Second Ponds Creek, and an artefact scatter with ten artefacts and PAD, approximately 50m from First Ponds Creek. This artefact scatter is located directly over the road from the southern boundary of the Riverstone East Precinct. Three PADs were also located on the southern side of Schofields Rd.

A revised assessment was undertaken for this project in 2011 (Jo McDonald Cultural Heritage Management/GML 2011), and a further two PADs were identified. One of these was associated with an isolated artefact: SCR/UPG3 + PAD, (AHIMS ID# 45-5-4112), located within the south east corner of the Riverstone East Precinct. This site was later the subject of sub-surface testing by KNC (2012b), who identified a further three artefacts.

The site was re-assessed by Artefact Heritage Services (AHS) in 2013 as being of low scientific significance (see below). According to AHS, an AHIP to destroy the site had been granted, so it is highly likely that this site has since been disturbed or destroyed.

6.3.13 KNC – Schofields Road Upgrade (2012b)

KHC were engaged by the Roads and Maritimes Services to assess the archaeological impact of the widening of Schofields Rd between Tallawong Road and Veron Road, encompassing the area studied by Jo McDonald in 2007, as well as the southern boundary of the Riverstone East Precinct. The project identified four sites that would be impacted by the upgrade, and made recommendations for an AHIP to be sought for the entire Schofields Rd corridor.

6.3.14 Artefact Heritage Services – Rapid Transit Rail Facility (2013)

AHS prepared an ACHA Report for the development of a Rapid Transit Rail Facility, as part of the North West Rail Link project. The area investigated was located on the north west corner of Tallawong Rd and Schofields Rd, within the south east corner of the Riverstone East Precinct. Three previously identified sites were the main subject of AHS' study, all of which are also located within the Riverstone East study area. These sites are:

- SCR/UPG3 + PAD (AHIMS ID# 45-5-4112), a low density artefact scatter, first identified by JMcD CHM, then later expanded and reassessed by KNC and GML;

- Schofields Rd AS (AHIMS ID# 45-5-4188), an artefact scatter located within a disturbed area that had been used for market gardening, originally identified by GML;
- 65 Schofields Road, an isolated artefact, located by GML in 2012 on a vehicle track. This site is not listed on the AHIMS database.

AHC undertook a survey of nine properties within their study area, and concluded that most of the area had been highly disturbed as a result of excavation, market gardening and ploughing. No additional sites were located as a result of the survey, and the previously identified sites were all assessed as being of low significance due to the level of disturbance. As an AHIP had already been granted for the impact of #45-5-4112, and no salvage of cultural heritage was proposed by the Aboriginal stakeholders, no further management recommendations were required for the proposed facility.

6.4 The Archaeological Resource

A number of observations can be made regarding Aboriginal archaeological site patterning for the north western Cumberland Plain, due to the number of detailed and broad-scale studies undertaken in the Riverstone region. Archaeological investigations of the wider Cumberland Plain have also been extensive, including site surveys, excavation and salvage works. From these studies, numerous archaeological models have been developed.

A trend in the site patterning of the area indicates that regardless of landform type, stream order is of primary importance in determining the scale and complexity of the sites. Sites with higher artefact densities occur near high order drainage lines, while low densities occur near low order drainage lines. The scale and assemblages that result from excavations in the vicinity of higher order drainage lines have been interpreted as representing a higher level of occupation. The stone assemblages in these areas have shown evidence of a variety of activities and tools and repeated occupation whereas sites near low order drainage have shown evidence of transient and casual occupation. The scale of occupation near high order drainage lines has been attributed to the greater number of resources in these areas. Excavations have also shown that the scale of stone assemblages decreases away from a water source but their composition or complexity does not necessarily follow the same trend.

Sensitive landforms include alluvial landforms such as terraces, creek flats and floodplains, as well as the crests of elevated landforms such as hills, ridges and sandy rises. These landforms are more likely to contain high density sites that show evidence of knapping activities. However, low density artefact scatters have been found on the surface of all landforms. These results are indicative of a 'background scatter' of occupation occurring across the Cumberland Plain with sporadic areas of extensive or repeat usage.

Assemblages have shown how people used and carried the material around the landscape from a series of known raw material sources (most notably silcrete, quartzite, tuff and indurated mudstone). Several completed excavations indicate that the use of raw materials from a known quarry (such as the outcroppings of silcrete at Plumpton Ridge and Riverstone) was preferred over local river/creek gravels.

Analysis also suggests that the relatively small size of the stone artefact assemblages indicates increased curation and the movement of raw material significant distances from the known quarry sites in several cases. A number of silcrete sources relating to St Marys geological formation, have been identified in the local area. Assemblages in the vicinity of raw material sources have been interpreted as being used to test the durability and usefulness of the raw material prior to leaving the source.

Following the trend of the archaeology of the Sydney Basin, the majority of sites in the north west Cumberland Plain have been typologically dated to the late Holocene (4,000 to 1,000 BP). The area may have potential for evidence of Pleistocene occupation, with excavations at Second Ponds Creek revealing intact Pleistocene deposits, although no artefactual material was recovered. Recent dating by AHMS (in prep) have also recovered a number of OSL ages for assemblages along Eastern and Caddies Creek, and similarly demonstrate ages of 4,000-2,000 years BP for these types of assemblage.

6.4.1 Summary

For the purpose of this assessment and the archaeological predictive modelling presented in **Section 7.2.4**, the following factors have been identified and implemented from the review of the previous archaeological literature and AHIMS data:

- The majority of recorded sites in the North West Growth Centre are artefactual (either artefact scatters or isolated finds), followed by PADs and scarred trees;
- There is also potential for silcrete sources to be located within the study area;
- Stream order is of primary importance in determining the density and scale of the sites;
- Sites with low densities of artefacts have been identified on all landforms adjacent to low order drainage lines. These include floodplains, creek banks, elevated spurs, lower slopes, mid slopes and upper slopes.
- Archaeological sites near high order drainage lines occur on lower slopes, floodplains and ridges. These sites have high artefact densities and demonstrate a variety of tool types, frequent or repeat use, and complex assemblages;
- Archaeological sites near low order drainage lines occur on all landforms, have low artefact densities and demonstrate evidence of transient use, which in turn is evidence of short term or casual occupation;
- The scale of stone assemblages decreases away from a water source but there are no marked changes in the composition or complexity of the assemblages;
- Distance to raw material sources is another factor that influences the location and distribution of sites across the landscape; and
- Areas of historical and/or modern disturbance (such as buildings, roads, services, market gardening, etc) are severely detrimental to the preservation and integrity of archaeological sites. Where present, sites located in disturbed contexts will be low in density and significance.

7 FIELD INVESTIGATIONS

The following sections describe the results of a survey carried out by AHMS between the 5th and 12th June, 2014. The principal aim of the survey was to identify exposed cultural material (i.e. surface sites) and to assess disturbance levels. The survey aimed to identify areas of archaeological potential, landforms, vegetation patterns, geomorphic units, and areas of disturbance.

The investigation was also used to assess the extent to which past land-uses may have affected natural soil profiles. This information was used to assess the depth and potential integrity (intactness) of natural soil profiles across the study area and the likely impact of future development.

The results of the survey were used to help inform planning and design and to inform development of management recommendations for the study area.

7.1 Survey Methodology

The archaeological survey was designed to balance a comprehensive and representative sample of landforms across the study area and comply with landowner requirements. The survey team included Fenella Atkinson, Michelle Lau & Liz Foley of AHMS. Representatives of each Registered Aboriginal Party were present during the survey (the participants are listed in **Table 1, Section 4.1.4**):

The field survey was undertaken in the following stages:

Stage 1 – An analysis of topographic maps and recent aerial photographs of the study area was undertaken prior to the survey to identify landforms across the study area and to identify areas of probable ground surface exposure in the form of tracks, unsealed roads, dams, cuttings and areas of erosion. These areas were targeted during the survey because they provided an opportunity to identify surface artefact scatters and to investigate exposed soil profiles.

Properties that had been subject to extensive ground disturbance were neglected in favour of undisturbed properties with high ground surface visibility in order to maximise the chance of identifying surface sites and potential archaeological deposits. The properties selected for survey also reflected the range of landforms present within the subject area. Features involved in sample selection included a bias towards those properties considered to have higher archaeological potential, specifically, properties that were within 250m of, or contained sections of First Ponds Creek.

Stage 2 – AHMS sought contact with the landowners of the selected properties, who had agreed to be a part of the study to arrange a date for the archaeological survey to be conducted. AHMS also sought advice from each landowner on access issues and discussed requirements which some landowners had stipulated. A map showing the participating landholdings is shown on **Figure 17** and the property details are shown in **Table 5**.

Stage 3 – Archaeological survey of the selected properties was conducted on foot across each property, with a focus on areas of ground surface exposure. The team typically walked in transects across the extent of each property with a spacing of 5m between each team member. For the purposes of sampling, each property is considered a survey unit, which is further broken up by landform in **Table 5**.

Areas of erosion and ground exposure were examined for archaeological evidence such as stone artefacts, charcoal and shell. Ground surfaces and cuttings were also examined to determine the degree of soil disturbance, erosion and potential for archaeological deposits below current ground. Mature trees were examined for evidence of scarring, axe marks and/or old footholds.

Stage 4 – Surface artefact scatters found during the surveys were recorded in detail using a proforma developed for field recording. The location and extent of each surface site was recorded with a handheld GPS. Field notes were made and photographs taken to document landscape configuration, soil profiles, soil disturbance, ground visibility and vegetation types. During the survey we also sought to relocate previously registered Aboriginal places (access permitting).

7.2 Survey Results

A total of 22 landholdings were surveyed within the Riverstone East Precinct (**Figure 17**). Details of the accessible properties and influences on effective survey coverage for each property are outlined in **Table 4** and **Table 5**.

The Riverstone East Precinct comprises predominantly rural land, with a mixture of sealed and unsealed roads. Lot sizes were generally large, comprising one dwelling, sheds, dams and large open spaces areas for cattle or horse grazing. Lot sizes tended to be smaller towards the southern end of the precinct, though these were still predominantly rural properties.

The landscape between First Ponds Creek to the west and Second Ponds Creek to the east of the precinct comprised undulating hills and spur crests, with slopes declining towards major creeks as well as a number of minor drainage channels that cross the survey area.

Survey coverage aimed to balance sampling of areas of ground surface exposure on these properties with detailed coverage of areas of moderate – high sensitivity as indicated in the predictive model (**Section 6.4.1**). The survey also aimed to sample each of the landform types, providing coverage of crest, slope and floodplain landforms. The survey was particularly comprehensive in areas demonstrating good ground surface visibility.

Effective survey coverage during the survey was generally low. At the time of survey visibility was typically low, as recent rains had encouraged vegetation growth. The results of the survey are summarised by survey unit (property) in **Table 5**, and discussed below.

Most of the properties had extremely low visibility at the time of survey (typically <5%). Low – high grasses covered most of the study area limiting ground surface exposure. Properties that had been chosen on the basis of recent aerial photography due to the presence of distinct areas of exposure had become overgrown due to a recent period of uncharacteristically wet weather.

Areas of higher ground surface visibility (50-80% visibility) were typically restricted to isolated patches under trees, along tracks and in areas of gardening, horse trampling, and natural exposures caused by slope wash.

Table 4. Table of effective survey coverage according to landform

Landform	Sum of Area (m ²)	Effective coverage area (m ²)	Effective coverage %	Number of sites	Number of artefacts
Waterway	55127.5	53.26375	0.43	0	0
Crest	179229.6	5842.299	3.65	4	11
Flat	44076	633.42	1.50	0	0
Floodplain	46761.5	3004.86	6.20	1	1
Slope	757391.4	72682.24725	6.93	6	14
Total	1082586	82216.09	4.32	12	26

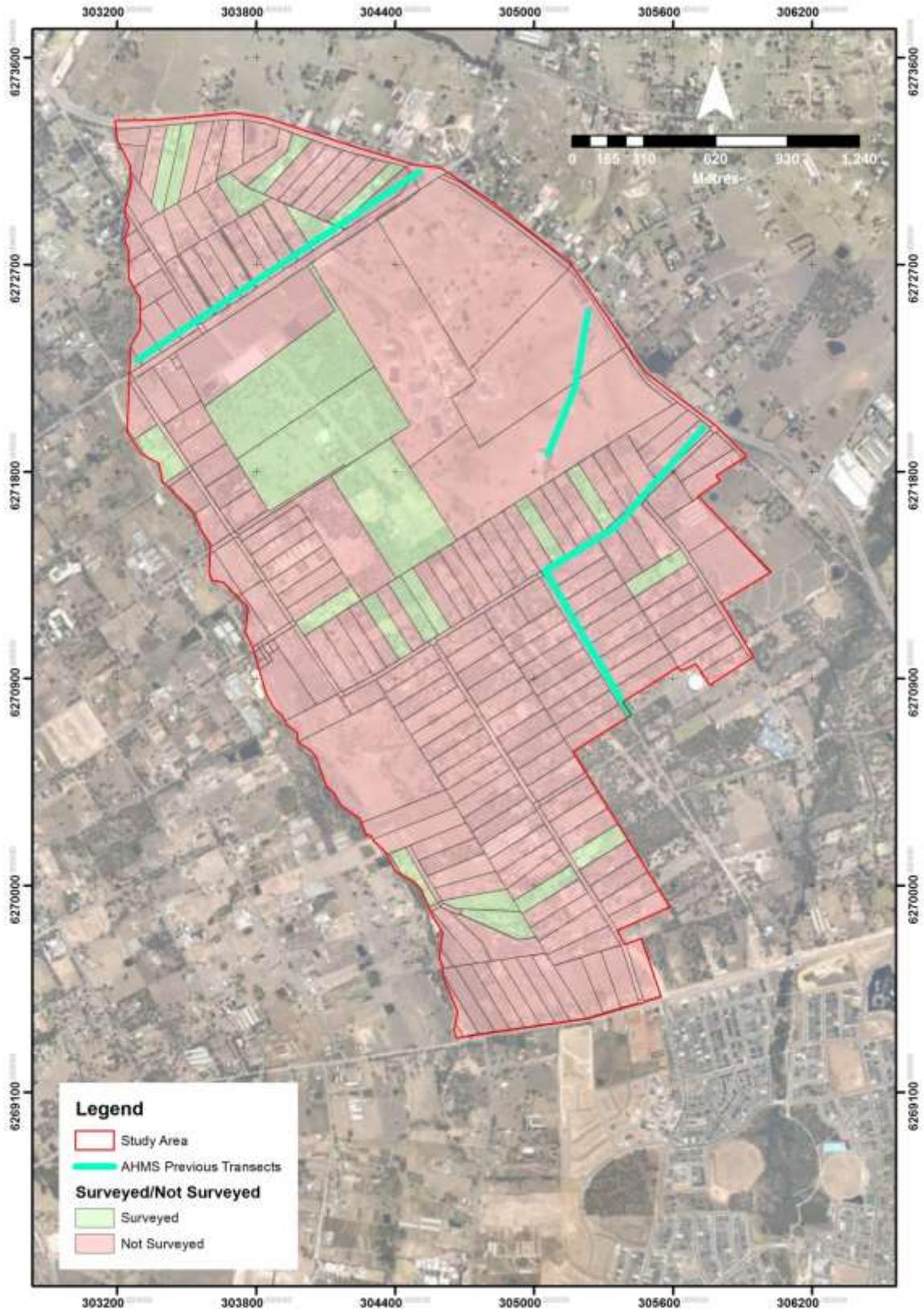


Figure 17. Outline of areas traversed as part of the survey, which largely related to accessibility of private property. Note that large parts of First Ponds Creek and the Riverstone meatworks were not surveyed, since access was not permitted. However, much of this area has been investigated through previous studies by AHMS (see Section 6.3.1)

Table 5. Results of the field assessment, including landform, disturbance and survey coverage

Property Address	Area (ha)	Landform	Landform area (m ²)	Disturbance	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage %	Sites	
3	Clarke Street	2.819	Slope	28190	Market gardening, Dam on First Ponds Creek. House and sheds on cut and fill.	60	50	8457.00	30	Riverstone East 1 (see Table 7)
35	Oak Street	2.247	Floodplain	22470	Cut for temples and shrines. Imported soils on creekline for meditation walk. Concrete carpark.	2	20	89.88	0.4	Carpark abuts site boundary of A7
259	Riverstone Road	41.66	Ridge crest	83320	Cut and fill for house, sheds and tracks	5	5	208.30	0.25	None
			Ridge slope	291620	Cattle tracks	5	5	729.05	0.25	RV2; RV Pole 30 (see Table 7)
			Drainage line	41660	Dams	0	0	0.00	0	None
270	Riverstone Road	16.54	Slope	124050	Market gardening. Extensive cut and fill for tracks and sheds. Powerlines run through.	80	50	49620.00	40	None
			Flat	24810	Imported fill for large dams	10	10	248.10	1	None
			Crest	16540	Cut and fill for house and tracks	10	10	165.40	1	Riverstone East 2 (see Table 7)
Lot 1	Riverstone Road	9.971	Crest	14956.5	Horse trampling	20	20	598.26	4	Riverstone East 6 (see Table 7)
			Slope	79768	Horse trampling, sheds.	20	20	3190.72	4	Riverstone East 7 (see Table 7)
			Drainage line	4985.5		5	5	12.46	0.25	None
166	Guntawong Road	2.126	Crest	3189	House, driveway and horse trampling	5	5	7.97	0.25	None

Property Address	Area (ha)	Landform	Landform area (m ²)	Disturbance	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage %	Sites	
		Slope	17008	Horse trampling	50	50	4252.00	25	None	
		Drainage line	1063	Dam	0	0	0.00	0	None	
156	Guntawong Road	2.006	Slope	19057	Cut and fill for house, sheds and tracks	5	5	47.64	0.25	None
		Drainage line	1003	Embankment for creek crossing	0	0	0.00	0	None	
150	Guntawong Road	1.933	Slope	17397	Cut and fill for house, sheds and tracks	5	5	43.49	0.25	None
		Drainage line	966.5	Dam	0	0	0.00	0	None	
		Crest	966.5	Road construction	5	20	9.67	1	Riverstone East 4 (see Table 7)	
1322	Windsor Road	2.557	Floodplain	24291.5	Imported fill for old racing track. House, shed and tracks.	20	60	2914.98	12	Riverstone East 3 (see Table 7)
		Drainage line	1278.5		0	0	0.00	0	None	
1316	Windsor Road	2.3	Slope	23000	Cut and fill for house, dam and sheds	10	10	230.00	1	None
307	Garfield Road East	2.232	Spur crest	15624	Cut and fill for house and shed. Gravel pony trotting track.	10	20	312.48	2	None
		Slope	6696	Natural silcrete eroding out of slope	10	10	66.96	1	Riverstone East 5 (see Table 7)	
315	Garfield Road East	0.5066	Spur crest	506.6	House, swimming pool and sheds.	5	5	1.27	0.25	None
		Slope	4559.4	Ploughing in northern corner. Farm dam.	5	5	11.40	0.25	None	

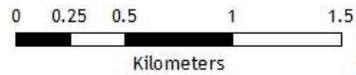
Property Address	Area (ha)	Landform	Landform area (m ²)	Disturbance	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage %	Sites	
90	Guntawong Road	2.065	Creek	1032.5	Dam	0	0	0.00	0	None
			Slope	19617.5	Cut and fill for house, sheds and tracks	10	5	98.09	0.5	None
62	Guntawong Road	2.095	Slope	20950	Cut and fill for house. Stock trampled. 2 remnant trees in neighbours yard.	5	5	52.38	0.25	None
97	Worcester Road	2.209	Crest	2209		5	5	5.52	0.25	None
			Slope	18776.5	Cut and fill for house, pool, sheds and dam	5	5	46.94	0.25	None
			Creek	1104.5		0	0	0.00	0	None
28	Clarke Street	2.119	Slope	21190	Extensive cut and fill for house, sheds and concrete tracks. Ploughed for crops in rear yard. Stock trampling.	50	50	5297.50	25	Riverstone East 8 (see Table 7)
67	Tallowong Road	2.04	Ridge crest	2040	Horse trampled	10	40	81.60	4	None
			Slope	17340	Horse trampled, House and sheds	10	20	346.80	2	None
			Drainage line	1020	Dam, artificial trench	20	20	40.80	4	None
6	Oak Street	2.011	Spur crest	14077	Was gardened, now overgrown	5	5	35.19	0.25	None
			Slope	6033	House and driveway	5	5	15.08	0.25	None
74	Tallowong Road	2.028	Water hole	1014		0	0	0.00	0	None
			Flat	19266	Cut and fill for three houses, one dirt vehicle track. Ploughed in the past, now overgrown	10	20	385.32	2	None

Property Address	Area (ha)	Landform	Landform area (m ²)	Disturbance	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage %	Sites	
1220	Windsor Road	2.344	Crest	9376	Extensive fill across most of crest due to house, sheds and gardening	5	5	23.44	0.25	None
			Slope	14064	Dam	5	5	35.16	0.25	None
1264	Windsor Road	2.055	Crest	2055	Horse trampling	20	20	82.20	4	None
			Slope	18495	Artificially flattened in areas with fill for horse dressage arena, sheds and house. Horse trampling	5	5	46.24	0.25	None
2	Oak Street	2.395	Spur crest	14370	House and driveway, eroded vehicle tracks	60	50	4311.00	30	Riverstone East 9 (see Table 7)
			Slope	9580	Driveway	10	10	95.80	1	None



Legend

- Riverstone East Precinct
- ◆ New sites
- Natural Silcrete Occurrence
- ▲ AHIMS Listed Sites
- ▲ RV Pole Sites
- Drainage
- Disturbance
- Elevated landforms



Map date: 11.07.2014
 Prepared by: Liz Foley (AHMS)
 Data: Nearmap, AHIMS
 Projection: GDA94 MGA Zone 56

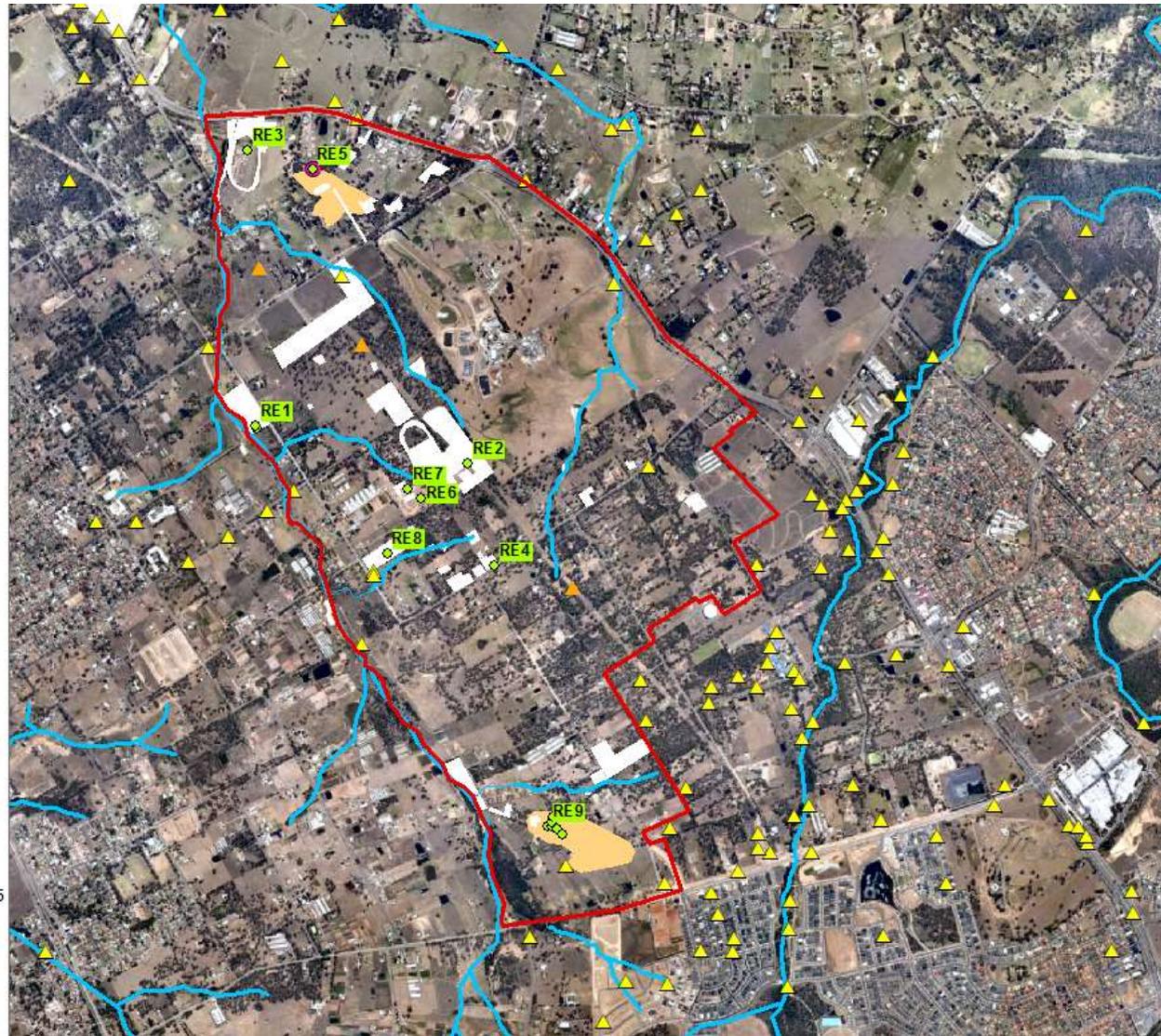


Figure 18. Results of the survey: Sites, disturbance and landforms of interest that were identified as part of the field investigations.

7.2.1 Landforms

The key landform feature identified in the background review of the subject area was First Ponds Creek, which flows approximately north-south along the western margin of the Riverstone East Precinct. The First Ponds Creek drainage channel is a narrow, shallow waterway that has been dammed in a number of places. A number of properties within the precinct lie adjacent to or comprise part of the creek channel. Few of these properties granted permission to the DPE to participate in the study, and even fewer provided access at the time of the survey. As a result, two sections of land adjacent to First Ponds Creek were investigated. Both sections were disturbed by modern land-use practices, although a low density of artefacts was identified in areas of high visibility caused by market gardening at 3 Clarke St (Riverstone East 1, **Figure 18**).

Minor drainage channels that cross the precinct have been substantially modified as a result of agricultural and pastoral land uses, and were not easily identifiable during the survey. Where identified, these were typically overgrown and/or disturbed through dam construction, and ground surface visibility was low. One particular drainage channel, located parallel with Guntawong Rd, was particularly overgrown, and two isolated finds were identified in association with it, as part of the survey. Part of the waterway that extends from the north-east has been identified with sites previously (**Figure 18**).

Slope gradients across the study area were generally low, particularly in the vicinity of the creeklines. As demonstrated in **Table 4**, effective survey coverage was highest for sloping landforms, and correspondingly, yielded the highest number of sites. This landform was also the most highly surveyed landscape element, due to the high proportion of the precinct that is made up of gently sloping land.

Hill and spur crests were identified throughout the precinct, but these had primarily been used as the basis for roads, or were chosen as the location for houses, thus obscuring the potential of sites in these areas. Despite the generally low level of effective coverage for this landform, a number of sites were identified on crests (**Table 4, Figure 18**).

The floodplain landform was analysed separately to higher land that was identified adjacent to First Ponds Creek (which mainly falls within the slope category). The floodplain was considered to be consistent with the 'flood-prone land' category identified within the predictive model, and comprises low-lying land in the vicinity of First Ponds Creek. This landform was largely present within the northern part of the precinct. Despite high effective coverage (relative to other landforms surveyed), only one artefact was identified in this context. It should be noted that this area had also been highly disturbed by the construction of recent pipeline installations.



Figure 19. Area of First Ponds Creek showing recent disturbance of the floodplain through gardening and water pipeline installation.



Figure 20. Example of gently sloping land with patches of visibility around trees.

7.2.2 Disturbance

One constraint to the predictive model developed by AHMS in 2009 that had been identified as a result of subsequent ground-truthing investigations (AHMS 2010, 2011b, 2012) was the over-representation of areas of remnant native vegetation. The survey was, therefore, used as an opportunity to improve the extent and nature of past ground disturbance within the predictive model, which had previously been assessed from historical and recent aerial images..

As a result of the survey, the vegetation of the Riverstone East precinct consists predominantly of modified native vegetation (immature eucalypts). Mature vegetation was limited to occasional isolated ironbark eucalypts (**Figure 21**). Several of the longer-term residents of the area communicated to us that they believed that the majority of the Riverstone East Precinct had been cleared due to the prior use of the land for grazing.

Other types of disturbance within the study area were extensive and caused by a wide range of factors. The following specific disturbances to the study area were observed during the survey:

- Clearing of native vegetation;
- Market gardening;
- Construction of dams;
- Construction of houses and out-buildings;
- Construction of formal gardens around the periphery of houses;
- Construction of sheds for farm activities;
- Modification of the landscape for horse dressage and riding;
- Installation of the recent pipeline installations;
- Erosion from horse, cow, sheep and goat trampling;
- Construction of major and minor roads throughout the study area;
- Construction of driveways and path networks;
- Construction of farm tracks; and
- Installation of boundary fences.

These impacts have been previously discussed in the background study and have been confirmed by field inspection undertaken during the survey. Areas of disturbance have been mapped for areas surveyed on foot in **Figure 18**. Aspects of the predictive model have also been amended to reflect the absence of remnant native vegetation, which was used as a proxy for sub-surface potential in the original modelling study.

Furthermore, results from previous studies corroborate that it is unlikely that archaeological material will be located within areas of cut and fill disturbance. These areas comprise substantially modified and/or highly disturbed ground resulting from cut and fill for construction of dams, buildings and the water pipelines. This is likely to have resulted in the complete removal of archaeological deposits from these parts of the study area.



Figure 21. An example of an isolated mature eucalypt surrounded by recent growth.



Figure 22. Ground disturbance caused by market gardening. Despite good visibility, these areas revealed few Aboriginal objects and suggest loss of any such deposits through this activity.



Figure 23. Cut and fill disturbance associated with residential construction.

7.2.3 Aboriginal Cultural Heritage

As a result of the survey, nine new Aboriginal sites were identified within the Riverstone East Precinct. Where possible, the locations of previously recorded sites were also investigated. However, due to access issues, a large proportion of the previously identified sites were not re-visited. These sites are summarised in **Table 6** and mapped on **Figure 18**.

Table 6. Summary of previously recorded sites within the study area.

Site ID	Site Name	Site Type	Artefact Density	Relocation information	Destroyed?
45-5-3024	WMB Area 3	Artefact scatter	290	Access not permitted	Yes
45-5-4066	1004-46	Artefact scatter, PAD	1	Access not permitted	No
45-5-4067	1006-46	Artefact scatter, PAD	500+	Access not permitted	No
45-5-4079	1018-6	PAD	-	Access not permitted	No
45-5-4080	1019-7	Scarred Tree	-	Access not permitted	No
45-5-4081	1020-6	PAD	-	Access not permitted	No
45-5-4082	1021-6	PAD	-	Access not permitted	No
45-5-4112	SCR/UPG3 + PAD	Artefact scatter	2	Access not permitted	Yes
45-5-4188	Schofields Road AS	Artefact scatter	6	Access not permitted	Yes
45-5-4311	A7 Archaeological Complex	Artefact scatter, PAD, & Modified Tree	1,280+	Access not permitted. Area to south of site assessed, but has been disturbed (carpark) with no surface artefacts visible.	No
45-5-4065	RV 30/1003-6	PAD	<1	Initially identified as of high potential, recent excavations indicate a background scatter only.	No
NA	RV2	Artefact scatter	29	Revisited – location is overgrown, no surface artefacts identified.	Yes
NA	RV Pole 26	Artefact scatter	40	Access not permitted	Yes
NA	RV Pole 30	Artefact scatter	5	Revisited – location is overgrown, no surface	Yes

Site ID	Site Name	Site Type	Artefact Density	Relocation information	Destroyed?
NA	RV Pole 39	Artefact scatter	3	artefacts identified.	
NA	WMB3/1005-4	Artefact scatter	-	Access not permitted	Yes
NA	WMB4	Artefact scatter	-	Site destroyed through road widening	Yes
				Site destroyed through road widening	Yes

Table 7. Previously unrecorded Aboriginal sites located as a result of the survey.

Site Name	Easting	Northing	Site type	Artefact Density	Landform	Site extent
Riverstone East 1	303544	6271978	Artefact scatter	7	Gentle slope within 50m of First Ponds Creek	18m x 4m
Riverstone East 2	304592	6271790	Isolated find	1	Vehicle track on hill crest	1m x 1m
Riverstone East 3	303501	6273334	Isolated find	1	Floodplain	1m x 1m
Riverstone East 4	304728	6271288	Isolated find	1	Road verge on crest landform	1m x 1m
Riverstone East 5	303823	6273240	Artefact scatter	5	Hill slope with naturally occurring silcrete	10m x 2m
Riverstone East 6	304362	6271620	Isolated find	1	Hill crest	1m x 1m
Riverstone East 7	304297	6271663	Isolated find	1	Upper slope	1m x 1m
Riverstone East 8	304193	6271350	Isolated find	1	Gentle slope	1m x 1m
Riverstone East 9	305010	6270007	Artefact scatter	8	Spur crest	85m x 80m
Total				26		

A total of 26 stone artefacts, associated with nine locations were recorded as a result of the survey. In addition to these sites, one outcrop of heat-fractured, naturally occurring silcrete was identified in the vicinity of Riverstone East 5 (**Figure 18**), as well as in isolated occurrences or dispersed low densities across the precinct. Only those pieces of stone with diagnostic attributes of deliberate flaking were recorded as artefact sites. The majority of sites were isolated artefacts, which were found in a variety of contexts, including on the surfaces of slope, crest and floodplain landforms (

Table 7).

Three higher density sites were located:

- Riverstone East 1: A scatter of seven artefacts located in a market garden, approximately 50m from First Ponds Creek (**Figure 24, Figure 25**).
- Riverstone East 5: A large scatter of naturally and heat-fractured silcrete eroding out of a hill-slope. Of the scatter, approximately 20 pieces showed ambiguous evidence of human modification, and five pieces were recorded as artefacts owing to the unambiguous evidence for human flaking (**Figure 28, Figure 29**).
- Riverstone East 9: A dispersed scatter over a highly eroded spur crest and adjacent upper slope, comprising eight silcrete artefacts. This area was previously investigated by AHS for the North West Rail Link Rapid Transit Rail Facility. However, this particular parcel of land was not surveyed as part of their study (AHS, 2013). The site was located approximately 300m from First Ponds Creek, and was expected to continue into the neighbouring property which although it was surveyed had 0% visibility (**Figure 30, Figure 31**).

These sites were all relatively low in artefact density, and therefore have low potential for providing meaningful archaeological information about occupation of the area. It is highly likely that there are more sites within the area, and that they simply have not been identified due to low ground surface visibility, inaccessibility to several areas and/or that they are buried.

Recent investigations undertaken by AHMS at the A7 Archaeological Complex site provide an indication of the potential for higher density sites within the study area, which can be uncovered through sub-surface testing. Although access to this site was not granted as part of the present study, AHMS' involvement with the archaeological assessment for the Sydney Water pipeline has allowed us to access as yet unpublished information (see **Section 6.1.1**). The A7 complex is primarily located on the eastern bank of First Ponds Creek (**Figures 13-15**), and comprises surface artefacts, artefact bearing deposits and one scarred tree. Salvage excavation was undertaken in preparation of water infrastructure for the North West Growth Centre, which yielded artefact densities on average $>42/m^2$ and overall totals in excess of ~1,500.

The A7 complex comprised relatively shallow soils, in some areas only 20cm deep. These soils along the length of the complex prove to be variable depending on location. The southern end of the site was heavily disturbed by market gardens and agricultural works; and very few Aboriginal objects were recovered, further highlighting the impact of disturbance on these types of deposit. The northern end soils were deeper and had a darker profile, possibly indicative of a former swamp. Few artefacts were recovered from the northern and southern ends of the site.

The highest densities were recovered from undisturbed sandy duplex soils, on a gentle slope close to an area of First Ponds creek where the watercourse diverges around a small island (RV 27). The artefacts recovered were mainly manufactured from red silcrete, with diagnostic tools comprising small tool microliths, Bondi points and Geometric microliths. These tools would place occupation of the area to the Holocene era, similar to most other high density sites identified within the Cumberland plain.



Figure 24. Artefacts recorded as part of Riverstone East 1.



Figure 25. Location of artefacts in market garden at Riverstone East 1. First Ponds Creek is located approximately 30m to the right of the photograph.



Figure 26. Silcrete artefact recorded as site Riverstone East 3.



Figure 27. Location of Riverstone East 3 on floodplain of First Ponds Creek, in area of good ground surface visibility. The location of the creekline is depicted by trees in the top-left of the photograph.



Figure 28. Stone artefacts found within a scatter of naturally fractured silcrete at Riverstone East 5.



Figure 29. Photograph showing the location of Riverstone East 5 on a hill slope. A concentration of silcrete was identified in this area of high surface visibility.



Figure 30. Silcrete core identified as part of Riverstone East 9.



Figure 31. Location of artefacts recorded as Riverstone East 9.

7.2.4 Conclusions

The results of the field survey are consistent with the regional models and previous local studies outlined in preceding sections. Namely, that the cultural materials of the study area would be dominated by surface and buried artefactual material, with lesser occurrences of other site types. The results of the survey are generally consistent with the predictive model, where stream order is the primary determinant of how large and/or complex archaeological sites are likely to be. The results of the survey identified only low density sites and PADs in association with low order drainage channels (**Figure 14**). However, investigations undertaken for 'Water Related Services for North-West and South-West Growth Centres' (AHMS 2009-2013) identified more complex and significant sites within the study area, in the vicinity of First Ponds Creek, which is the largest creek in the study area (**Section 6.1.1.**).

The limitations of relying on surface data to predict site distributions have been discussed during previous studies undertaken throughout the Cumberland Plain (e.g. McDonald, 1997). This means that surface survey alone may not always provide a comprehensive inventory of sites in the study area. High artefact densities were recovered from previously recorded sites such as A7 Archaeological Complex site, and WMB Area 3, where excavation has occurred. These results indicate that, although a generally low density of artefacts was present across the precinct, there is potential for more meaningful archaeological information to be obtained through test excavation.

8 REGIONAL CHARACTER

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

8.1 Archaeology

Based on the regional and local archaeological context of the precinct, a number of conclusions can be reached regarding the Aboriginal archaeological potential of the subject area. From a regional perspective, exceptionally high density and complex archaeological sites have been found in the vicinity of Eastern Creek, South Creek and Second Ponds Creek. These same types of sites can be expected along First Ponds Creek, which is similarly a large, permanent water body. There is some evidence of this already through the excavations and recovery of large numbers of Aboriginal objects at the A7 Archaeological Complex site on the banks of First Ponds Creek. Other areas such as smaller creeks, ridgelines and hilltops, have also been shown to contain cultural material, albeit of less complexity and scientific significance than along the major river systems.

Archaeological material in this region is commonly composed of stone artefacts in varying densities, along with lesser proportions of other site types, such as scarred trees, grinding grooves and quarries. Stone materials are often dominated by silcrete and quartz, and typologically date to up to a few thousand years in age. The findings of the field survey are consistent with these predictions. Nine previously unrecorded sites were documented; all consisted of low density artefact scatters dominated by silcrete raw materials. The 17 previously identified sites in the study area, also consisted of stone artefacts. Extensive clearing of native vegetation has occurred in the study area significantly reducing the potential for scarred trees.

Based on these results, the following areas have been highlighted as of archaeological importance for the study area (unless impacted upon by prior disturbance-see below):

- Areas within 250m of First Ponds Creek, and associated tributaries /creeklines.
- Elevated landforms identified in **Figure 18**.
- Areas within 100m of minor tributaries of First Ponds Creek/low order waterways.

Any undisturbed portion of these landforms could reasonably be expected to contain sub-surface Aboriginal objects.

Excavation within the A7 Archaeological Complex site, which was recently undertaken for another project, illustrated the potential for high density sites in this area. A significant finding of the background review was the limitation of surface data in understanding the full distribution and nature of sites generally, within the region. This has important implications for understanding the archaeological potential of the Riverstone East precinct.

8.2 Existing Disturbance

While the regional and local archaeological records suggest varying levels of moderate to high archaeological potential, past experience in the area indicates that this is also heavily influenced by the nature and extent of the land use history of the area. A review of the land use history was therefore undertaken to determine areas of disturbance and low archaeological potential. Previous assessments (e.g. **Section 6.3.1**) have suggested that remnant vegetation may be used as a proxy for the survival of cultural materials, due to a perceived lack of disturbance; however during the survey we noted that no remnant vegetation was identified within the study area. Therefore areas that

had previously been identified as undisturbed and containing high integrity due to remnant vegetation have now been demonstrated to have been impacted. Therefore this indicator has now been removed from the predictive model for the area (**Table 8**). Isolated finds or low density artefact scatters occur even in disturbed contexts. This mean disturbed area may still have some archaeological potential. These areas are therefore considered to have low archaeological probability, rather than very low (**Table 8**).

8.3 An Archaeological Model for the Study Area

The distribution of Aboriginal objects, as well as determination of disturbance, can be used to refine elements of the predictive model discussed in **Section 6.3**, and thus provide an indication of where sub-surface deposits containing archaeological material are more likely to occur. The results have allowed for the refinement of the predictive model, the updated versions of which can be seen in **Figure 32** and **Table 8**.

The original predictive model (**Figure 14**) was contrived based on a values-system, where environmental factors were accorded a positive value and disturbance factors attributed a negative value. The mathematical result of these factors was directly interpreted as a probability rating which ranged between Low and Very High. **Figure 32** incorporates the original model's parameters (**Table 8**), and incorporates the findings of this assessment (**Sections 7, 8.1** and **8.2**). Key changes include:

- The presence of sites on elevated landforms that are some distance from a high order stream suggests that this landscape element could be added as an additional variable in the sensitivity model (**Figure 18**). These landforms are regarded as having high archaeological probability.
- Areas of disturbance which would impact on the likelihood of cultural heritage include those kinds of disturbances such as housing, buildings and underground infrastructure that would have resulted in a significant amount of topsoil disturbance. Other forms of disturbance such as trampling and scuffage from horse and cattle are not considered to impact heavily on site integrity, except in some individual cases where extensive trampling has all but removed intact topsoils. These areas have now been incorporated into the model as areas of low archaeological probability.
- Disturbance levels along First Ponds Creek and other creeklines were generally high; and works at the A7 Archaeological Complex site suggest such disturbance is detrimental to the survivability of buried cultural materials even when present in large numbers. Therefore, all drainage channels within the study area have been reduced to moderate/high in archaeological probability.
- The original predictive model included presence of remnant vegetation as contributing to archaeological probability. As the survey confirmed that no large areas of original vegetation remained, the probability rating was downgraded by one level in these areas.
- The elevated landforms associated with Riverstone East 5 and Riverstone East 9 have been accorded a higher value, resulting in a high archaeological probability rating.
- The inclusion of previously recorded PADs as areas of high archaeological probability. These PADs predominantly comprise those identified by AHMS' assessments of the North West Growth Centre. The PADs identified in the A20 precinct which appeared

likely to extend into the Riverstone East Precinct could not be ground-truthed as access was not permitted, so these are excluded from the model.

The probability values identified within the assessment relate directly to management recommendations regarding conservation and further investigations, detailed below in **Section 10**.

Table 8. Variables that were attributed values to calculate archaeological potential (from AHMS 2009) and revised for this study

Archaeological Probability Classification	Environmental variables/features present (AHMS, 2009)	Environmental variables/features present (This study)	Locations within the study area
Very High	Is within 250 m of a creekline; and Is on a lower slope or flat landform; and Retains remnant or significant vegetation; and Does not have disturbed/erosional soils; and Does not have 'other' types of vegetation.	N/A – As the area is generally considered to retain only isolated occurrences of remnant vegetation, this classification was not applied to the Riverstone East Precinct. Only identified sites known to be of high cultural and archaeological value have been identified with this assignation.	Encompasses two sites within the study area – the A7 Archaeological Complex site and 1006-46.
High	Is within 250 m of a creekline; and Is on a lower slope or flat landform; and Does not have disturbed/erosional soils.	Is within 250m of an <i>undisturbed</i> section of large creekline; or Is within 100m of an <i>undisturbed</i> section of minor creekline; and Is on a lower slope or flat landform; and Does not have disturbed/erosional soils; and/or Has been previously identified as a PAD (and has not been destroyed); or Elevated areas where cultural material was found.	PADs including 1004-46 1018-6, 1020-6, 1021-6. Lesser disturbed parts of First Ponds Creek, mainly in the northwest quadrant of the study area.
Moderate/High	N/A	Is within 250m of a <i>disturbed</i> section of large creekline; or Is within 100m of a <i>disturbed</i> section of minor creekline; and Does not have disturbed/erosional soils; and Does not have 'other' types of vegetation.	Encompasses all creeklines with the study area.
Moderate		Is within 100m of a <i>disturbed</i> section of minor creekline; and Does not have disturbed/erosional soils; and Does not have 'other' types of vegetation.	Encompasses small sections of minor creeklines in the northeast of the study area.
Low	Is not within 250 m of a creekline; and Is not on a lower slope or flat landform; and Does not retain remnant or significant vegetation; and Does not have disturbed/erosional soils; and Does not have 'other' types of vegetation.	Is not within 250 m of a creekline; and Is not on a lower slope or flat landform; and Does not retain remnant or significant vegetation; and/or Has been subject to ground disturbance.	All remaining parts of the study area.
Flood prone land	Areas within flood prone lands have a complex sedimentary history. While the archaeological probability classifications within flood prone areas have not been changed, caution should be undertaken in these areas.	These areas have not been included as part of the predictive model as the impact of flood events on archaeological deposits is untested for the region, and cannot be used as an indicator of archaeological sensitivity.	NA



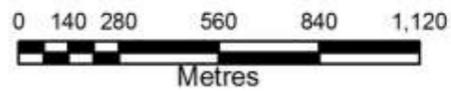
Legend

Previously Recorded Sites

- Artefact Scatter
- ★ Scarred Tree
- Study Area
- Newly Identified Sites
- Disturbance
- Drainage
- RV Pole Sites

Archaeological Probability

- Moderate
- Moderate/High
- High
- Very High



Map date: 20.1.15
 Prepared by: AW (AHMS)
 Data: Nearmap, AHMS
 Projection: GDA94 MGA Zone 56

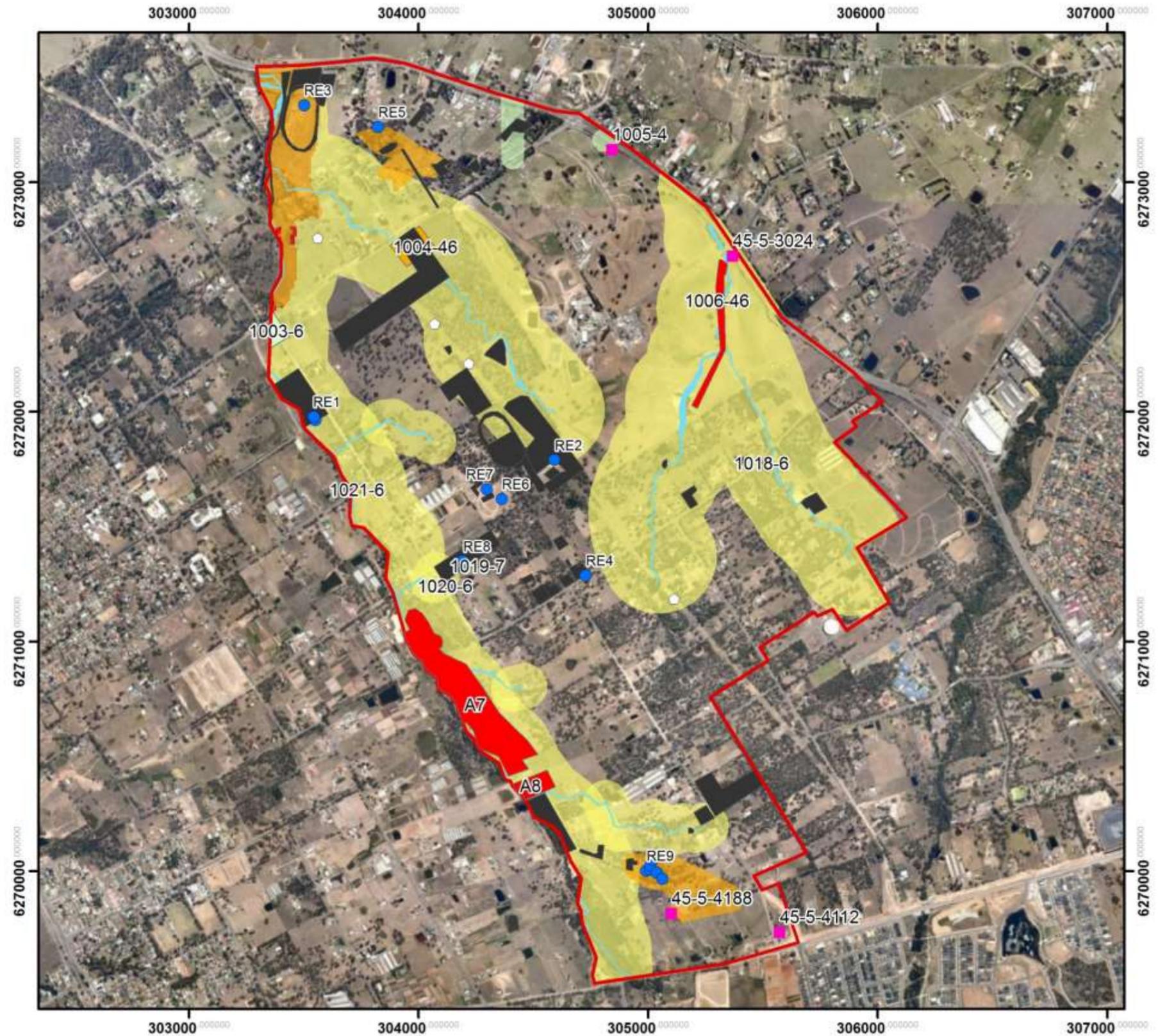


Figure 32. Revised predictive model for the Riverstone East Precinct. Areas not highlighted are considered to have low archaeological probability.

9 SIGNIFICANCE ASSESSMENT

While all Aboriginal objects in NSW are protected under NSW legislation, the NPW Act, 1974 recognises that the destruction of sites may be necessary to allow other activities or developments to proceed. In order for the State regulator to make informed decisions on such matters, a consideration of the significance of cultural heritage places and objects is an important element of the cultural heritage assessment process. The heritage significance of Aboriginal archaeological sites can be assessed using the four criteria outlined in the Burra Charter; aesthetic, historic, scientific, and social or spiritual (Australia ICOMOS, 2013).

9.1 Significance Levels and Thresholds

Most cultural places and objects are of cultural value to at least some individuals or community groups. The assessment process requires the analysis and ranking of significance. Australia has a four tiered system of heritage protection that has been implemented across all levels of government i.e. Commonwealth, State and Local governments (see **Section 2** for details on legislation). While heritage in NSW is managed under NSW legislation it is compliant with this four tiered system. Under this system, cultural heritage places and objects once identified are assessed according to their significance at World, National, State and Local levels and whether they are above or below threshold for listing or protection. For ease of discussion here we can set aside discussion of world heritage places as such places must meet a threshold of 'Outstanding Universal Value' (OUV) and such places are unlikely to occur in the study area. It is a requirement of this process that the higher levels will meet and exceed the thresholds for the level below. In other words a place or object of World Heritage Significance will also be of National significance and so on. This process can be visualised as shown in **Figure 33** where each of the protected categories of Local, State and National are subset of each other and indeed a broader inventory of places that have been assessed and considered. It can be seen that places that meet the threshold for a particular level of significance will have met the thresholds for the levels below: e.g. nationally significant places will as a pre requisite have satisfied the thresholds for State significance and Local significance.

In NSW 'State heritage significance', in relation to a place, building, work, relic, moveable object or precinct, means significance to the State in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item, and 'Local heritage significance', in relation to a place, building, work, relic, moveable object or precinct, means significance to an area in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item (S 4A, NSW Heritage Act 1977).

In assessing the significance of sites aspects such as rarity and representativeness and the integrity (sometimes referred to as the intactness of the site) must be considered. Generally speaking a site or object that is rare will have a heightened significance although a site that is suitable of conservation as 'representative' of its type will also be significant. Conversely an extremely rare site may no longer be significant if its integrity has been sufficiently compromised. For example a rare Pleistocene era site that would normally be considered of high scientific significance may be below threshold if the site has suffered substantial subsurface damage.

A summary of these values is presented in **Table 9**.



Figure 33. The tiered heritage system operating in Australia.

9.2 Aesthetic Significance

This criterion refers to aspects of sensory perception and the ability of the site to elicit emotional responses referred to as sensory or sensori-emotional values. The guidelines to the Burra Charter note that assessment may include consideration of the form, scale, colour, texture and material of the item or place, as well as sounds and smells. With regard to pre-contact Aboriginal cultural heritage sites, the placement within the landscape would be considered under this criterion as would memoryscapes and the ability of the site to transmit such memories. It is important to consider that sensori-emotional values are not always equated with “beauty”; for example massacre sites or sites of incarceration may have value under this criterion. Individual artefacts, sites and site features may also have aesthetic significance.

9.3 Historic Significance

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

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

In relation to Aboriginal cultural heritage, many post-contact places and sites would have historic value. Pre-contact places and items may also be significant according to this criterion, although the

association with historic figures, events, phases or activities may be more difficult to establish. Places of historic significance may include sacred or ceremonial sites, sites of resistance battles and massacres, and archaeological sites with evidence of technological developments.

9.4 Social and Spiritual Significance

In Aboriginal heritage this criterion concerns the relationship and importance of sites to the contemporary Aboriginal community. Aspects of social and spiritual significance include people's traditional and contemporary links with a place or object as well as an overall concern by Aboriginal people for sites and their continued protection. Aboriginal cultural values may partially reflect or follow on from archaeological values, historic values, aesthetic values or be tied to values associated with the natural environment. This criterion requires the active participation of Aboriginal people in the assessment process as it is their knowledge and values that must be articulated.

9.5 Scientific Significance

Scientific value is associated with the research potential of a site. Rarity and representativeness are also related concepts that are taken into account. Research potential or demonstrated research importance, is considered according to the contribution that a heritage site can make to present understanding of human society and the human past. Heritage sites, objects or places of high scientific significance are those which provide an uncommon opportunity to provide information about the specific antiquity of people in an area, or a rare glimpse of artistic endeavour or a chronological record of cultural change of continuity 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. Artefacts of a particular type may be common in one region, but outside the known distribution in another.

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

The capacity of a site to address research questions is predicated on a definition of what the key research issues are for a region. In the region including the subject area, the key research issues revolve around the chronology of Aboriginal occupation and variability in stone artefact manufacturing technology. Sites with certain backed implements from the Holocene are very common, but sites with Pleistocene evidence are extremely rare, and hence of extremely high significance if found.

Table 9. A summary of criteria and rankings used to determine a site's significance

Criterion	Threshold indicators State	Threshold indicator local	Below threshold for significance
Aesthetic	The site or object elicits a strong emotional response and is part of a state or national narrative. Is set within a landscape that inspires awe.	The site is known or suspected of eliciting strong responses from the local community. While similar sites may exist elsewhere they are rare in the local area.	The site or object does not elicit a relevant sensori-emotional response. Or The site has been disturbed to the extent that it can no longer elicit a relevant sensori-emotional response
Historic	The site or object is important in representing an aspect of history important to the State or National as reflected in the Australian (and State) Historical Thematic Framework	The site or object is rare in the local area and, Would provide strong opportunities for interpretation to the public. The site illustrates elements of the history of the local area	The site is common in the local area, does not provide opportunities for interpretation to the public and does not contribute substantially to an understanding the historic themes relevant to the local area and or the state. (Note – individuals may still feel attachment for sites below threshold)
Cultural and or spiritual	The site or object is important to an understanding of pre or post contact Aboriginal cultural life in NSW The site or object is part of a dreaming story or track. The site or object is part of ongoing ceremony or ritual Substantial cultural knowledge about this site exists within the relevant Aboriginal community or custodians for this site or has been previously documented.	The site is important to local Aboriginal community or subset of the community and this importance can be articulated.	There is little or no knowledge in the Aboriginal community about this site or object. The knowledge that does exist falls into the category of family history and is not generally relevant to the broader Aboriginal community and or Aboriginal historical narrative. (Note – individuals may still feel attachment for sites below threshold)
Scientific (archaeological)	The site or object has potential to answer key questions about Aboriginal culture and society in NSW or Australia as a whole pre or post contact; The site or object is unique and /or rare and intact/ or the site is the best representative (and intact) example of a type of site that may be common but not conserved elsewhere.	The site or object is rare in the local area; <u>and</u> It provides potential to learn more about a little understood aspect of Aboriginal cultural or society in the local area. The site has a high artefact density, and is large enough in size to be used to interpret larger scale questions about technology and occupation in the local area.	The site or object is common in the local area and or the state. The site does not have or has low excavation /research potential OR the site is common but has <u>some</u> potential information to be salvaged.

9.6 Statement of Significance

The subject area consists of 15 previously recorded sites and nine new, Aboriginal archaeological sites. The significance of each site is discussed and presented in **Table 10**. Where previously recorded sites could not be inspected, the relevant information is taken from the original report descriptions. Where aesthetic, historic and social/spiritual values were not outlined by the investigators, a judgement was made based on the information provided in the report.

No non-archaeological sites of contemporary significance to Aboriginal people were identified within the project boundaries during the survey and the subsequent consultations regarding cultural values. However, Aboriginal participants did articulate a range of cultural values of the landscape as a whole (see **Section 5.2**). None of the sites identified are historically or socially significant although we note the general spiritual connection that some of the RAPs articulated regarding the ability of artefacts to provide a tangible connection to the past and their Aboriginal ancestors.

A low density of surface material was noted within the sites identified as part of this assessment. Several of the isolated artefacts have very low research potential, especially those that were identified in disturbed contexts. Riverstone East 1, an artefact scatter with seven artefacts, is also considered to have low integrity and low research potential, as it was identified within a market garden, and is therefore heavily disturbed. The majority of sites are not rare. As the AHIMS search results revealed, artefact scatters and isolated artefacts are the most common site type encountered in the region.

Sites WMB Area 3, 1006-46, 1018-6, 1019-7, 1020-6 and 1021-6 and the A7 Archaeological Complex site, are all higher density sites, and thus considered to be of moderate to high scientific significance due to the fact that their high artefact densities, are large enough in size to be used to interpret larger scale questions about technology and occupation. They have each been assessed as being of Local significance. The scarred tree (AHIMS #45-5-4080) is scientifically significant due to the rarity of this site type in the landscape at a local level.

The low density artefact scatters identified at Riverstone East 5 and 9 were located in contexts with good integrity, and with the potential for further sub-surface material. These two sites are also located between 300 and 400m from First Ponds Creek, on elevated landforms. These characteristics would allow for a comparison between these sites and those more common sites that represent occupation of the high order creekline, to test the regional theory that occupation away from high order creeks was short term and casual in nature. While they have been assessed as 'below threshold' for Local significance, they are worthy of salvaging. If a larger density of artefacts were to be identified in a buried context at these two sites, their research potential would be considerably higher.

Apart from the A7 Archaeological Complex the sites located within the study area are not considered to be aesthetically significant. The landscape has been substantially altered since pre-European settlement through clearing and farming practices, and has removed any aesthetic landscape values that may have become associated with these sites. The A7 Archaeological Complex site is located near sections of First Ponds Creek that have been relatively undisturbed and this site therefore provides an opportunity to gain a sense of how this site was once experienced in the pre-colonial landscape.

Table 10. Table of scientific significance of sites located within the Riverstone East Precinct

Site	AHIMS number	Site Type	Scientific significance	Aesthetic Significance	Historic Significance	Social/Spiritual Significance	Overall Significance
Riverstone East 1		Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
Riverstone East 2		Isolated artefact	Low/Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
Riverstone East 3		Isolated artefact	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold or state	Low
Riverstone East 4		Isolated artefact	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
Riverstone East 5		Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
Riverstone East 6		Isolated artefact	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
Riverstone East 7		Isolated artefact	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
Riverstone East 8		Isolated artefact	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
Riverstone East 9		Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
WMB Area 3*	45-5-3024	Artefact scatter	High/Local	Below Threshold	Below Threshold	Below Threshold	High Local
1004-46	45-5-4066	Artefact scatter, PAD	Moderate/Local	Below Threshold	Below Threshold	Below Threshold	Moderate Local
1006-46	45-5-4067	Artefact scatter, PAD	High/Local	Local	Below Threshold	Below Threshold	High Local
1018-6	45-5-4079	PAD	Moderate/Local	Below Threshold	Below Threshold	Below Threshold	Moderate Local
1019-7	45-5-4080	Scarred Tree	High/Local	Below Threshold	Below Threshold	Below Threshold	High Local
1020-6	45-5-4081	PAD	High/Local	Below Threshold	Below Threshold	Below Threshold	High Local
1021-6	45-5-4082	PAD	High/Local	Below Threshold	Below Threshold	Below Threshold	High Local
SCR/UPG3 + PAD*	45-5-4112	Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
Schofields Road AS*	45-5-4188	Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low

Site	AHIMS number	Site Type	Scientific significance	Aesthetic Significance	Historic Significance	Social/Spiritual Significance	Overall Significance
A7 Archaeological Complex	45-5-4311	Artefact PAD & scatter, Scarred Tree	High/Local	Local	Below Threshold	Below Threshold	High Local
RV30/1003-6	45-5-4065	PAD	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
RV2*	NA	Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
RV Pole 26*	NA	Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
RV Pole 30*	NA	Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
RV Pole 39*	NA	Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
WMB3/1005-4**	45-5-2869	Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low
WMB4*	NA	Artefact scatter	Low/ Below threshold	Below Threshold	Below Threshold	Below Threshold	Low

*Indicates the site has been previously destroyed.

** This site has been partially destroyed by the Windsor Road upgrade, but subsequent Aboriginal objects have been found in the vicinity since the upgrade and assigned to this site.

10 ABORIGINAL ARCHAEOLOGY MANAGEMENT STRATEGIES

10.1 General

The following section outlines principles for planning and future investigations within the study area.

The legislative review (**Section 2**) identifies the relevant statutory requirements as:

- The different development approvals processes in relation to Aboriginal heritage in accordance with Part 4 and Part 4.1 of the *Environmental Planning and Assessment Act 1979*;
- The assessment, consent and development requirements in the Sydney Local Environmental Plan 2012 related to Aboriginal heritage of State or local significance;
- At this stage it is as yet unknown what any State Environmental Planning Policies will apply to the study area; and
- The *National Parks and Wildlife Act 1974* requirements to obtain an Aboriginal Heritage Impact Permit to harm Aboriginal objects or sites.

The principles are also based on the:

- The results of the archaeological investigation and assessment documented in this report.
- The views and recommendations of the Registered Aboriginal Parties.

10.2 Management Principles

Development is proposed for the Riverstone East Precinct. Parts of this area fall within various archaeological potential zones being: High, High/Moderate, Moderate and Low. The assessment categories should be treated as preliminary, and the recommended steps below undertaken to refine the archaeological potential, and therefore elucidate the specific constraints of development.

The following principles, in reference to the archaeological potential zones outlined in **Figure 32** are intended to inform design and planning work for the Indicative Layout Plan (ILP). The conservation and development ideas are designed to reduce the risk of disturbing Aboriginal cultural heritage and minimise the scope for potentially expensive and time-consuming Aboriginal archaeological investigations.

In general terms, the risk of impact on significant archaeological and Aboriginal cultural heritage values is likely to increase in accordance with the level of potential. Therefore, areas that are in the high potential zone are likely to have the highest level of archaeological significance and as a result these areas are also likely to have the highest level of risk for development proponents. Likewise, areas of low potential or which are disturbed have a lower risk level.

We would recommend the following PSP design responses with reference to the zones of archaeological potential shown on **Figure 32**:

Areas of High Archaeological Potential: retain as much as possible in open space, riparian, bio-link, set-backs and asset protection zones. The aim of design should be to minimise future development impact on these areas. This approach will protect areas with high potential for significant archaeological deposits and cultural values. The approach will also save time and money in reducing the scope of mitigation and salvage of sensitive areas.

If development is to occur in these areas, additional works in the form of sub-surface investigations would first be required to further characterise the archaeological and cultural deposits (if any) present. If undertaken in the short term, these works could be appended to this ACHA document and revise **Figure 32** accordingly. If, however, there is significant delay (>6 months without consultation), a new ACHA may be required to undertake further investigations. In the event Aboriginal objects are identified and require harm, an Aboriginal Heritage Impact Permit (AHIP) would need to be sought from the Office of Environment and Heritage.

Areas where no development or ground disturbance is proposed would not require further assessment.

Areas of Moderate – Moderate/High Archaeological Potential: development impact should be minimized where practicable. For instance, where there are opportunities to establish open space, these could be placed on areas of moderate potential to protect Aboriginal heritage and reduce the scope of archaeological mitigation measures that would otherwise be required.

If development is to occur in these areas, additional works in the form of sub-surface investigations would first be required to further characterise the archaeological and cultural deposits (if any) present. If undertaken in the short term, these works could be appended to this ACHA document and revise **Figure 32** accordingly. If, however, there is significant delay (>6 months without consultation), a new ACHA may be required to undertake further investigations. In the event Aboriginal objects are identified and require harm, an AHIP would need to be sought from the Office of Environment and Heritage.

Areas where no development or ground disturbance is proposed would not require further assessment.

Areas of Low Archaeological Potential/Disturbed: no design and planning recommendations have been specified. These areas are the least likely to contain Aboriginal cultural heritage and provide fewer constraints for future development. It should be noted that the areas mapped as low significance are a preliminary indicator of the relative potential of disturbed areas to contain Aboriginal cultural heritage as no archaeological testing was carried out as part of this current study. It is therefore strongly recommended that this model be refined and the sub-surface potential be fully explored prior to development.

According to the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales 2010*, areas of significant ground disturbance do not require an ACHA or AHIP in order for development to proceed. However, given the potential for isolated Aboriginal objects to occur in all types of environment, it is recommended that these areas similarly seek an AHIP if disturbance is required. Given the low potential and disturbed nature of these areas, it is considered that no further on-site works would be required prior to seeking an AHIP.

11 INDICATIVE LAYOUT PLAN IMPACT ASSESSMENT

11.1 General

The Riverstone East Indicative Layout Plan (ILP) Stages 1 and 2 has been reviewed in relation to its potential impacts to Aboriginal heritage. The ILP was developed using information obtained from the early stages of this report (see **Section 10**), and has been modified where possible to minimise Aboriginal heritage impacts. This is most noticeable in several re-designs around the A7 Archaeological Complex site.

This section provides a summary of the potential impacts of Stages 1 and 2 of the ILP to identified Aboriginal heritage.

11.2 Potential Impacts

The ILP divides the study area into different zonings and is presented in **Figure 34**. The location of Aboriginal objects/sites and zones of potential are overlaid onto Stages 1 and 2 of the ILP in **Figure 35**.

11.2.1 Aboriginal Object/Sites

As outlined in previous sections, 26 Aboriginal objects/sites were located within the study area (**Figure 32**). Of these, seventeen were previously recorded on the AHIMS database, eight of which have been destroyed through past activities (and one that has been destroyed, but subsequently remains of it have been re-recorded), and a further nine were recorded as part of this study; ultimately resulting in 18 sites within the precinct. These sites were primarily composed of various densities of surface artefacts scatters and potential archaeological deposits, with one scarred tree. A review of the sites suggest that only two areas remain of key archaeological importance and significance within the study area, namely, the A7 Archaeological Complex site (#45-5-4311) and 1006-46 (#45-5-4067), although a number of the other sites remain poorly investigated to date.

In relation to the A7 Archaeological Complex site (#45-5-4311) and 1006-46 (#45-5-4067), both sites would remain largely unaffected by the proposed development. In the case of 1006-46, only a dam will be installed at the northern end for drainage of the ridge to the south, and this would largely be superimposed over a pre-existing dam already present. While impacts are slightly larger, the existing disturbance, areas of the site with greater integrity and visible archaeological material would remain unaffected. Based on recent excavation works by AHMS, the A7 Archaeological Complex site is likely to be much smaller than its current curtilage (**Figure 35**), especially north-south. Despite this, the ILP has been re-designed to minimise impact to the curtilage, which included significant modification to the drainage system that originally required an artificial channel and large dam in this area. The design now incorporates the majority of the site within parkland, open space, riparian corridor and/or areas proposed for water management. In the case of the latter activity, this is largely unmodified works that would result in minimal impact to the site. Overall, of the 11.5ha of the site within the precinct, 9.5 ha (83%) should remain unaffected by the ILP.

Consideration of the impacts to the remainder of the sites within the precinct is presented in **Table 11**.

**Table 11. Summary of potential impacts to Aboriginal heritage from the proposed ILP (Stages 1 and 2).
Note, sites identified as previously destroyed have not been considered.**

Site	AHIMS #	Site Type	Significance	Proposed Zoning	Potential Impact
Riverstone East 1		Artefact scatter	Low	Water Management	Low/nil
Riverstone East 4		Isolated artefact	Low	Medium Density Residential	High
Riverstone East 6		Isolated artefact	Low	Low Density Residential	High
Riverstone East 7		Isolated artefact	Low	Low Density Residential	High
Riverstone East 8		Isolated artefact	Low	Low Density Residential Water Management	High
Riverstone East 9		Artefact scatter	Low	General Infrastructure	High
1019-7	45-5-4080	Scarred Tree	High Local	Low Density Residential	High
1020-6	45-5-4081	PAD	High Local	Low Density Residential	High
1021-6	45-5-4082	PAD	High Local	Riparian Corridor Local Park	Low/nil
A7 Archaeological Complex	45-5-4311	Artefact scatter, PAD & Scarred Tree	High Local	Riparian Corridor; Water Management; Medium Density Residential; Local Park	Low/nil
RV30/1003-6	45-5-4065	PAD	Low	Riparian Corridor; Local Park.	Low/nil

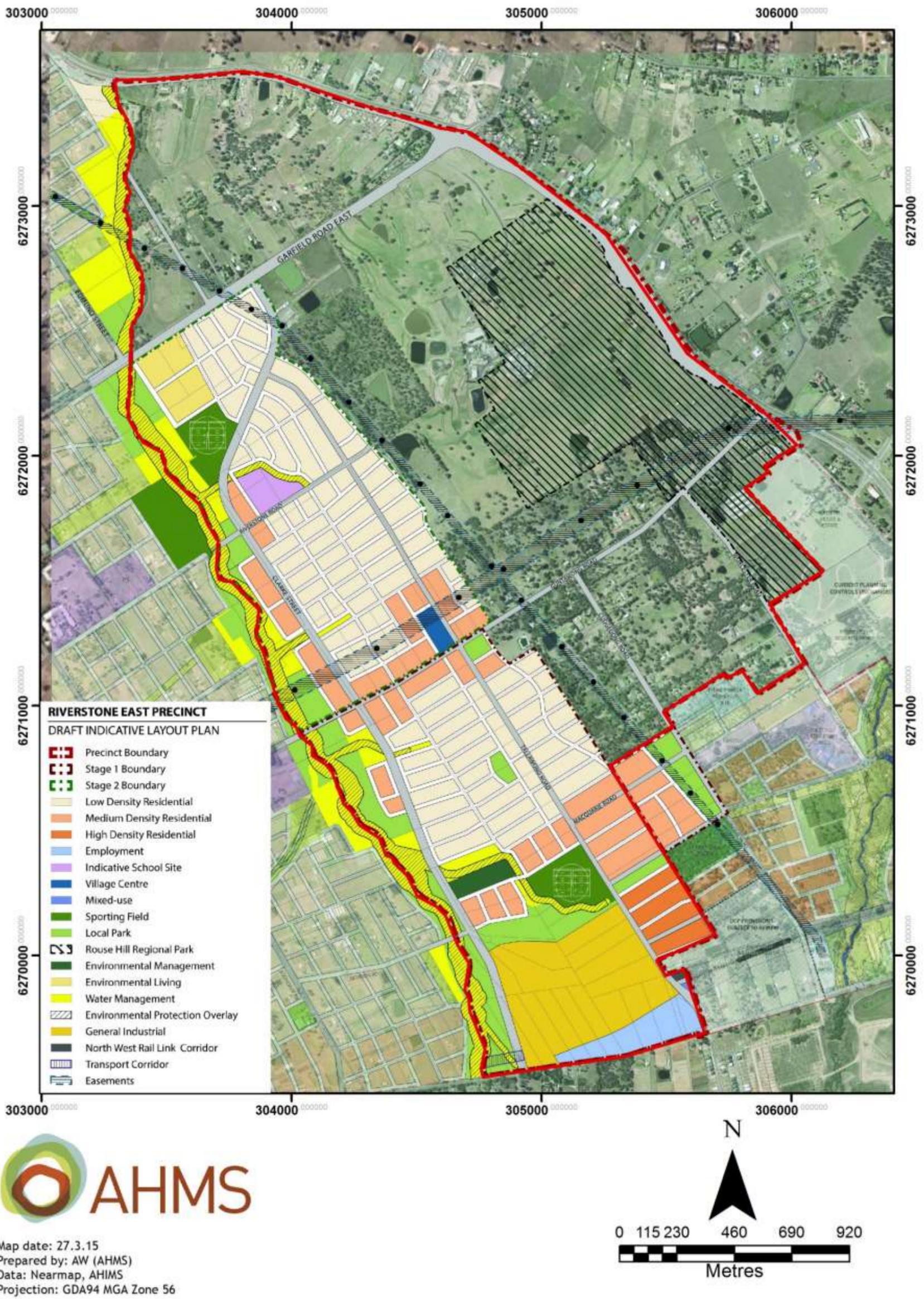


Figure 34. The proposed ILP (Stages 1 and 2) for the study area.

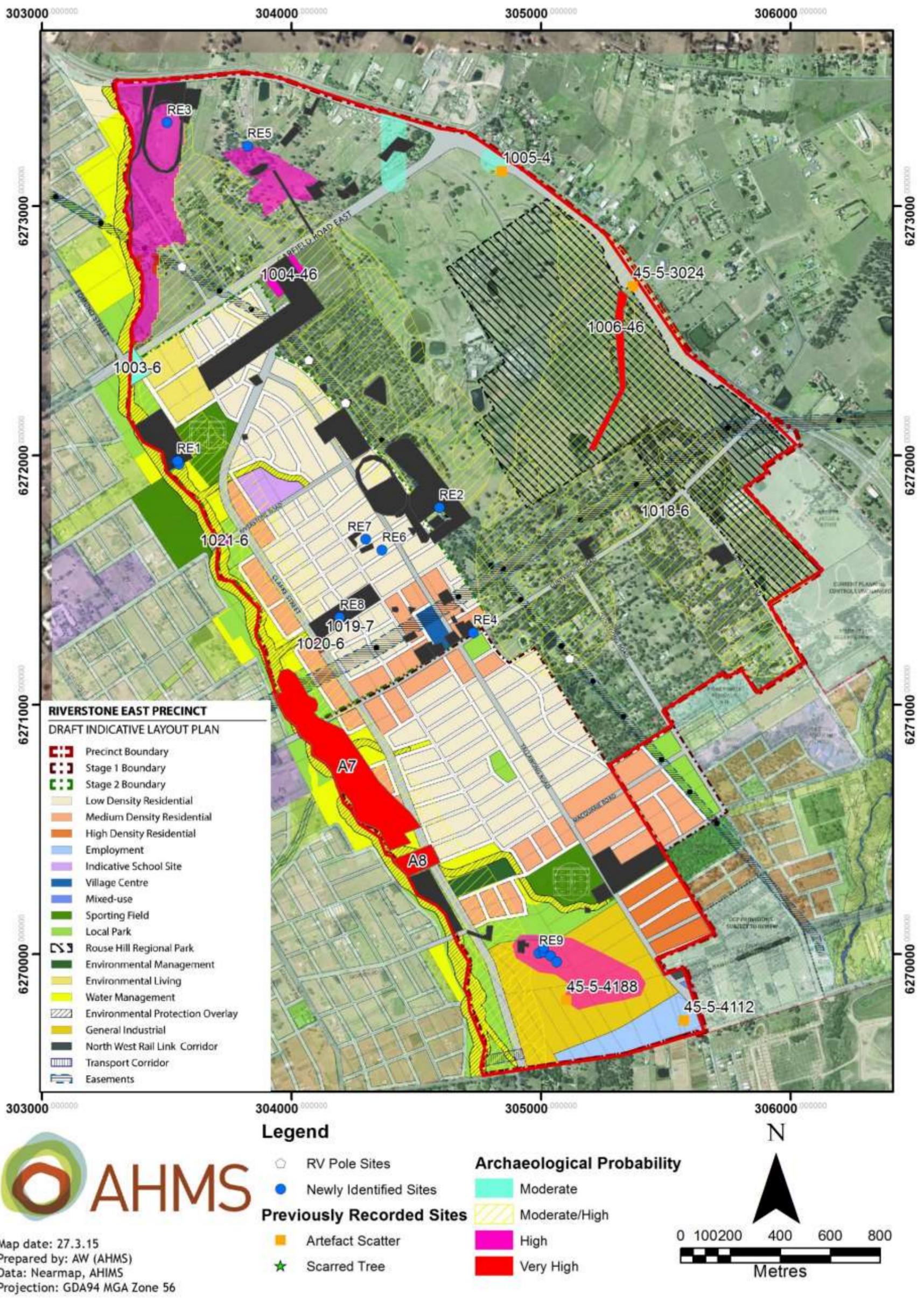


Figure 35. The identified Aboriginal objects/sites and areas of potential overlaying the proposed ILP (Stages 1 and 2).

11.2.2 Archaeological Probability

Due to the lack of access and the nature of the planning process, no sub-surface investigations were feasible as part of this assessment. As outlined in **Sections 6 and 8**, the likelihood of buried cultural material occurring is considered high based on regional and local studies. Within the study area, this is most evident in recent works in the A7 Archaeological Complex site, which had a limited surface expression of Aboriginal objects, but in which excavations recovered over 1,200 artefacts. Conversely, excavations at RV 30/1003-6, which was considered to have high potential recovered <10 artefacts. For this reason, several areas of archaeological potential or probability have been assigned across the study area, which identify where there is likelihood for buried cultural material to occur. These zones generally follow, and are within 100-250m of, the creeklines running through the precinct, with a focus along First Ponds Creek and the tributaries of the Killarney Chain of Ponds (**Figures 32 and 35**). Two elevated hills/ridgelines have also been highlighted due to the presence of Aboriginal objects and their good views over the surrounding areas.

Of the areas considered of high probability in the northwestern section of the study area (~16.5ha), they are in close proximity to First Ponds Creek, and unlikely to be significantly impacted through development. None of these areas are within the ILP (Stages 1 and 2). When considering areas of moderate-high probability, by far the largest zone at ~317ha of the site, a large proportion is also likely to remain unaffected within riparian corridors, park land, and Rouse Hill Regional Park – the latter encompassing ~61ha of the zone. However, these areas along First Ponds Creek will be significantly affected by the proposed ILP (Stages 1 and 2). Areas of moderate probability are relatively minor in extent – constrained to two small areas in the northeast – and would be unaffected by the ILP (Stages 1 and 2). Similarly, areas of low probability encompass much of the study area in areas of proposed residential development.

11.2.3 Cultural Values

Aboriginal participants in this study did not identify any additional cultural sites or features within the study boundary although they did describe general cultural values and issues including the desire for better education and interpretative opportunities relating to past and contemporary Darug Aboriginal history and culture and the retention/ reinstatement of natural (and locally specific) vegetation in parkland. Recommendations are made below in relation to these values following consultation with the RAPs.

11.2.4 Summary

A number of sites have been identified in the subject area. In accordance with OEH requirements, AHIMS Site Cards will be completed for the Aboriginal objects identified within the subject area and lodged with the AHIMS registrar. This project also revealed some generalised Aboriginal cultural values that provide opportunities for further recognition of Aboriginal cultural heritage.

The ILP has been designed to minimise impact to the known and expected Aboriginal heritage. In summary, the adoption of the ILP (Stages 1 and 2) would have the following outcomes for the known and expected Aboriginal cultural heritage as identified in this report:

- Eleven of the eighteen identified Aboriginal objects/sites (61%) are within the ILP curtilage. Of these four would be subject to low (if any) impacts being situated within parkland, riparian corridor, water management, and/or environmental management.
- Of the four sites that remain unaffected/minimally impacted, two were considered of high local significance (of four that were identified during this assessment). This includes two Aboriginal sites prominently documented in the literature, namely the A7 Archaeological Complex site (45-5-

4311) on the banks of First Pond Creek. A small section on the periphery of the A7 Archaeological Complex site would, however, be zoned, medium density residential.

- One site of high significance, a scarred tree (1019-7/#45-5-4080) and associated PAD (1020-6/#45-5-4081) situated on Guntawong Road is currently situated within proposed low density residential, and may be impacted through the ILP.
- All remaining sites within areas of high potential impact were generally composed of low densities of Aboriginal objects and considered of low significance.
- Areas of high archaeological probability (~16.5ha) situated in the northwest of the precinct would largely be unchanged by the ILP, being situated outside of the curtilage and generally within riparian corridor areas.
- Areas of moderate-high archaeological probability are extensive across the precinct (~317ha) and would be subject to impact from residential development. However, a significant proportion of this zone (137ha or 43%) along the banks of First Ponds Creek and the tributaries of Killarney Chain of Ponds would be situated in parkland, riparian corridor, water management, environmental management and/or the Rouse Hill Regional Park and remain relatively unaffected.
- Areas of moderate and low archaeological probability encompass much of the study area, and would be impacted by a range of activities proposed in the ILP.
- Opportunities exist to reflect contemporary Aboriginal values through a range of possible initiatives that have been identified by the Aboriginal community. Consultation in later design stages is recommended to maximise these opportunities however general recommendations are provided below.

12 RECOMMENDATIONS

The following recommendations are proposed based on the findings of this assessment and the proposed ILP (Stages 1 and 2) (**Figures 34** and **35**). The recommendations can be divided into three categories: legal obligations, archaeological investigation, and cultural values.

Statutory Requirements

DPE are required as part of the ACHA process to undertake the following:

- For ease of compilation and review, this report represents a combined Cultural and Archaeological report. However to conform with OEH guidelines, it will need to be split into two separate (largely duplicate) reports: the Aboriginal Cultural Heritage Assessment, which focuses on cultural values and significance (ACHA), and the Archaeological Technical report (ATR), outlining the archaeological investigations. Both reports should be submitted to the Registered Aboriginal Parties for their review. Any comments, corrections and recommendations received should be incorporated into the final versions of the reports.
- Any development proposed for the properties in which Aboriginal objects/sites or potential were identified will first require an Aboriginal Heritage Impact Permit to be obtained from OEH.
- Any development proposed for properties in which areas of moderate, moderate-high, or high archaeological probability are identified will first require further sub-surface investigations to characterise any Aboriginal objects present, determine their extent and significance. An Aboriginal Heritage Impact Permit may also be required from OEH depending on the findings of further works.
- Consultation with the Registered Aboriginal Parties should be maintained if the subject area is likely to be affected by development in the future. Please note should consultation lapse then the consultation process as outlined by OEH may need to be commenced from the beginning.

Recommendations for further archaeological assessment:

AHMS recommends the following, in order to comprehensively evaluate the archaeological record and development risk of the Riverstone East Precinct:

- Sub-surface excavation should be implemented in areas of high, moderate/high and moderate archaeological potential (**Figure 32** and **35**) to characterise and assess the significance of any buried sub-surface cultural materials. Information on these deposits is currently uncertain, and any potential impact to these areas would require such investigations to ensure an AHIP could be obtained from OEH. Test excavations should focus on areas of potential impact, but also consider conservation areas if they are designated as such due to heritage values.
- No further investigation is considered necessary in order to characterise areas/sites of low archaeological probability within the study area.

Recommendations arising from the cultural values assessment:

The following recommendations are made in order to maintain a link with the contemporary connections identified as part of the focused discussions. Although these connections varied between individuals, consensus regarding the significance of the landscape was reached, and as part of a best practice approach, the following recommendations are made in order to recognise the cultural link between the Aboriginal community and the Riverstone area. These recommendations are necessarily broad, as specifics will require further consultation with the Registered Aboriginal Parties.

A major theme that came out of the focus discussions was that Aboriginal people, and specifically members of the Darug nation, would like informative and educational outcomes. This would allow both Aboriginal and non-Aboriginal peoples to gain more in-depth understandings of the Darug people in particular, who have been connected to this area for thousands of years. Examples of these outcomes include, but are not designed to limit opportunity for further initiatives:

- Showcasing of artefacts within a local community-run organisation such as an educational facility or community centre. This centre would also act as a keeping place for the increasing number of artefact collections being unearthed as a result of development in the north west growth centre, simultaneously providing a solution for the storage issues commonly encountered, as well as providing a source for educational displays;
- Integration of displays/interpretations of Aboriginal Australia within the precinct design, such as:
 - Plain language summaries of the archaeological investigation of any given specific site;
 - Walking trails with interpretive signage panels within the riparian corridor and open space;
 - Inclusion of Aboriginal place names and language in street and park names;
 - Retention of some open space for revegetation to reflect the pre-European landscape;
 - Inclusion of artwork from the local Aboriginal community as part of the open space design.

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Appendix 1 - AHIMS Search Results



**AHIMS Web Services (AWS)
Search Result**

Your Ref Number : RiverstoneEast2
Client Service ID : 128692

Archaeological & Heritage Management Solutions Pty Ltd (AHMS)
Level 2, 729 Elizabeth Street
WATERLOO New South Wales 2017
Attention: Jodi Cameron
Email: jodic@ahms.com.au

Date: 18 March 2014

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 302000 - 308000, Northings : 6269000 - 6273000 with a Buffer of 0 meters, conducted by Jodi Cameron on 18 March 2014.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

101	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location.*

Figure A-1: AHIMS Basic Search

Appendix 2 – Aboriginal Consultation