

**Vineyard Priority Growth Area Precinct
Aboriginal Cultural Heritage Assessment
(Modified for Stage 1)**

For

**Department of Planning and Environment,
NSW**

26 October 2016

AHMS

ARCHAEOLOGICAL & HERITAGE
MANAGEMENT SOLUTIONS



AUTHOR/HERITAGE ADVISOR	Liz Foley, Fenella Atkinson, Michelle Lau, Nalisa Neuendorf, Ngaire Richards
PROPONENT	Department of Planning and Environment, NSW
PROJECT NAME	Aboriginal Cultural Heritage Assessment Vineyard Priority Growth Area Precinct
REAL PROPERTY DESCRIPTION	Vineyard Precinct, Hawkesbury LGA
DATE	26 October 2016

AHMS INTERNAL REVIEW/SIGN OFF				
WRITTEN BY	DATE	VERSION	REVIEWED	APPROVED
Liz Foley, Fenella Atkinson, Michelle Lau, Nalisa Neuendorf	5.8.14	1	S McIntyre-Tamwoy	Alan Williams
Ngaire Richards	30.6.2015	2	Alan Williams	Alan Williams
Alan Williams	3.8.15	3	Minor Edits	
Alan Williams	26.10.16	4	Minor Edits	

Copyright and Moral Rights

Historical sources and reference materials used in the preparation of this report are acknowledged and referenced in figure captions or in text citations. Reasonable effort has been made to identify, contact, acknowledge and obtain permission to use material from the relevant copyright owners.

Unless otherwise specified in the contract terms for this project AHMS:

- Vests copyright of all material produced by AHMS (but excluding pre-existing material and material in which copyright is held by a third party) in the client for this project (and the client's successors in title);
- Retains the use of all material produced by AHMS for this project for AHMS ongoing business and for professional presentations, academic papers or publications.

ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

ABN 45 088 058 388
ACN 088 058 388

www.ahms.com.au
info@ahms.com.au

SYDNEY
2/729 Elizabeth St
Waterloo NSW 2017
P 02 9555 4000
F 02 9555 7005

MELBOURNE
2/35 Hope St
Brunswick VIC 3056
P 03 9388 0622

PERTH
13/336 Churchill Ave
Subiaco WA 6008
P 08 9381 5206

CONTENTS

EXECUTIVE SUMMARY	5
1 INTRODUCTION.....	8
1.1 Background	8
1.2 Authorship and Acknowledgements.....	8
1.3 Study Area.....	8
2 STATUTORY CONTEXT	11
2.1 Commonwealth Legislation	11
2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984	11
2.1.2 Environment Protection and Biodiversity Conservation Act 1999.....	11
2.1.3 Native Title Act 1993	11
2.2 NSW State Legislation	12
2.2.1 Environmental Planning and Assessment Act 1979	12
2.2.2 National Parks and Wildlife Act 1974.....	12
2.2.3 Aboriginal Land Rights Act 1983.....	13
2.3 State Environmental Planning Policies	13
3 EXISTING ENVIRONMENT	14
3.1 Landscape Characteristics.....	14
3.1.1 General.....	14
3.1.2 Hydrology	15
3.1.3 Geology and Soils	15
3.1.4 Landforms	15
3.1.5 Flora and Fauna	18
3.2 Previous Disturbance	18
3.3 Conclusions and Archaeological Implications.....	22
4 ABORIGINAL COMMUNITY CONSULTATION.....	23
4.1 Aboriginal Community Consultation Stages.....	23
4.1.1 Pre-Notification Stage	23
4.1.2 Notification and Registration of Interest	24
4.1.3 Presentation of Information and Proposed Methodology.....	24
4.1.4 Field Investigation	25
4.1.5 Report Review	25
4.2 Cultural Values Recording	25
5 ETHNOGRAPHY AND CULTURAL VALUES.....	27
5.1 A Further Approach to Ethnographic Research	27
5.1.1 A Summary of Findings	29
5.1.2 The Study Area	31
5.2 Findings of the Field Investigation.....	34

5.3	Cultural Values of the Study Area	34
5.3.1	Historical Significance	34
5.3.2	Contemporary Connections	34
5.3.3	Summary of Contemporary Connections	38
6	ARCHAEOLOGICAL CONTEXT	41
6.1	Regional Context.....	41
6.1.1	Early Occupation	41
6.1.2	Intensification during the Holocene	41
6.1.3	Regional Site Patterns	42
6.1.4	Stone Artefacts.....	43
6.2	AHIMS Results.....	43
6.3	Previous Local Studies.....	48
6.3.1	AHMS: Water Related Services for North-West and South-West Growth Centres (2009-2013)	48
6.3.2	AECOM: Box Hill and Box Hill Industrial Precincts (2012)	51
6.3.3	ENSR AECOM: Alex Avenue and Riverstone Precincts (2008a, 2008b).....	51
6.3.4	Dallas: Riverstone, Schofields and Quakers Hill Survey (1982).....	51
6.3.5	Darwala-Lia: Riverstone Land Release Area (1999)	52
6.3.6	Godden Mackay Logan/AHMS: Riverstone West Precinct, Sydney (2008/2009/2014).....	52
6.3.7	Kelleher Nightingale Consulting: Area 20 Precinct – North-West Priority Growth Area (2010)	53
6.3.8	KHC: Marsden Park Precinct – North-West Priority Growth Area (2012).....	53
6.3.9	AHMS: Vineyard to Rouse Hill Electricity Upgrade (2007)	53
6.3.10	McDonald: Rouse Hill Infrastructure Development (1993-2005)	54
6.3.11	Therin - Windsor Road Upgrades, Rouse Hill to Vineyard (2002-2004).....	55
6.3.12	Brayshaw – Blacktown to Richmond Railway Modifications (1986-1987)	56
6.4	The Archaeological Resource	56
6.4.1	Summary	57
7	FIELD INVESTIGATIONS	58
7.1	Survey Methodology	58
7.2	Survey Results	59
7.2.1	Landforms	64
7.2.2	Disturbance	66
7.2.3	Aboriginal Cultural Heritage	69
7.2.4	Conclusions.....	74
8	REGIONAL CHARACTER	75
8.1	Archaeology	75
8.2	Existing Disturbance	75
8.3	An Archaeological Model for the Study Area	76

9	SIGNIFICANCE ASSESSMENT.....	79
9.1	Significance Levels and Thresholds	79
9.2	Aesthetic Significance	80
9.3	Historic Significance	80
9.4	Social and Spiritual Significance	80
9.5	Scientific Significance	81
9.6	Significance Assessment	82
10	ABORIGINAL ARCHAEOLOGY MANAGEMENT STRATEGIES	86
10.1	General.....	86
10.2	Management Principles.....	86
11	INDICATIVE LAYOUT PLAN IMPACT ASSESSMENT	88
11.1	Potential Impacts.....	88
11.2	Aboriginal Sites	88
11.2.1	Archaeological Potential.....	91
11.2.2	Cultural Values	91
11.2.3	Summary	91
12	RECOMMENDATIONS.....	93

LIST OF TABLES

Table 1.	Representatives from the Registered Aboriginal Parties that participated in the field survey.....	25
Table 2.	Results of AHIMS search: Site types present in the area captured by the Extensive Search.	44
Table 3.	Results of AHIMS Search: Sites located within the Vineyard Precinct.	44
Table 4	Table of effective survey coverage according to landform.	59
Table 5.	Results of the field assessment, including landform, disturbance and survey coverage.	61
Table 6.	Summary of previously recorded sites within the study area.....	69
Table 7.	Aboriginal sites that were located as a result of the survey.....	69
Table 8.	Variables that were attributed values to calculate archaeological potential (from AHMS 2009) and revised for this study.	77
Table 9.	Summary of criteria and rankings used to determine a site’s significance.	81
Table 10.	Table of cultural and scientific significance of sites located within the Vineyard Precinct.	84
Table 11.	Summary of potential impacts to Aboriginal heritage from the ILP (Stage 1).	88

LIST OF FIGURES

Figure 1.	Plan of the general location of the study area.....	10
Figure 2.	The Cumberland Plain sub bioregion. (Source: NSW NPWS May 2002).....	14
Figure 3.	Mapped soil landscapes and drainage lines within the study area.....	17
Figure 4.	1947 aerial photograph, with the approximate boundaries of the study area marked in red (LPI).....	20
Figure 5.	1956 aerial photograph, with the approximate boundaries of the study area marked in red (LPI).....	20

Figure 6.	1965 aerial photograph, with the approximate boundaries of the study area marked in red (LPI).....	21
Figure 7.	1986 aerial photograph, with the approximate boundaries of the study area marked in red (LPI).....	21
Figure 8.	An overview of AHMS' ethnographic mapping program.	28
Figure 9.	An example of some of the information within the AHMS' ethnographic mapping program.	28
Figure 10.	Map of ethnographic observations in proximity to the subject area (shown in red). (Source: Google Maps Pro).	33
Figure 11.	Uncle Fremo's house built by his parents in the 1930s.	37
Figure 12.	Tree marking Uncle Fremo's property.....	39
Figure 13.	Locations visited as part of the cultural values recording.	40
Figure 14.	AHIMS Search results within and surrounding the study area.	46
Figure 15.	Previous studies undertaken in the local area.	47
Figure 16.	AHMS (2011b) predictive model for the North West Priority Growth Area, highlighting the predicted archaeological sensitivity of throughout the North West Priority Growth Area.	50
Figure 17.	Outline of areas traversed as part of the survey.	60
Figure 18.	Results of the survey: Sites, disturbance and landforms of interest that were identified as part of the field investigations.....	63
Figure 19.	Section of Killarney Chain of Ponds with recently constructed causeway.....	65
Figure 20.	Ephemeral low-lying drainage line.	65
Figure 21.	An example of a gentle slope with natural erosion exhibiting relatively high levels of ground surface visibility.	66
Figure 22.	Area of disturbance showing farm dam and young regrowth vegetation. One older eucalypt can be seen in the foreground which likely represent earlier regrowth.	67
Figure 23.	Photograph showing built up ground surface caused by the importing of fill.....	68
Figure 24.	Photograph of disturbance caused by installation of water services in the vicinity of Killarney Chain of Ponds.....	68
Figure 25.	Area of exposure revealing three artefacts in Vineyard Precinct 5.....	70
Figure 26.	Three silcrete artefacts recorded as Vineyard Precinct 5.	71
Figure 27.	Area of exposure revealing approximately 70 artefacts in Vineyard Precinct 6.	71
Figure 28.	Stone artefact typical of the red silcrete identified at Vineyard Precinct 6. Note the sandy texture of the underlying soil.	72
Figure 29.	Location of Vineyard Precinct 9 on a small area of good ground surface visibility next to a track on a hill crest (Road transect 3).	72
Figure 30.	Isolated artefact identified as Vineyard Precinct 9.	73
Figure 31.	Location of Vineyard Precinct 10 on a sandy exposure on slope.	73
Figure 32.	Isolated artefact identified as Vineyard Precinct 10.	74
Figure 33.	Revised predictive model for the Vineyard Precinct.	78
Figure 34.	The tiered heritage system operating in Australia.....	80
Figure 35.	The proposed Indicative Layout Plan (Stage 1) for the study area.....	89
Figure 36.	The identified Aboriginal objects/sites and areas of potential overlaying the proposed ILP.	90

LIST OF APPENDICES

Appendix 1 – AHIMS Results

Appendix 2 – Community Consultation

EXECUTIVE SUMMARY

This report presents a revision to the final Vineyard Precinct - Aboriginal Cultural Heritage Assessment developed in August 2015 for Department of Planning and Environment. The revisions to the report include the inclusion of the final Stage 1 Indicative Layout Plan (ILP), which has been modified since the original study. It should be noted that while the details of the ILP have changed between the two reports, the overall Stage 1 curtilage remains unchanged, and therefore the findings and recommendations of the report as they were presented in August 2015 are unmodified in this current report.

Archaeological and Heritage Management Solutions Pty Ltd (AHMS) were commissioned by the NSW Department of Planning and Environment (DPE) to undertake an Aboriginal Cultural Heritage Assessment (ACHA) of the Vineyard Priority Growth Area Precinct in accordance with Office of Environment & Heritage (OEH) guidelines.

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 (2010) *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 (2010) *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 Killarney Chain of Ponds 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 83 Aboriginal objects/sites in the general region, of which eight were located within the study area. Those within the study area consisted of (note some sites retained multiple attributes): one isolated Aboriginal object, five artefact scatters (ranging from two -260 objects), one quarry, one potential archaeological deposit and a scarred tree. These sites were primarily situated along Windsor Road, reflecting the identification of sites as part of the road upgrade.

A predictive model of the region indicated that the most likely cultural materials would be stone artefacts, and that isolated artefacts might be found in any location. However, archaeological sites of increasing complexity and of significance are usually found within 250m of higher-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.

An archaeological survey investigated 26 accessible properties within the precinct, as well as three road transects, totalling ~62 hectares. These areas were selected primarily based on good visibility, and correlation with landforms of interest. The investigations identified 12 previously unrecorded archaeological sites, which consisted of isolated Aboriginal objects and low density artefact scatters,

and a potential cultural place. A second site inspection was undertaken specifically to explore traditional and contemporary cultural values. This latter inspection identified no additional sites within the precinct, but several in the vicinity.

Overall, the assessment identified 19 Aboriginal sites within the precinct, two of which have been either destroyed or salvaged, one partially destroyed, and one non-cultural in origin (resulting in 16 sites overall). These sites included stone artefact scatters of various densities, a potential archaeological deposit, and a potential cultural place. Of these sites, four were considered to have moderate/local significance (one of which has been destroyed), and the remaining 12 of low significance.

For the purposes of this report, the precinct has been divided into areas of high, moderate-high, moderate and low archaeological 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. Such works should be undertaken to refine the model prior to development.

An overlay of the Vineyard Precinct Indicative Layout Plan (Stage 1), dated October 2016, found the following:

- Of the 19 Aboriginal sites recorded within the precinct, six are located within the Stage 1 boundary. Five of the sites (VP5, VP7, VP8, VP 10 and VP 11) are considered to have low significance, and are isolated finds or artefact scatters composed of low densities of Aboriginal objects. One site (VP6) is a dense scatter of artefacts considered to have moderate/local significance.
- Three of the sites (VP5, VP8 and VP10) would be located within passive open space, water management and/or environmental protection zones, and subject to minimal (if any) impacts.
- The remaining three sites (VP6, VP7 and VP11) would be located within low or medium density residential zones, and are likely to be impacted by the proposed land use.
- Areas of high archaeological potential are extensive across the Vineyard Precinct (~272ha). Those areas situated along the banks of Killarney Chain of Ponds would be largely unchanged by the ILP (Stage 1), being within areas zoned for environmental living, water management, passive open space, and environmental protection. However, there is likely to be potential impacts in areas zoned for the sewer pump station, sports fields/active open space, and low and medium density residential land use.
- Areas of moderate-high archaeological probability encompass a smaller area within the Vineyard Precinct (~18ha), and within Stage 1 are generally situated along the ridgeline in the north. These areas are mostly within proposed low or medium density residential zones, and are likely to be subject to potential impacts.
- Areas of moderate and low archaeological probability encompass the remainder of the Vineyard Precinct (~300ha), and would be impacted by a range of land uses 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:

- 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 potential 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 for the precinct 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 and, retaining artefacts collected in such a way that children and future generations could see, feel and experience them for themselves.

1 INTRODUCTION

This report presents a revision to the final Vineyard Precinct - Aboriginal Cultural Heritage Assessment developed in August 2015 for Department of Planning and Environment. The revisions to the report include the inclusion of the final Stage 1 Indicative Layout Plan (ILP), which has been modified since the original study. It should be noted that while the details of the ILP have changed between the two reports, the overall Stage 1 curtilage remains unchanged, and therefore the findings and recommendations of the report as they were presented in August 2015 are unmodified in this current report.

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 Vineyard Priority Growth Area Precinct. DPE has developed a Stage 1 Indicative Layout Plan (ILP) 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 Vineyard Precinct, which includes:

- A review of existing and former environments to determine the likely resources in the vicinity the study areas;
- 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 significance of the study area;
- Assessment of significance;
- Mapping of areas of cultural heritage sensitivity within the Vineyard Precinct;
- Management recommendations for conservation, further testing and/or further consultation.

1.2 Authorship and Acknowledgements

This report was written by Liz Foley, Michelle Lau, Fenella Atkinson, and Nalisa Neuendorf (Consultants, AHMS). Alan Williams (Manager NSW - Aboriginal Heritage) and Susan McIntyre-Tamwoy (Associate Director, AHMS) provided technical and quality assurance of the report. All maps were produced by Ngairé Richards and/or Tom Sapienza (Heritage Advisors, AHMS) unless otherwise noted.

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

1.3 Study Area

The study area comprises the Vineyard Precinct within the Hawkesbury LGA (**Figure 1**). The precinct is the northernmost precinct within the North West Priority Growth Area (NWPGA). The study area is 590 hectares in total, and lies north-west to southeast in orientation. It is immediately surrounded by the Riverstone Precinct to the south, Box Hill to the south-east and Riverstone West to the west.

The Hawkesbury River runs to the north of the study area. Eastern Creek flows approximately 1km to the east. The study area is bisected by Windsor Road, which runs parallel with Killarney Chain of Ponds.

The study area is currently zoned as General Rural, under the *Hawkesbury Local Environment Plan 1988*, and comprises predominantly farm land and residential housing. The Blacktown Railway Line also passes through the eastern part of the study area.

For the purposes of potential impact, the ACHA also focuses on the Stage 1 ILP, which encompasses the southern portion of the precinct, bounded by Menin, Boundary, Chapman and Windsor Roads (**Figure 1**).

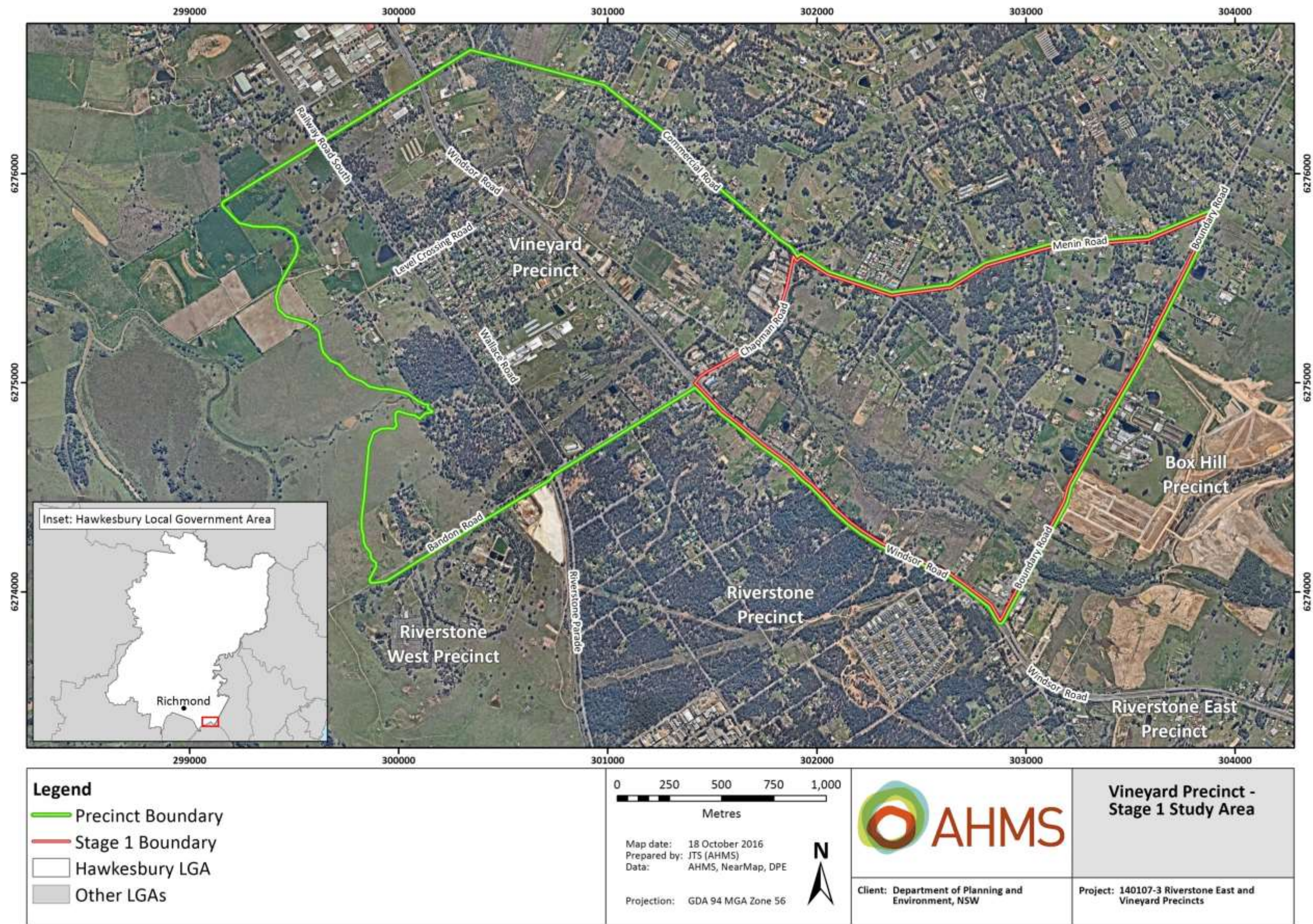


Figure 1. Plan of the general location of the study area.

2 STATUTORY CONTEXT

Archaeology in New South Wales is protected by a number of pieces of legislation; Commonwealth, State and local. 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 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.

2.1.2 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 the 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.

2.1.3 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 processes that attract 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.

A search of the National Native Title Tribunal register (dated 2/4/2014 ref 6116/14SJ) was undertaken and confirmed that the study areas are not within any registered or determined native title claims.

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 development of the Vineyard Precinct be assessed under Part 4 of the EP&A Act, the development would be subject to a local approval, integrated approvals, permits and/ or consents under the *National Parks and Wildlife Act 1974*, in relation 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 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 Lots 1 & 2 DP1042267 Parish of Gidley, County of Cumberland were identified as crown land within the Vineyard Precinct. A search of Land Claim Register managed by the Office of the Registrar was undertaken on the 1/4/2014 and no land claims were identified over these lots.

2.3 State Environmental Planning Policies

The preparation of a Precinct Plan for the study area involves amendments to the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* in order to rezone areas within the Hawkesbury 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 (**Figure 2**). 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 (Morgan and Terry 2002: 5).

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).

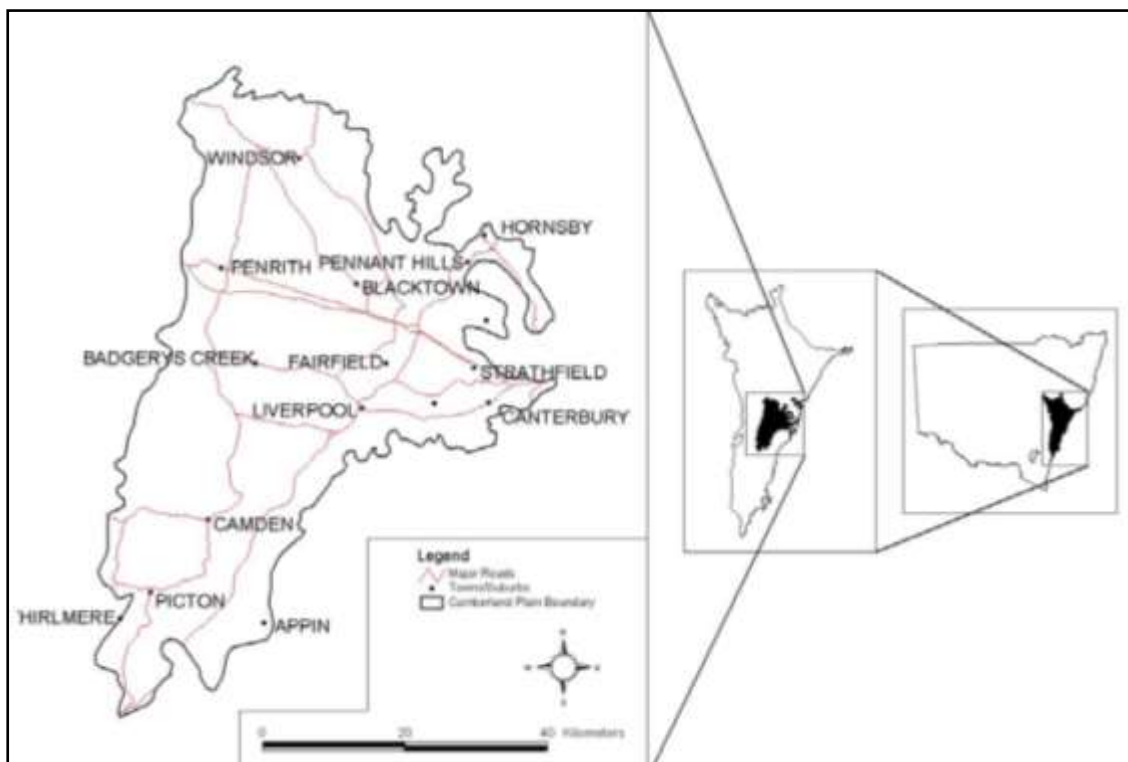


Figure 2. The Cumberland Plain sub bioregion. (Source: NSW NPWS May 2002).

3.1.2 Hydrology

The Cumberland Plains are 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. Eastern Creek, a third order creek, lies approximately 1 kilometre west of the Vineyard Precinct. Killarney Chain of Ponds, a distributary of Mackenzie Creek to the north-east, flows through the Vineyard precinct (**Figure 3**). 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, Killarney Chain of Ponds would have supported diverse plant and animal resources. However, flooding may have significant impacts to 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 Plains area is fairly consistent as the subregion is characterised by common geological attributes. The dominant geology is the Triassic Wianamatta shales which forms 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, Berkshire Park soil landscapes) (**Figure 3**). The soil landscape data available, further supports the results indicated by the hydrology, i.e. that the Vineyard Precinct contains regularly inundated fluvial land, particularly on the western floodplain of Killarney Chain of Ponds. 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, to be present, 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 or 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 10-50m ASL in association with minor waterways and drainage channels. There are few prominent ridgelines.

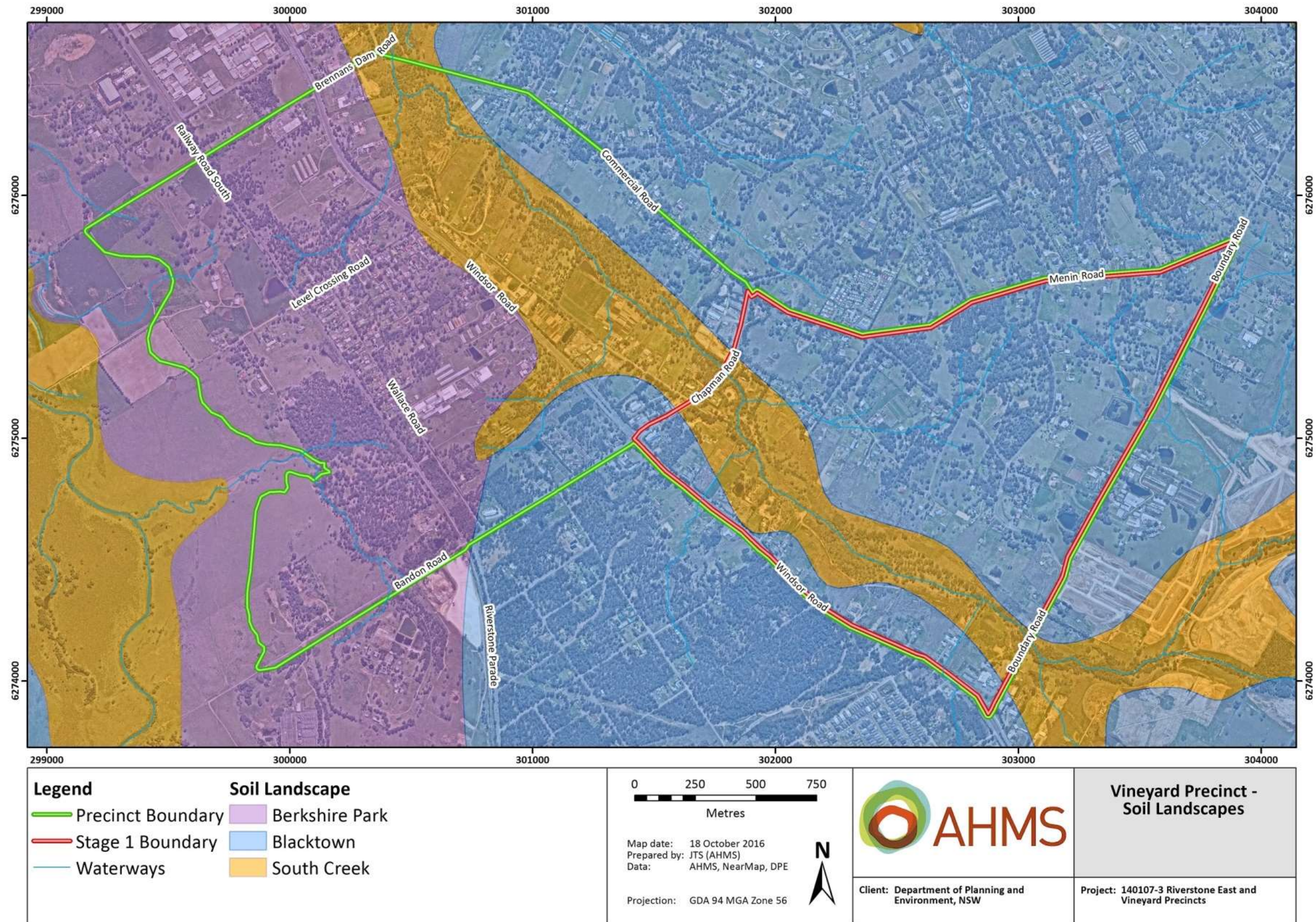


Figure 3. Mapped soil landscapes and drainage lines within the study area.

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. Eastern Creek, to the west to the subject 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 four communities that have been mapped as occurring within the Vineyard 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;
- Shale/Gravel Transition Forest. Key species *E. fibrosa*, *E. moluccana* and *E. tereticornis*, with sparse shrub undergrowth. Found in similar environmental conditions to Shale Plains woodlands, but with a higher proportion of alluvium and ironstone gravels within the soils;
- 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 Killarney Chain of Ponds;
- Cooks River/Castlereagh Ironbark Forest. Key species: *E. fibrosa*, *Melaleuca decora* and *E. longifolia*, with smaller trees and dense shrubland. This community is associated with clay-rich alluvial soils and/or Wianamatta shales.

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 Hawkesbury 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

Windsor Road was laid out in 1794, with the original route through the study area roughly following the present line of Old Hawkesbury Road. The land on the western side of Old Hawkesbury Road was alienated shortly afterwards. To the north of Bandon and Chapman Roads, the study area is part of Portion 58 of the Parish of St Matthew, which was granted to Charles Marsden in 1803. To the south, the study area is part of Portion 95, which was granted to Maurice Charles O'Connor in 1810. That part of the study area to the east of Old Hawkesbury Road was part of the Nelson (later Pitt Town) Common, created in 1804.

The initial use of the two estates, Portions 58 and 95, was for low-intensity agricultural purposes, such as grazing, and in fact large areas remained uncleared through the nineteenth century. However, some smaller areas were cultivated, including the establishment of orchards and vineyards. The most intensive development during this period was in relatively discrete areas, such as around the homesteads (not included in the study area) and along Old Hawkesbury Road and later Windsor Road. Pitt Town Common was similarly used for pasture, and parts were cleared for this purpose, along for timber-getting. Building materials such as stone are also known to have been sourced in the Common, suggesting at least minor quarrying.

Subdivision of the estates began in the mid-nineteenth century, but the lots sold only slowly. That part of the Common within the study area was not subdivided until the 1890s. In general, the lots were large, and intended for smaller scale and more intensive agricultural use, such as dairying, market gardening, orcharding and vineyarding. The 1947 aerial photograph indicates that development remained sparse through to the mid-twentieth century (**Figure 4**).

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;
- The construction of the railway and associated sidings and stations along the western part of the subject area;
- Residential expansion, particularly within the last decade, including service installations such as sewerage pipes and powerlines. Parts of Killarney Chain of Ponds have been realigned due to the construction of sewerage and water services (AHMS 2011);
- Minor industrial works such as poultry sheds and fodder production.



Figure 4. 1947 aerial photograph, with the approximate boundaries of the study area marked in red (LPI).

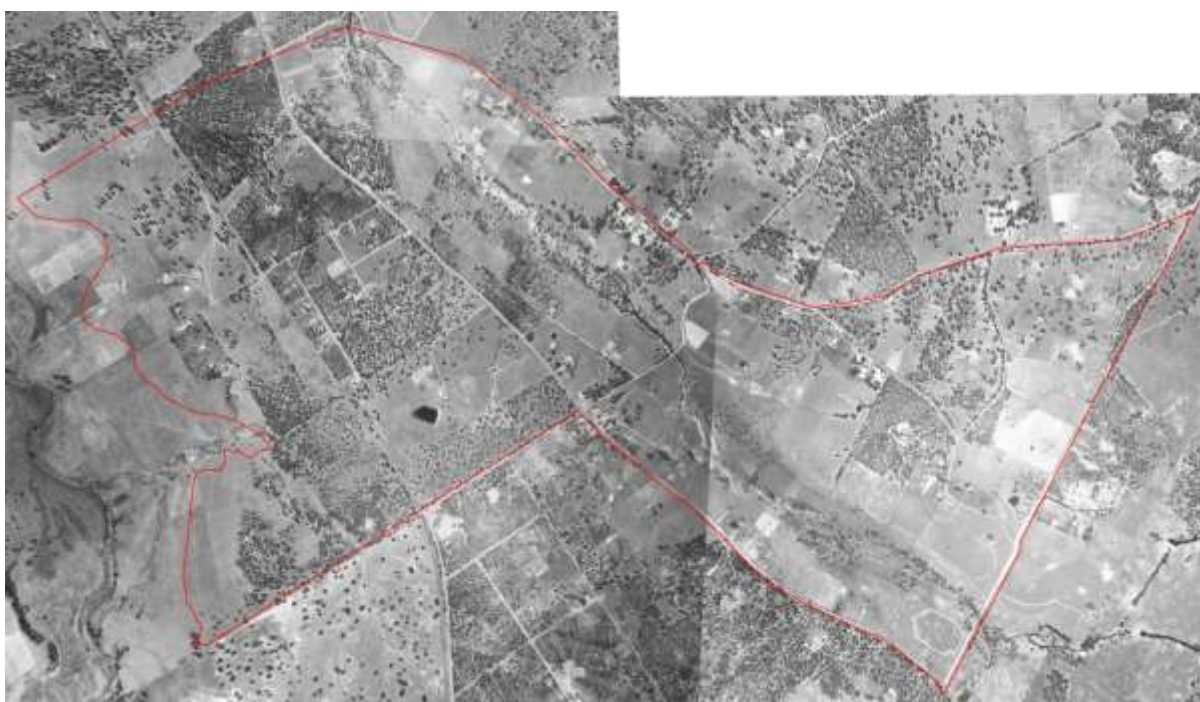


Figure 5. 1956 aerial photograph, with the approximate boundaries of the study area marked in red (LPI).

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 Killarney Chain of Ponds. The frequency of low-order streams throughout the study area suggests that during wetter climatic periods, fresh water would have been abundant throughout 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. Given the dominance of natural silcrete outcrops, it is considered that prevalent surviving cultural materials would be 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. Parts of Killarney Chain of Ponds have been realigned due to water and sewerage services works, reducing the potential for intact archaeological deposits in these locations.

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 Vineyard Precinct, a more targeted consultation 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 5 - 12 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 Cultural Heritage Assessments	Gordon Morton Tim Wells	Thursday 5th, Friday 6th, Wednesday 11th & Thursday 12th June 2014
Darug Land Observations	Gordon Workman Paul Goddard Jamie Workman	Thursday 5th, Wednesday 11th, Thursday 12th & Friday 13th June 2014
Gunjeewong Cultural Heritage Aboriginal Corporation	Cherie Carroll Turrise Bruce Turrise	Wednesday 11th – Friday 13th June 2014
Tocomwall	Ricky Fields	Thursday 5th, Friday 6th, Thursday 12th & Friday 13th June 2014
Deerubbin Local Aboriginal Land Council	Steven Randall Kayne Moreton Steven Knight Rivers McEwan	Tuesday 10th June 2014
Darug Custodian Aboriginal Corporation	Justine Coplin	Thursday 5th, Friday 6th, Thursday 12th & Friday 13th June 2014
Shane Williams	Shane Williams	Wednesday 11th June 2014
Kamilaroi-Yankuntjatjara	Philip Khan	Friday 6th June 2014

4.1.5 Report Review

On 21 June 2014, a summary report of the results of the field investigations were provided to all participants. This report was provided to the RAPs for comment between 10 July – 3 August 2015.

One RAP (DCAC) provided comments on the report (**Appendix 2**). These comments indicated their support for the recommendations of the project, but raising concern over the number of RAPs involved in the process.

4.2 Cultural Values Recording

The original intent of 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 and Vineyard areas, 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 Vineyard precinct. While

respondents were given the option of meeting as a focus group to 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 Aboriginal Cultural Heritage Assessments	Celestine Everingham Gordon Morton	Wednesday 9 July 2014	Michelle Lau Nalisa Neuendorf
Darug Land Observations	Gordon Workman Shauna Locke	Monday 7 July 2014	Michelle Lau Nalisa Neuendorf
Gunjeewong Cultural Heritage Aboriginal Corporation	Cherie Carrol Turrise Bruce Turrise	Friday 4 July 2014	Michelle Lau Nalisa Neuendorf
Darug Custodian Aboriginal Corporation	Leanne Watson Justine Coplin	Thursday 10 July 2014	Michelle Lau Nalisa Neuendorf William 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 ranged 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), Joan Goodrum (Mulvaney & White, 1987), James Kohen (1993) and Anne Ross (1988).

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 or has been 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, 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 J. , 1788). On an expedition north-west of Parramatta, Watkin Tench records that his guides Colebe (Gadigal) and Ballederry (Burramattagal) quickly found themselves in 'county unknown' and that they described those who lived there as 'enemies'. When the party finally they 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, p. 17 June 1789). 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 Colebe'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 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. Colebe 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, p. Appendix IV).

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 J. , 1788, p. 26 April). '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, p. 15 Sept 1814). 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, p. 31 August 1791). 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, p. Appendix VI).

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, p. July 1788). A short-lived fish trade sprang up in Parramatta, with Aboriginal people selling fresh bream and mullet for bread and salted meat (Collins, 1798, p. June 1791). 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, 2010b) (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 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 south-west of the Vineyard Precinct. Historic records also refer to the ‘Windsor tribe’ centred on an area around Windsor, to the north 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 Hawkesbury LGA, which includes the study area, has a population of more than 1,600 people identifying as either Aboriginal or Torres Strait Islander, representing 2.6% 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 Vineyard 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 10: blue line**); and a later trip by Watkin Tench and William Dawes in May 1791 (**Figure 10: purple line**). During the earlier expedition on the 15 April 1791 (see **Figure 5**), Aboriginal people were observed in the area immediately north of the subject 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.

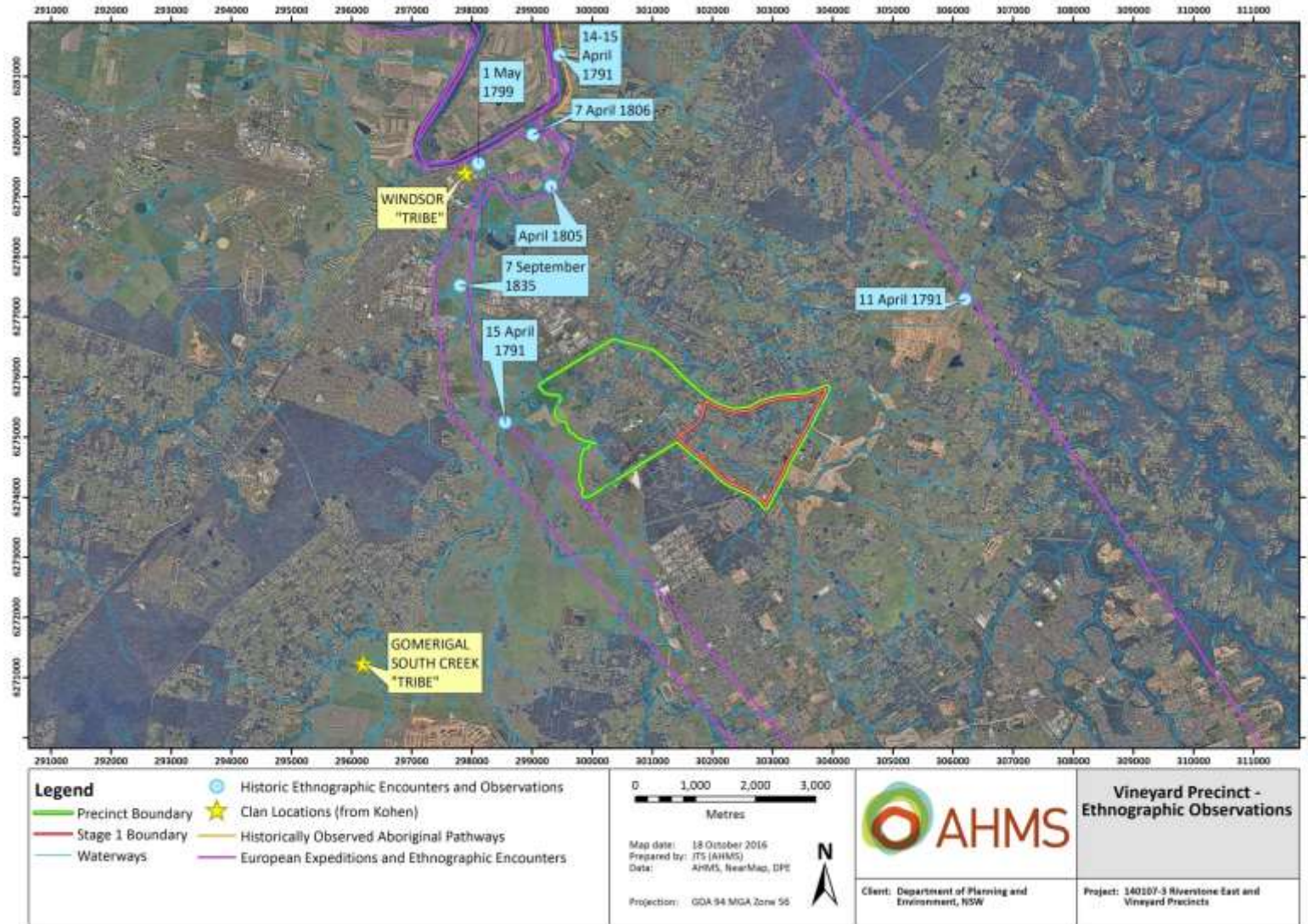


Figure 10. Map of ethnographic observations in proximity to the subject area (shown in red). (Source: Google Maps Pro).

5.2 Findings of the Field Investigation

One cultural place was identified during the field investigation. This comprised a stand of paper-bark trees at 338 Old Hawkesbury Rd, which Shane Williams indicated that the planting of paper-barks was a traditional method of place-marking sites of significance.

As a precautionary measure, this site has been identified here as 'Vineyard Precinct 12', however no other RAP individual or organisation throughout the remainder of the project raised this area in discussion. Given this, it is recommended that should the site be proposed for impact through future activities, further investigation of its cultural values are undertaken.

5.3 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 Vineyard Precinct. These connections are varied in nature and highlight the dynamic significance of the landscape to Aboriginal people past and present.

5.3.1 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 1.5km west of the precinct.

5.3.2 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." (Seba,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 Vineyard 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 11, Figure 13**). 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 12, Figure 13**):

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 13**) 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 Vineyard:

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 Vineyard 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 Vineyard 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 11. Uncle Fremo's house built by his parents in the 1930s.

5.3.3 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 12. Tree marking Uncle Fremo's property.

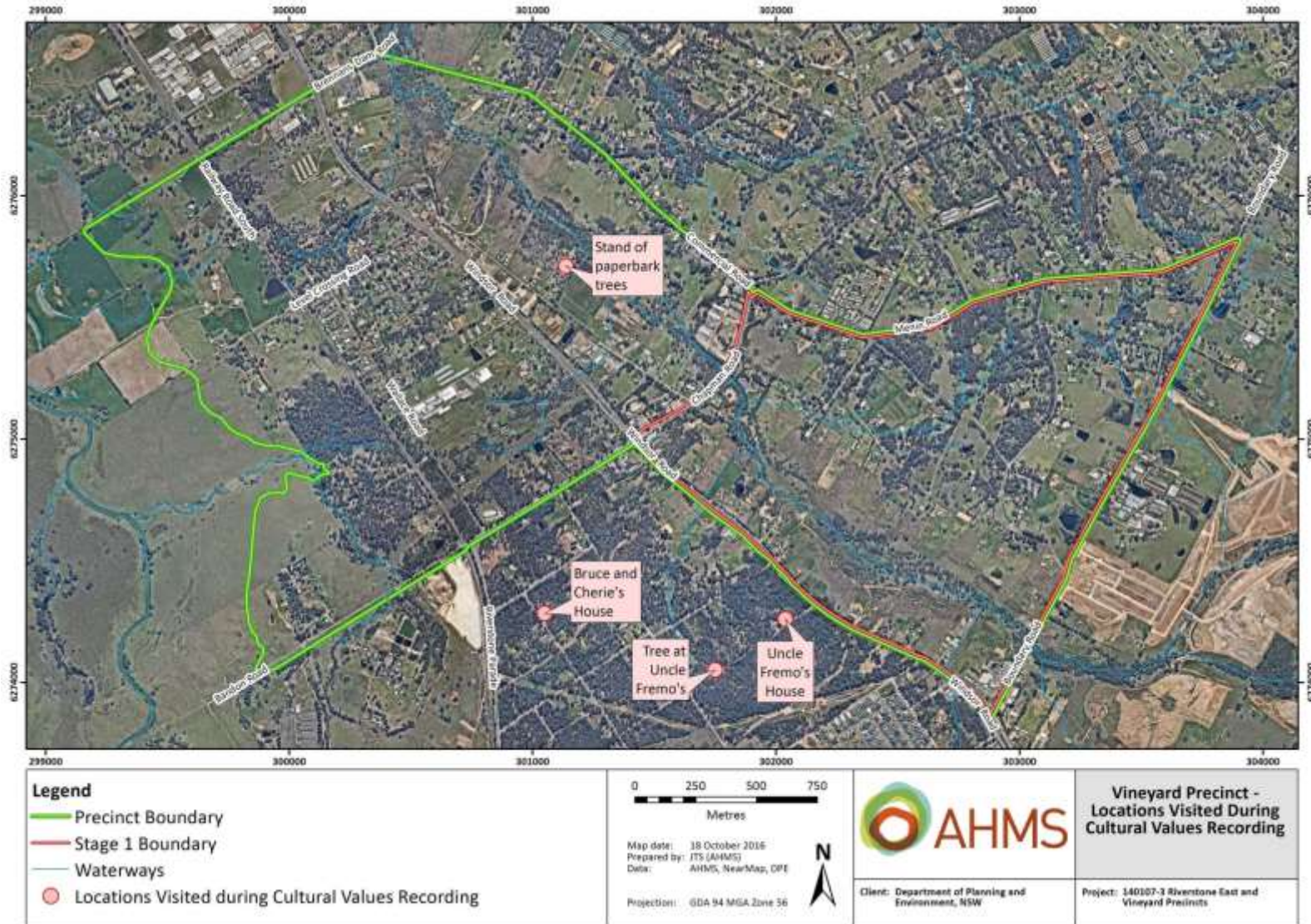


Figure 13. Locations visited as part of the cultural values recording.

6 ARCHAEOLOGICAL CONTEXT

This section discusses the regional and local archaeological context within which the precinct 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, 2005) (Kohen, 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) (Vattenbrow, 2002) (McDonald, 2005) (Bowdler 1976; Lampert 1971; Jo McDonald Cultural Heritage Management 2006). 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, Mitchell, Wright, & Toms, 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) (Vattenbrow, 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, 2004). Attenbrow's (2004) 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, most notably in the last 2,000 years, did. This increased use of sites appeared in the archaeological record as increasing population.

Holdaway et al. (2008), similarly suggest that populations did not increase in the late Holocene, but 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 et al. (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 rock shelters with midden deposit, rock shelters with art, rock art engravings and open artefact scatters (Vattenbrow, 2002). Less common site types (~5-15%) include rock shelters with artefacts, grinding grooves and open middens (Vattenbrow, 2002). The distribution, density and size of sites are largely dependent on environmental context. For instance, middens are found in close proximity to marine, estuarine and, less often, freshwater bodies. Rock shelters are only found in areas of exposed sandstone escarpment and grinding grooves are found on areas of exposed flat bedded sandstone near a source of water.

A 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 rock shelters 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, Aboriginal resource and gathering, Aboriginal ceremony and dreaming, 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 (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 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 System (AHIMS) database was undertaken on 18 March 2014 (ID 128691). The search covered 40km², centred on the study area and returned 83 listings (see **Table 2** and **Figure 14**). A number of archaeological reports have also been put together for studies undertaken within the Vineyard 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. Eight registered and unregistered sites were identified within the Vineyard study area (**Table 2, Table 3**).

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

Site type	Number of sites	%
Artefact Scatter	34	40.96
Artefact Scatter and PAD	16	19.28
Isolated Artefact	21	25.30
Potential Archaeological Deposit (PAD)	11	13.25
Quarry and Artefact Scatter	1	1.20
Total	83	100.00

Table 3. Results of AHIMS Search: Sites located within the Vineyard Precinct.

Site ID	Site name	Context	Site status	Site features	Reference
45-5-2846	WBH1	Open site	Partially destroyed/collected	Artefact: 2	Therin 2002, see also site RV19 in ENSR 2008
45-5-2839	WBH2	Open site	Collected	Artefact: 7	Therin 2002, see also site RV18 in ENSR 2008
45-5-2840	WBH3	Open site	Destroyed	Artefact	Therin 2002
45-5-2841	WBH4	Open site	Partially destroyed	Quarry, Artefact: 14	Therin 2002
45-5-2845	WBH8	Open site	Destroyed	Isolated artefact	Therin 2002
45-5-2902	PAD WBH	Open site	Partially destroyed	Potential Archaeological Deposit (PAD)	Therin 2002, see also Area-SA2 in Oakley 2000
N/A	Vineyard 1	Open site	Collected	Artefact: 260	Brayshaw 1987
N/A	WSTS	Open site	Probably non-cultural	Scarred Tree	Oakley 2000

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.

Eight registered and unregistered sites were identified within the Vineyard Precinct. Of these, all sites have been either partially destroyed¹ or salvaged prior to development:

- WBH1 (45-5-2846): An artefact scatter of two artefacts located 25 metres apart in a disturbed context, recorded by Therin (2002) as part of an assessment for the upgrade of Windsor Rd. One of these artefacts was predicted to partially fall within the impact zone of the road upgrade, and a consent to destroy was recommended for this portion of the site. The remaining portion was re-recorded by ENSR AECOM (2008) as RV 19, which comprised a scatter of 3 artefacts. Salvage through surface collection was recommended for this site.
- WBH2 (45-5-2839): An artefact scatter of three artefacts located 2 metres apart in a disturbed context, recorded by Therin (2002) as part of an assessment for the upgrade of Windsor Rd. Conservation was recommended for this site. This site was re-recorded by ENSR AECOM

¹ The destruction of sites recorded by Therin (2002) has not been recognised on the AHIMS database. However, it is inferred to have taken place on the basis of the impact assessment in the report. It is considered likely that the recommendations for salvage and destruction were implemented prior to the upgrade of Windsor Rd.

(2008) as RV 18, which comprised a scatter of <10 artefacts. Salvage through surface collection was recommended for this site.

- WBH3 (45-5-2840): An isolated silcrete core with potential machine damage, located in a disturbed context by Therin (2002), as part of an assessment for the upgrade of Windsor Rd. A consent to destroy permit was recommended for this site.
- WBH4 (45-5-2841): A scatter of 14 silcrete artefacts amongst a scatter of naturally occurring silcrete, recorded by Therin (2002) as part of an assessment for the upgrade of Windsor Rd. This site was therefore recorded as a quarry site, and was located on a hill slope approximately 200m from Killarney Chain of Ponds. Part of this site was predicted to be impacted in the course of the road upgrade, and a consent to destroy permit was recommended.
- WBH8 (45-5-2845): An isolated artefact manufactured from fine-grained silicious material, located on a small soil exposure, recorded by Therin (2002) as part of an assessment for the upgrade of Windsor Rd. A consent to destroy permit was recommended for this site.
- PAD WBH (45-5-2902): A potential archaeological deposit identified by Therin (2002) as part of an assessment for the upgrade of Windsor Rd. Approximately 70% of the PAD was expected to be impacted by the proposed road upgrade, and a consent to destroy permit was recommended for this portion.
- Vineyard 1: An artefact scatter of 260 artefacts located as a result of assessments undertaken on behalf of the State Rail Authority of NSW. The site was considered to have been salvaged through surface collection and excavation, and a consent to destroy was sought for the site location (Brayshaw McDonald 1987).
- WSTS: A scarred tree recorded by Oakley (2000) and reassessed by Therin (2002) during the Windsor Rd upgrade assessment to be of natural rather than cultural origins. As a result, this site is no longer listed on the AHIMS database.

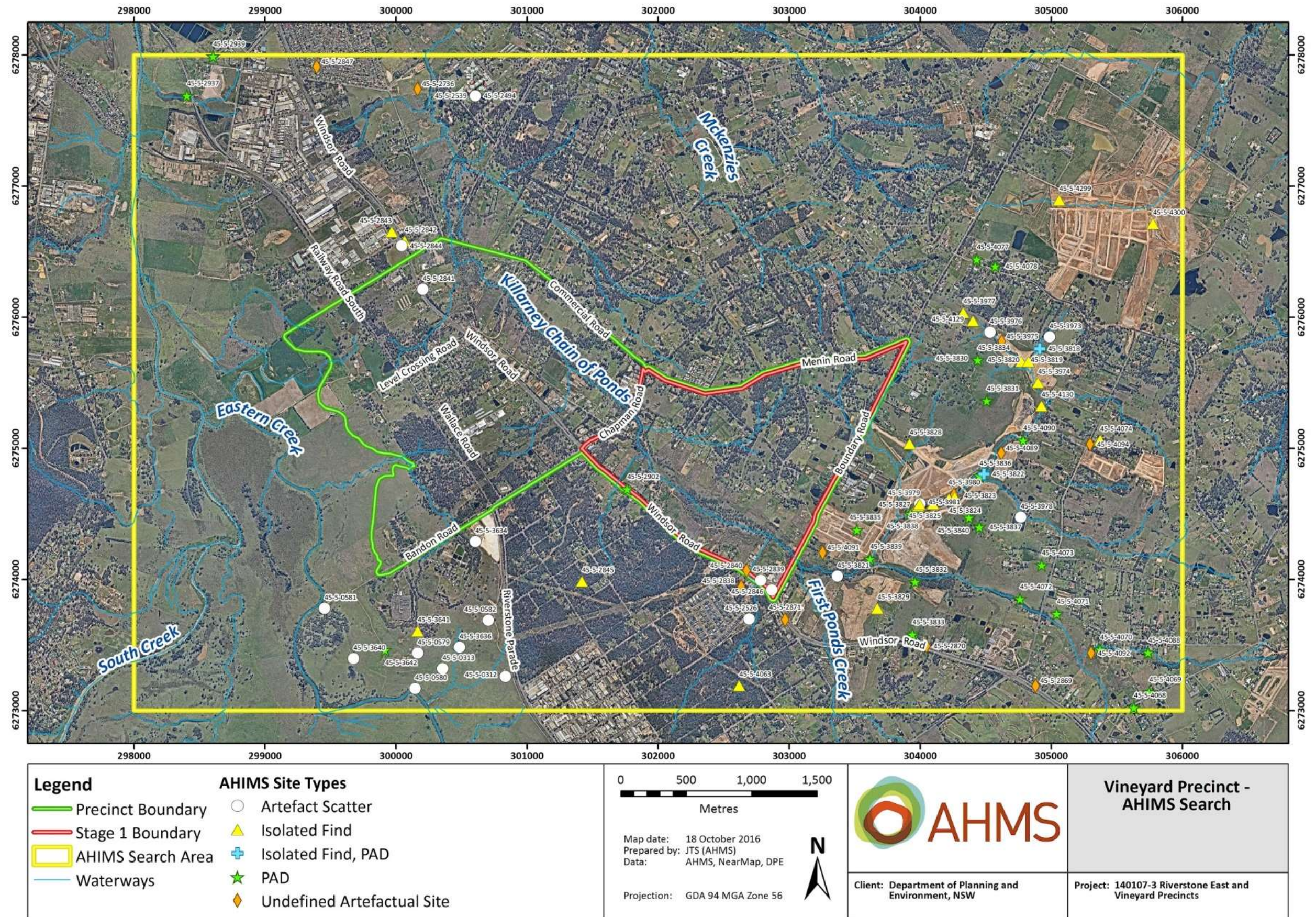


Figure 14. AHIMS Search results within and surrounding the study area.

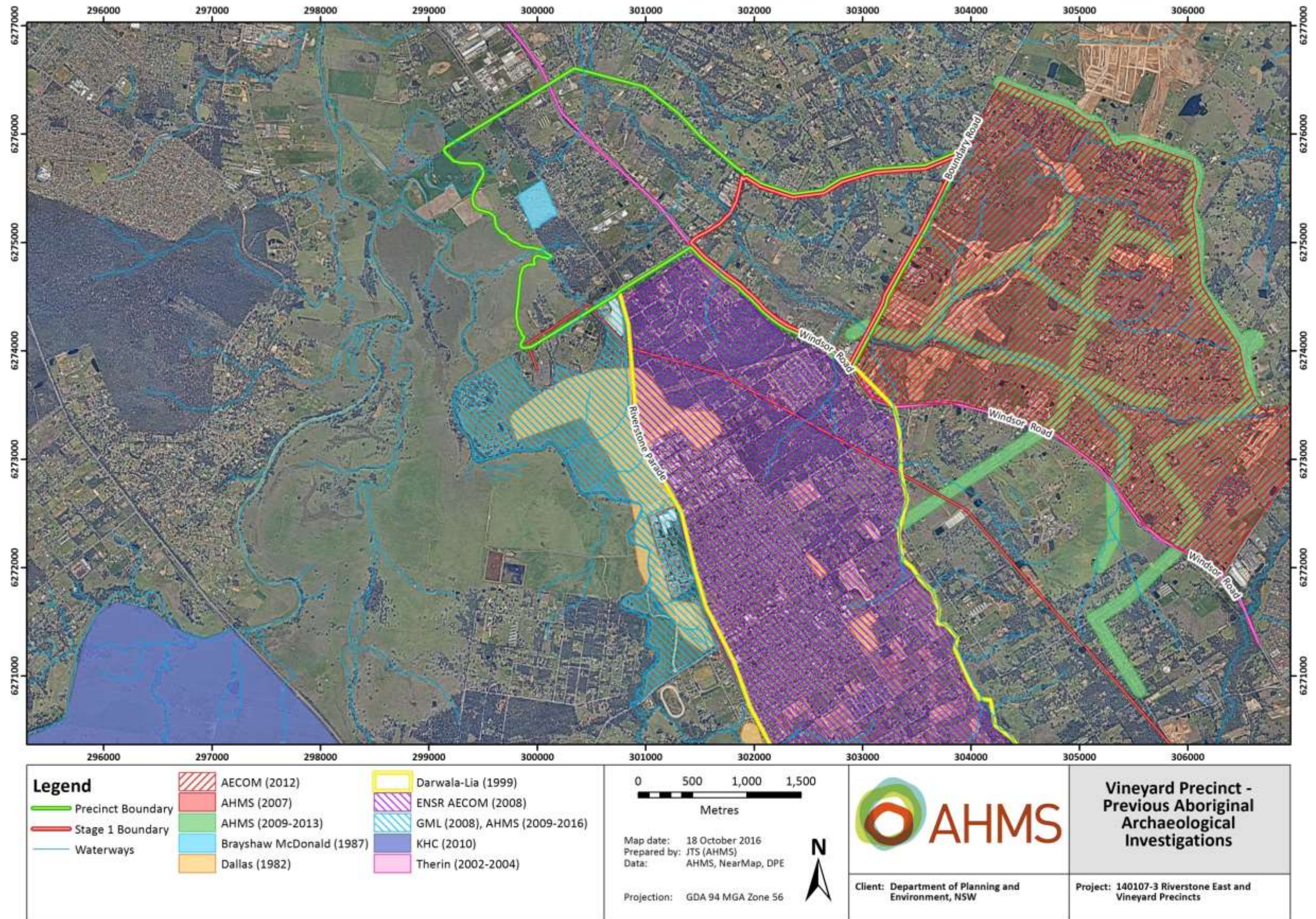


Figure 15. Previous studies undertaken in the local area.

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 Vineyard 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 Priority Growth Area precincts in the local area. 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. Referenced studies are depicted in **Figure 15**.

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 Priority Growth Area (NWPGA) and South West Priority Growth Area (SWPGA), Sydney (an area of over 30,000 hectares). The North West (NW) assessment area comprised all or part of 15 precincts in the NWPGA, including Marsden Park, Box Hill, Riverstone West, Riverstone, Riverstone East, Alex Avenue and part of Vineyard.

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 NWPGA and SWPGA. 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 250 m of the high order creeklines in the NW assessment area. The review also concluded that historical and modern development have had a significant negative effect on the survival of archaeological resources.

A Due Diligence Assessment undertaken within the umbrella of this project, assessed parts of Killarney Chain of Ponds within the Vineyard Precinct. This assessment identified significant ground disturbance had already occurred within the locations studied, indicating a low likelihood for Aboriginal Cultural Heritage in these places (AHMS 2011a).

The main component of the assessment was the development of a detailed archaeological predictive model for the two assessment areas (**Figure 16**). 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

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 Killarney Chain of Ponds) 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 results of the predictive model with the Vineyard study area overlain are shown in Figure 16.

Landforms identified during the field assessment included gentle undulating slopes and hills in the vicinity of Riverstone with lower slopes, flats and alluvial terraces being present in the Riverstone and Vineyard areas, especially along the Killarney Chain of Ponds. The land was in general low lying and water logged, which was considered to have low archaeological potential.

The field assessment identified 27 Aboriginal objects/sites/places across 38 km of 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

As a result of these investigations, WBH3 (AHIMS# 45-5-2840), located within the south-west corner of the Vineyard Precinct, was reassessed. This consists of a single artefact, located on the northern side of Windsor Road within road gravel recorded by Therin (2002). Analysis of the mapped location of 45-5-2840 on Windsor Road found that it is probable that the site was removed during an upgrade of Windsor Road. Consent to Destroy under Section 90 of the *National Parks and Wildlife Act* (1974) was listed as a recommendation on the site cards for these sites and on 05/03/2004 a Section 90 Consent to Destroy (partial) AHIP #1844 was issued (Fran Scully (OEH) pers com.; L. Murray (AHMS) 11/01/2011). It is therefore highly likely that this site has been disturbed.

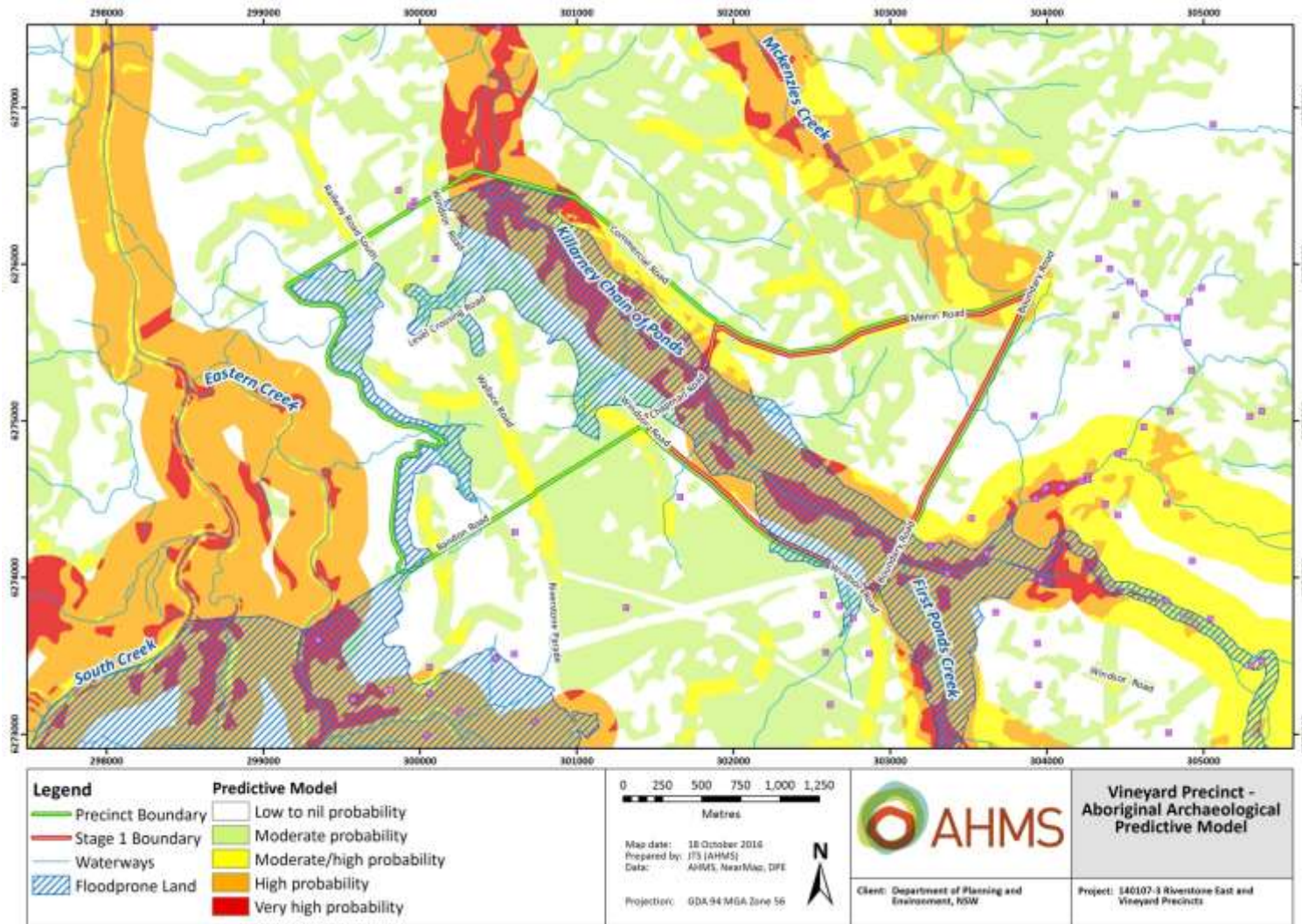


Figure 16 AHMS (2011b) predictive model for the North West Priority Growth Area, highlighting the predicted archaeological sensitivity of throughout the North West Priority Growth Area.

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 Priority Growth Area. The study reidentified 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 study area encompassed parts of Killarney Chain of Ponds directly east of the Vineyard Precinct, which was identified by Aboriginal stakeholders as culturally significant during the assessment. The majority of sites were located within 200m of water sources, although very few surface sites were located in the vicinity of Killarney Chain of Ponds. The survey recognised several areas of disturbance along the channel due to intensive use over the last 200 years, lowering the archaeological sensitivity of the floodplain area. Part of the significance assessment noted the cultural significance of the Killarney Chain of Ponds, and recommended conservation and ongoing consultation with registered Aboriginal stakeholders in regards to its conservation.

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

An archaeological survey was undertaken which investigated 303ha (a sample of 19%) of Alex Avenue and Riverstone Growth Precincts (2008a). 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.

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 (RV19 and RV18) were correlated with Therin's (2002) WBH 1 and WBH 2, located on the edge of the Vineyard Precinct. As the proposed water infrastructure was predicted to impact upon these sites, surface collection was recommended prior to development.

6.3.4 Dallas: Riverstone, Schofields and Quakers Hill Survey (1982)

Mary Dallas undertook an investigation to the south-west of the Vineyard Precinct, as part of a relatively 'broad brush' study of land within Quakers Hill, Riverstone and Schofields for Blacktown City Council, the Land Commission of NSW (Landcom) and the Department of Environment and Planning in 1982. It was part of the earliest stages of environmental assessment and planning of the 'Quakers Hill Release Area'.

The area was subject to targeted survey that covered a large part of the subject area, most notably areas around the meatworks. Dallas' study identified four artefact scatters and two isolated finds. However, although good descriptions of the sites were made, several subsequent investigations have failed to re-locate them. Many may have been destroyed in the 30 years since Dallas' study.

6.3.5 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, utilised 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 (2008), suggested that some of the scatters of silcrete recorded by Darwala-Lia, were in fact naturally occurring and non-purposefully fractured silcrete nodules.

6.3.6 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, directly south of the Vineyard Precinct, in the NWPGA 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.

6.3.7 Kelleher Nightingale Consulting: Area 20 Precinct – North-West Priority Growth Area (2010)

Kelleher Nightingale Consulting (KHC) conducted an Aboriginal Heritage Assessment for the Area 20 Precinct, located approximately 3km to the south 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 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 during the historical period. 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.

6.3.8 KHC: Marsden Park Precinct – North-West Priority Growth Area (2012)

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 the 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.

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

Integral Energy engaged AHMS and *Cultural Heritage Connections* 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).

Artefact densities on other landforms were considered relatively low in comparison. Pole site 9 & 10 (AHIMS ID# 45-5-3634) was identified within 200m of the southern part of the Vineyard Precinct, on the mid-slope of a low hill. No material was identified during survey. Five artefacts were recovered during excavation from six 1m x 1m excavation trenches. Pole site 2 was located approximately 250m south of the Vineyard study area, and comprised 23 stone artefacts recovered from three 1m x 1m test pits. Testing in this area indicated some disturbance in the form of imported fill. Artefacts were recovered from remnant topsoils underlying the fill. Sterile B horizon clay subsoils were located at depths of 20-25cm.

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 McDonalds findings that areas on lower slopes within 50 metres of a creek will display evidence of complex and intensive occupation.

6.3.10 McDonald: Rouse Hill Infrastructure Development (1993-2005)

A series of archaeological investigations associated with various stages of the Rouse Hill Infrastructure Development were undertaken from 1993 to 2005. 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.

6.3.11 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, passing through the centre of the Vineyard Precinct study area. 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. 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, WBH1-5 and WBH 8 were located within the Vineyard 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 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 approximately 3km south west of the Vineyard Precinct. Due to the proximity of the whole site to the creek, little intrasite 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.

6.3.12 Brayshaw – Blacktown to Richmond Railway Modifications (1986-1987)

Brayshaw McDonald Archaeologists were commissioned to undertake archaeological survey and sub-surface testing in order to determine the likelihood of Aboriginal cultural heritage in an undisturbed context, within the development impact of the duplication and electrification of the railway line between Blacktown and Riverstone. Two Aboriginal archaeological sites were identified during the survey, an isolated artefact, and an open artefact site. The open site is a scatter of artefacts over a 65 x 50m area, located on a low ridge, approximately 90m from a tributary of Killarney Chain of Ponds. According to Brayshaw's Report (Brayshaw 1987), the site is on the corner of Level Crossing Rd and the railway line, placing the site within the boundaries of the Vineyard Precinct. However, there was no AHIMS record of this site obtained during the site search.

This site, Vineyard 1 (45-5-0479), was further investigated with a series of five shovel probes excavated in a linear transect across the site. During excavation, modern railway material was identified below the artefact bearing deposits, and therefore the site was interpreted as being highly disturbed. As a result, no further excavation work was recommended. The site was effectively salvaged as a result of surface collection, which retrieved 260 artefacts from a total 389m² area.

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 Vineyard and wider 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 as pioneered by Laila Haglund, Dr Jim Kohen and Dr Jo McDonald.

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 Priority Growth Area consist of stone artefacts (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 repeated 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 5-12th of 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 will be used to help inform planning and design and have informed the 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 the **Table 1, Section 4.1.4**):

The field survey was undertaken in the following stages:

Stage 1 - An analysis of topographic maps and 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, such as elevated landforms and properties that were close to, or contained sections of Killarney Chain of Ponds.

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 pro-forma 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.

7.2 Survey Results

A total of 26 landholdings and three road transects were surveyed within the Vineyard 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 Vineyard Precinct comprises predominantly rural land, with a mixture of sealed and unsealed roads. The presence of unsealed roads created reasonable ground surface visibility that lended some areas to the survey of road transects. 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 and more developed towards the central north-west of the precinct, in the vicinity of the railway line.

The landscape was generally undulating, with a large ridgeline in the east running parallel with Killarney Chain of Ponds, with slopes declining towards the creek channel. The area to the west of the precinct comprised undulating hills with aesthetic views of Eastern Creek on the hill crests.

Survey coverage aimed to balance sampling of areas of ground surface exposure on the 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%). 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, animal 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
Crest	3488938.2	211355.38	1.02	1	1
Drainage line	15966	119.53	0.60	0	0
Flat	115920.5	4752.71	3.85	4	20
Floodplain	209857	2770.00	0.80	2	3
Slope	4559192.3	55877.34	6.72	5	80

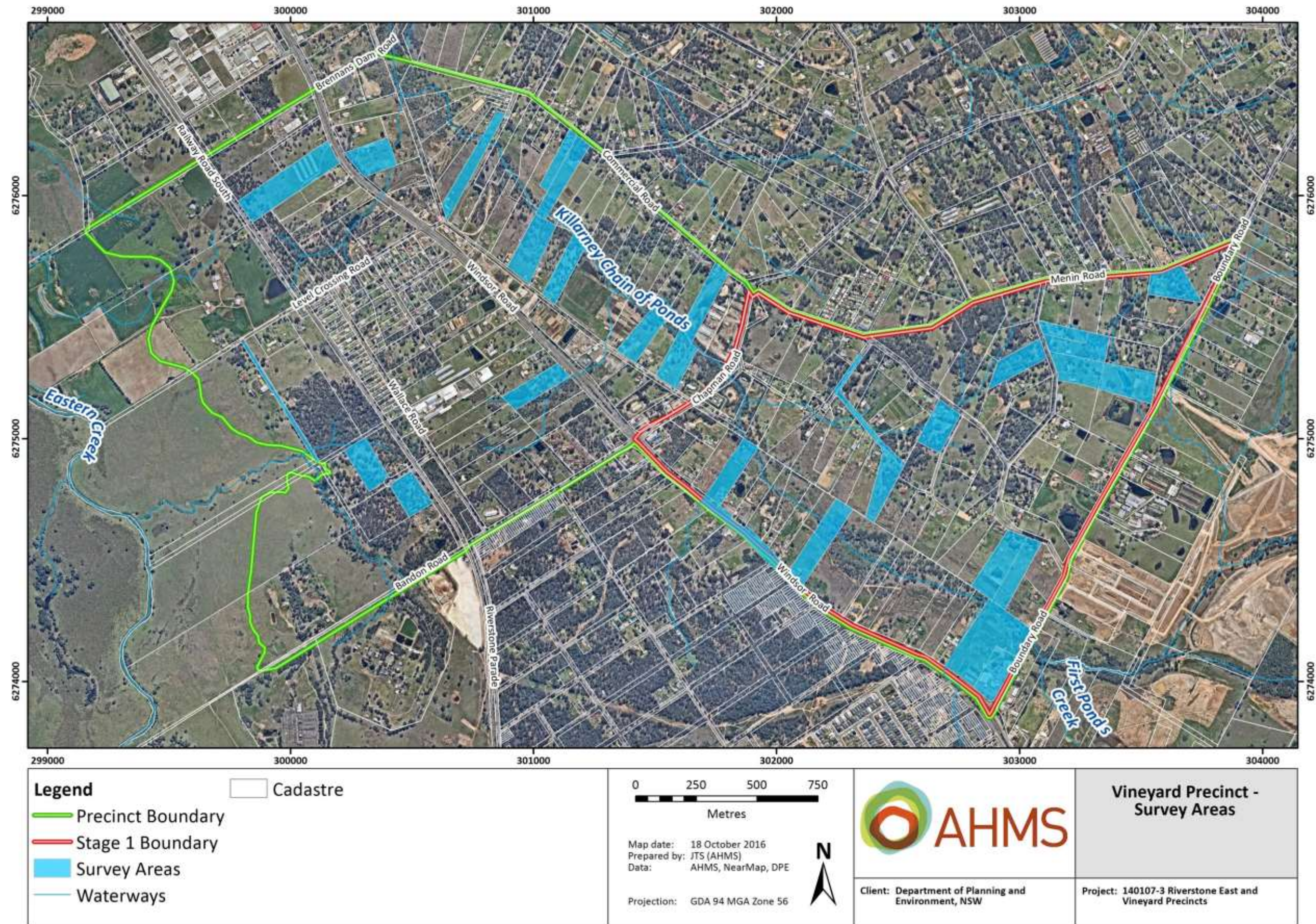


Figure 17. Outline of areas traversed as part of the survey.

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

Property Address	Area (ha)	Landform	Landform area (m2)	Disturbance	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage (%)	Sites
48	Boundary Rd, Oakville		27650	Past market gardening and hunting. House and large dams	50	50	6912.5	25	Vineyard Precinct 6 (see Table 7)
348	Commercial Road, Vineyard	Floodplain	2025	Swampy, areas of road base gravel to create track across swampy land	0	0	0	0	None
		Slope	18225	House, stock grazing	5	5	45.5625	0.25	None
338	Commercial Road, Vineyard	Crest	4045.5	House and driveway	5	5	10.11375	0.25	None
		Slope	17530.5	Shed, slope wash erosion scalds	50	50	4382.625	25	Vineyard Precinct 10, 11 (see Table 7)
		Floodplain	5394	Swampy	0	0	0	0	None
88	Commercial Road, Vineyard	Crest	2083	House	15	5	15.6225	0.75	None
		Slope	17705.5	Market gardened in one area	10	10	177.055	1	None
		Drainage line	1041.5		0	0	0	0	None
170	Commercial Road, Vineyard	Drainage line	1090		0	0	0	0	None
		Floodplain	2180	Drainage trench	5	5	5.45	0.25	None
		Slope	15260	Large amounts of fill dumped. Artefacts probably washed out of fill.	30	30	1373.4	9	Vineyard Precinct 4 (see Table 7)
274	Commercial Road, Vineyard	Crest	3270	House and power pylon	10	10	32.7	1	None
		Slope	8176	House, shed and gravel tracks	5	5	20.44	0.25	None
		Flat	10220	Clearing	20	20	408.8	4	Vineyard Precinct 5 (see Table 7)
84	Commercial Road, Vineyard	Drainage line	2044		20	20	81.76	4	None
		Crest	3255	House and track are cut into crest	5	5	8.1375	0.25	None
			7595	Fill dumped in areas to create motorcycle jumps	5	5	18.9875	0.25	None
49	Harkness Road, Oakville	Crest	7410	House and driveway	5	5	18.525	0.25	None
			17290	Cleared	5	5	43.225	0.25	None
42	Harkness Road, Oakville	Crest	4322	House	5	5	10.805	0.25	None
			17288	Dam	5	5	43.22	0.25	None
56	Harkness Road, Oakville	Slope	19820	House, shed and truck parts. Dip runs through, is dammed. Mostly new trees, some may be older	5	5	49.55	0.25	None
62	Harkness Road, Oakville	Crest	2941.2	House and road, driveway	5	5	7.353	0.25	None
		Slope	6862.8	Shed, cows and old pig sty. Flooding at eastern end	5	5	17.157	0.25	None
122	Menin Road, Oakville	Slope	13279.5	Dam	5	5	33.19875	0.25	None
		Low rise	7150.5	House, sheds and pool	5	5	17.87625	0.25	None
5	O'Dell Street, Vineyard	Flat	20460	House, tracks and sheds	30	20	1227.6	6	Vineyard Precinct 8 (see Table 7)
396	Old Hawkesbury Road, Vineyard	Floodplain	20570	Covered in fill, dam excavated. Used for trucks.	10	10	205.7	1	None
338	Old Hawkesbury Road, Vineyard	Floodplain	20550	House and shed	5	5	51.375	0.25	Vineyard Precinct 12 (see Table 7)
376	Old Hawkesbury Road, Vineyard	Floodplain	18288	Imported fill near road	5	5	45.72	0.25	None
		Drainage line	2032	Creek is forded	0	0	0	0	None
276	Old Hawkesbury Road, Vineyard	Floodplain	15510	House and shed	20	10	310.2	2	Vineyard Precinct 3 (see Table 7)
		Slope	4136	Area cut in preparation of house - not built	70	30	868.56	21	None
		Drainage line	1034		0	0	0	0	None
320	Old Hawkesbury Road, Vineyard	Floodplain	27510	Ploughed, some areas of deflation	10	20	550.2	2	None
2	St James Road, Vineyard	Crest	5190	House	10	10	51.9	1	None
		Slope	10380	Horse trampling, and horse pens	50	50	2595	25	None
		Drainage line	1730	Dam	10	10	17.3	1	None
5	St James Road, Vineyard	Crest	10235	House	10	10	102.35	1	None
		Slope	8188		50	20	818.8	10	Vineyard Precinct 1 (see Table 7)
		Drainage	2047		10	10	20.47	1	None

Property Address	Area (ha)	Landform	Landform area (m2)	Disturbance	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage (%)	Sites
		line							
711 & 725 Windsor Road (Gateway Motel, Vineyard Hotel)	7.753	Floodplain	77530	Vineyard hotel and carpark. Sydney water pipeline goes through. Very swampy sewerage area	20	10	1550.6	2	WBH1 (see Table 6)
372 Windsor Road, Vineyard	4.765	Drainage line	2382.5	Dam	0	0	0	0	None
		Flat	45267.5	Very flat: graded. Chicken sheds, house and track.	50	10	2263.375	5	Vineyard Precinct 2 (see Table 7)
587 Windsor Road, Vineyard	2.03	Floodplain	20300	Drain excavated through property, leads to dam. Grounds used for stock grazing	5	5	50.75	0.25	None
633 Windsor Road, Vineyard	3.036	Crest	3036		0	0	0	0	None
		Slope	25806	Sydney water pipeline, only area of GSV	10	10	258.06	1	None
		Drainage line	1518		0	0	0	0	None
381 Windsor Road, Vineyard	2.008	Flat	20080	Covered in fill, used for trucks. Natural soils may underlie.	20	20	803.2	4	WBH4
504 Windsor Road, Vineyard	2.094	Flat	19893	House, dog kennels	5	5	49.7325	0.25	None
		Drainage line	1047		0	0	0	0	None
Road Transect 1	333	Slope	2664000	Imported fill near road	5	10	13320	0.5	None
		Crest	666000	Imported fill near road	5	10	3330	0.5	None
Road Transect 2	166	Slope	1660000	Roadside linear pipeline and modern drainage lines. Insect nests.	15	10	24900	1.5	Vineyard Precinct 7 (see Table 7)
Road Transect 3	277	Crest	2770000	Imported gravel on track	50	15	207750	7.5	Vineyard Precinct 9 (see Table 7)

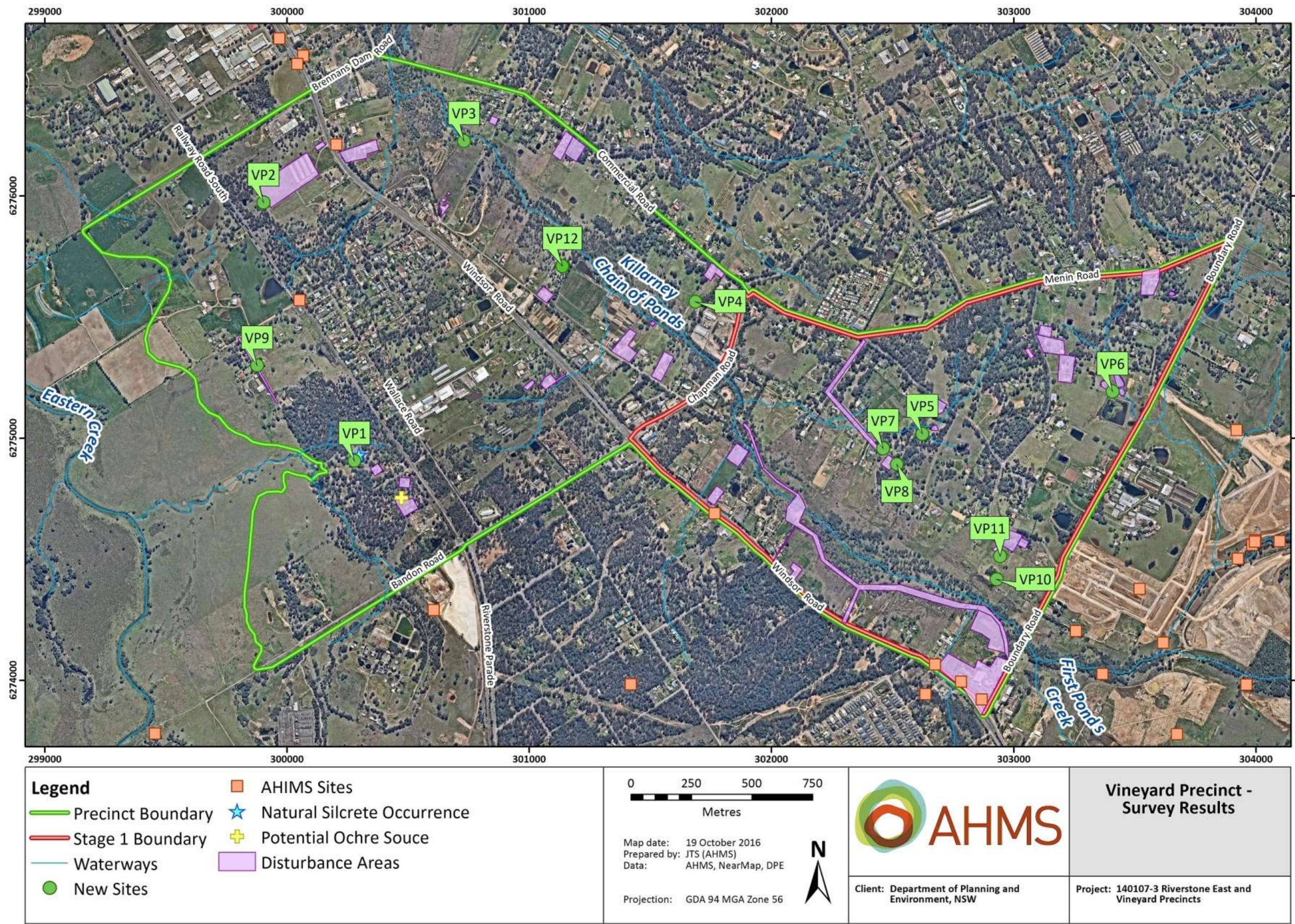


Figure 18. Results of the survey: Sites, disturbance and landforms of interest that were identified as part of the field investigations.

7.2.1 Landforms

The key landform feature identified in the background review of the subject area is Killarney Chain of Ponds which flows approximately northwest through the centre of the Vineyard Precinct. The drainage channel is a narrow, shallow waterway that has been forded in a number of places (example **Figure 19**).

A number of properties within the precinct lie adjacent to or comprise part of the creek channel. These were targeted during the survey. As a result, a large section of Killarney Chain of Ponds was investigated. Some sections were disturbed by modern land-use practices, including dams and causeways. Low visibility was generally encountered in these areas. Furthermore, due to high flood levels encountered in the last 60 years, a large proportion of the low-lying floodplain had been artificially built up with imported fill (**Figure 19**). There was no evidence to suggest that any original topsoils had been removed in this process, and therefore artefact bearing deposits may be present underneath the fill. Surface artefact distributions will therefore be biased away from these areas, as no intact archaeological sites were found in these areas. It should be noted that parts of the land close to the creek channel had also been highly disturbed by the recent pipeline installations. As the archaeological investigations associated with the pipeline have not yet been published, it is not yet apparent what sub-surface investigations may have encountered on the floodplain landform.

Ephemeral drainage lines were identified in a number of properties, mostly on steeper hill slopes and would have been unlikely to have held water for long periods of time. Nonetheless, a high number of the sites identified in the survey were located within proximity to low-order drainage lines, rather than Killarney Chain of Ponds (**Figure 18**). One low-lying channel (**Figure 20**) was identified at 274 Commercial Rd, associated with sandy soils and two artefacts (Vineyard Precinct 5).

Slope gradients across the study area were generally low, particularly in the vicinity of the creekline. 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. A generally low level of effective coverage was present for this landform, and only one site was identified (**Table 4**).

A number of crests and slopes were identified in properties located in Oakville within the north-east section of the precinct. This area of interest was characterised by the presence of relatively sandy soils. Low ground surface visibility was encountered across the area, but where exposures of this soil were evident, artefacts were frequently encountered. The most significant expression of this was identified at Vineyard Precinct 6, a dense scatter of artefacts located on a soil exposure caused by cattle trampling. This area may also be characterised by the density of drainage lines crossing through it. As a contrast, soils identified in the central-south part of the precinct, in the vicinity of St James Rd were typically thin, and where exposed, were almost entirely deflated down to the clay subsoil.



Figure 19. Section of Killarney Chain of Ponds with recently constructed causeway.



Figure 20. Ephemeral low-lying drainage line.



Figure 21. *An example of a gentle slope with natural erosion exhibiting relatively high levels of ground surface visibility.*

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.

The vegetation of the Vineyard Precinct consists predominantly of modified native vegetation (immature eucalypts). Mature vegetation was limited to occasional isolated eucalypts, predominantly identified within the Oakville region (**Figure 22**). Whilst some of these trees were older than others, they may represent an earlier phase of regrowth. Several of the longer-term residents of the area communicated to us that the majority of the Vineyard Precinct had been cleared due to 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;
- Installation of the recent water pipeline;
- Erosion from horse, cow, sheep and goat trampling;
- Construction of major and minor roads throughout the study area;
- Construction of the railway line through the western section of the precinct;
- 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 (these are mapped for areas surveyed in **Figure 18**). It is considered 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, railway line and installation of water infrastructure (**Figure 23** and **24**). This is likely to have resulted in the complete removal of archaeological deposits from these parts of the study area.



Figure 22. *Area of disturbance showing farm dam and young regrowth vegetation. One older eucalypt can be seen in the foreground which likely represent earlier regrowth.*



Figure 23. *Photograph showing built up ground surface caused by the importing of fill.*



Figure 24. *Photograph of disturbance caused by installation of water services in the vicinity of Killarney Chain of Ponds.*

7.2.3 Aboriginal Cultural Heritage

As a result of the survey, eleven new Aboriginal sites were identified within the Vineyard 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**.

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

Site ID	Site Name	Site Type	Artefact Density	Relocation information
45-5-2846	WBH1	Artefact scatter	2	Site had been destroyed by road widening.
45-5-2839	WBH2	Artefact scatter	7	Access not permitted
45-5-2840	WBH3	Artefact scatter		Access not permitted
45-5-2841	WBH4	Quarry, Artefact scatter	14	Site had been partially destroyed by road widening.
45-5-2902	PAD WBH	PAD	-	Access not permitted
N/A	Vineyard 1	Artefact scatter	260	Access not permitted. Site reported as destroyed.
N/A	WSTS	Scarred Tree	-	Access not permitted. Site reported as not of cultural origin.

Table 7. Aboriginal sites that were located as a result of the survey.

Site Name	Easting	Northing	Site type	Artefact Density	Landform	Site extent
Vineyard Precinct 1	300278	6274907	Artefact scatter	2	Slope	10m x 7m
Vineyard Precinct 2	299902	6275974	Artefact scatter	2	Flat	3m x 1m
Vineyard Precinct 3	300730	6276229	Isolated find	1	Floodplain	1m x 1m
Vineyard Precinct 4	301686	6275564	Artefact scatter	2	Slope	5m x 2m
Vineyard Precinct 5	302622	6275019	Artefact scatter	3	Flat	15m x 10m
Vineyard Precinct 6	303408	6275194	Artefact scatter	71	Slope	100m x 30m
Vineyard Precinct 7	302460	6274958	Artefact scatter	3	Slope	10m x 7m
Vineyard Precinct 8	302517	6274893	Isolated find	1	Flat	1m x 1m
Vineyard Precinct 9	299876	6275301	Isolated find	1	Crest	1m x 1m
Vineyard Precinct 10	302929	6274417	Isolated find	1	Slope	1m x 1m
Vineyard Precinct 11	302943	6274514	Isolated find	1	Slope	1m x 1m
Vineyard Precinct 12	301136	6275711	Potential cultural place	N/A	Flat	20m x 20m

A total of 88 stone artefacts, associated with eleven locations were recorded as a result of the survey (**Table 7, Figure 18**). In addition to these sites, large quantities of naturally and heat-fractured silcrete were identified throughout the precinct. Only those pieces of stone with diagnostic attributes of deliberate flaking were recorded as artefact sites. The majority of sites are isolated artefacts or low density artefact occurrences, which were found in a variety of contexts, including on the surfaces of slope, crest, flat and floodplain landforms (**Table 7**).

One higher density site was located: Vineyard Precinct 6. This site comprises a large scatter of silcrete artefacts eroding out of a sandy soil patch created through stock trampling (**Figure 27**). An approximate count of 69 surface artefacts was made on this exposure, all of which were observed to be made of silcrete. The exposure was located between two large dams, which undoubtedly would have curtailed the site extent. On the other side of one of the dams, two additional artefacts were found eroding out of spoil heaps. These soil heaps are inferred by their location to have been spoil from the excavation of the dam. The artefacts are therefore associated with the main artefact scatter. The site is also presumed to extend into the neighbouring property which was not accessed at the time of the survey.

One cultural place was also identified during the survey, which comprised a stand of paper-bark trees at 338 Old Hawkesbury Rd. An Aboriginal stakeholder indicated that the planting of paper-barks was a traditional method of place-marking sites of significance (see **Section 5.2** for further discussion).



Figure 25. Area of exposure revealing three artefacts in Vineyard Precinct 5.



Figure 26. *Three silcrete artefacts recorded as Vineyard Precinct 5.*



Figure 27. *Area of exposure revealing approximately 70 artefacts in Vineyard Precinct 6.*



Figure 28. *Stone artefact typical of the red silcrete identified at Vineyard Precinct 6. Note the sandy texture of the underlying soil.*



Figure 29. *Location of Vineyard Precinct 9 on a small area of good ground surface visibility next to a track on a hill crest (Road transect 3).*



Figure 30. *Isolated artefact identified as Vineyard Precinct 9.*



Figure 31. *Location of Vineyard Precinct 10 on a sandy exposure on slope.*



Figure 32. *Isolated artefact identified as Vineyard Precinct 10.*

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 scatters and buried artefacts, with less frequent 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 survey identified only low density sites and PADs in association with low order drainage channels (**Figure 18**). Seven previously recorded sites (two of which have been destroyed, one partially destroyed, and one non-cultural) are documented within the precinct, with a further 12 identified through the field investigation; and totalling 16 sites that require consideration and future management.

The limitations of relying on surface data to predict site distributions have been discussed during previous studies undertaken throughout the Cumberland Plains (e.g. McDonald 1997). This means that surface survey alone may not always provide a comprehensive inventory or understanding of the value of sites in the study area. High artefact densities were recovered from previously recorded sites such as Vineyard 1, where excavation occurred. Such results suggest that, although artefact densities across the precinct were typically low, there is potential for more meaningful archaeological information to be obtained through test excavation. This is especially the case in the area mapped as high archaeological probability surrounding Killarney Chain of Ponds, where visibility issues have impacted on the identification of sites in this area. Although only a low number of artefacts were identified in the vicinity of the creek, the archaeological probability has not been reduced.

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 Killarney Chain of Ponds, which is similarly a large, permanent water body. 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 a few thousand years in age. The findings of the field survey are consistent with these predictions. Seven previously recorded sites were documented; all consisted of low density artefact scatters dominated by silcrete raw materials. Two of these have been previously destroyed, one partially destroyed, and one considered non-cultural), resulting in five left within the precinct. Eleven of the newly identified sites in the study area also consisted of stone artefacts. A further site, VP12, was identified as a cultural place, and consisted of a copse of trees – it requires further investigation to determine its cultural values and any tangible features.

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 Killarney Chain of Ponds.
- Areas within 100m of minor tributaries of Killarney Chain of Ponds/low order waterways.

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

One important implication of the study for archaeological potential of the Vineyard precinct is the importance of sub-surface testing in providing a comprehensive catalogue of the archaeological sites within the study area. Excavation at Vineyard 1 illustrated the potential for high density sites in this area, and a significant finding of the background review was the limitations of surface data generally, within the region, which typically under-represent the presence and significance of archaeological sites.

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 (eg. **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 6.3.1**, 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 **Table 8** and **Figure 33****Error! Reference source not found.**

The original predictive model (**Figure 16**) 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 33** 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:

- 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.
- 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 presence of sites that are located greater than 250m from the main creek channel can be used to extend the areas of high archaeological probability. During the analysis of the survey results, it was noted that one high density site, and several low density sites were identified with a sandier variety of the local soil type. These sites can also be commonly associated with minor waterways which were not picked up in the broad scale North West Priority Growth Area mapping. It might be more meaningful to associate these sites with those tributaries, rather than the soil unit (although this could be a research question for future test excavation work). These tributaries are therefore recommended a higher level of archaeological probability. Based on the high density of artefacts identified at Vineyard Precinct 6, this classification is recommended to be high.

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 Vineyard Precinct.	N/A
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.	Lesser disturbed parts of Killarney Chain of Ponds.
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 small sections of the Killarney Chain of Ponds corridor.
Moderate		A ridgeline; and Does not have disturbed/erosional soils; and Does not have 'other' types of vegetation.	Encompasses ridgelines identified within the precinct.
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; or 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

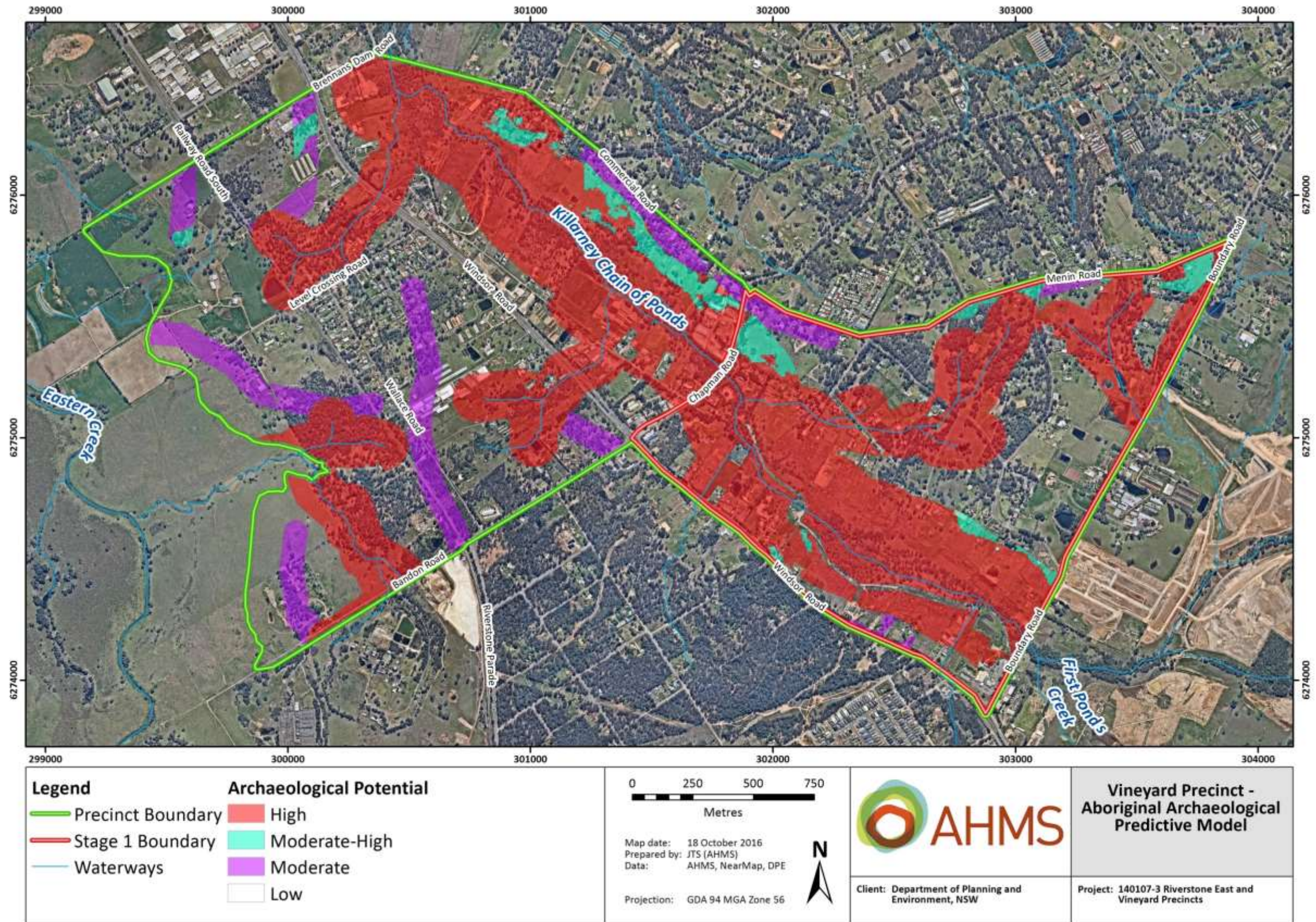


Figure 33. Revised predictive model for the Vineyard Precinct.

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 34** 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 34. 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. Summary of criteria and rankings used to determine a site’s significance.

Criterion	Threshold indicators State/High	Threshold indicator local/Moderate	Below threshold for significance/Low
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	The site is important to local Aboriginal	There is little or no knowledge in the

Criterion	Threshold indicators State/High	Threshold indicator local/Moderate	Below threshold for significance/Low
	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.	community or subset of the community and this importance can be articulated.	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; and 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 some potential information to be salvaged.

9.6 Significance Assessment

The subject area consists of seven previously recorded sites (three already destroyed) and 12 new Aboriginal archaeological sites. The scientific significance of each site according to the criteria of rarity, representativeness, research potential and integrity are discussed here, and presented in **Table 10**. Due to the general dearth of historical and aesthetic types of significance, scientific significance is considered the most informative. Where previously recorded sites could not be revisited, the relevant information is lifted from the original report descriptions, with two exceptions: Vineyard 1: where the original descriptions do not detail significance, and WSTS, which is not considered here since it has been reassessed as being a naturally scarred tree and therefore would not have any scientific significance.

A commonly low density of surface material was identified within the majority of sites identified as part of this assessment. Several of the isolated artefacts have limited research potential, especially those that were identified in disturbed contexts. Vineyard Precinct 1, 2, 4, 5 and 7, all artefact scatters with 3 artefacts or less, are also considered to have low integrity and research potential, due to the low density of artefacts present. These sites are not rare to the local area or to the region. As the AHIMS search results revealed, artefact scatters and isolated artefacts are the most common site type encountered in the area.

Therefore, it is the higher density sites such as Vineyard 1 and Vineyard Precinct 6, which yielded high artefact densities, large enough in size to be used to interpret larger scale questions about technology and occupation, that are attributed a higher degree of significance. Although both these sites have low integrity (particularly Vineyard 1, where artefact deposits were found overlying a

disturbed layer), the rarity of high density sites in the local area, and the inherent research potential of this rarity, imbues these two sites with moderate scientific significance. It must be also noted that Vineyard 1 has been reportedly destroyed as part of the development that instigated its investigation.

Table 10. Table of cultural and scientific significance of sites located within the Vineyard Precinct.

Site	AHIMS number	Site Type	Scientific significance	Aesthetic significance	Historic significance	Social/spiritual significance	Overall significance
Vineyard Precinct 1		Artefact scatter	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 2		Artefact scatter	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 3		Isolated artefact	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 4		Artefact scatter	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 5		Artefact scatter	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 6		Artefact scatter	Moderate/Local	Below threshold	Below threshold	Below threshold	Moderate/local
Vineyard Precinct 7		Artefact scatter	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 8		Isolated artefact	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 9		Isolated artefact	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 10		Isolated artefact	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 11		Isolated artefact	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
Vineyard Precinct 12		Potential cultural site	Low/Below threshold	Below threshold	Below threshold	Low	Low
WBH1*	45-5-2846	Artefact scatter	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
WBH2	45-5-2839	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
WBH3	45-5-2840	Isolated artefact	Low/Below threshold	Below threshold	Below threshold	Below threshold	Low
WBH4 [†]	45-5-2841	Quarry, Artefact scatter	Moderate/Local	Below threshold	Below threshold	Below threshold	Moderate/local
PAD WBH	45-5-2902	PAD	Moderate/Local	Below threshold	Below threshold	Below threshold	Moderate/local
Vineyard 1*	NA	Artefact scatter	Moderate/Local	Local	Below threshold	Below threshold	Moderate/local
WSTS ^Σ	NA	Scarred Tree	N/A	N/A	N/A	N/A	N/A

* Note site has been listed as previously destroyed.

† Note this site has been partially destroyed.

Σ This site was considered non-cultural and has not been assessed.

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 Vineyard Precinct. Parts of this area fall within various zones of archaeological potential 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 zones of archaeological potential outlined in **Error! Reference source not found.**, 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 ILP design responses with reference to the zones of archaeological potential shown on **Figure 33**.

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 33** 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 33** 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

The Vineyard Indicative Layout Plan (ILP) (Stage 1) has been reviewed in relation to the potential impacts on 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 section provides a summary of the potential impacts of the ILP to identified Aboriginal heritage.

11.1 Potential Impacts

The ILP (Stage 1) divides the eastern part of the Precinct into different zones and is presented in **Figure 355**. The location of Aboriginal sites and zones of archaeological potential are overlaid on the ILP in **Figure 36**.

11.2 Aboriginal Sites

As outlined in previous sections, 19 Aboriginal sites were identified within the precinct, two of which have been destroyed through past activities or salvaged prior to development, one partially destroyed, and one determined as non-cultural (resulting in a total of 16 sites). A further 12 sites were recorded during field investigations undertaken for the current study, six of which are located within the boundary of Stage 1 (**Figure 336**). These sites are all stone artefact scatters of various densities.

A summary of the potential impacts to the Aboriginal sites within the Vineyard Precinct (Stage 1) is presented in **Table 11**.

Table 11. Summary of potential impacts to Aboriginal heritage from the ILP (Stage 1).

Site*	Site Type	Significance	ILP Proposed Zoning	Potential Impact
Vineyard Precinct 5	Artefact scatter	Low	Passive Open Space	Low
Vineyard Precinct 6	Artefact scatter	Moderate	Low Density Residential	High
Vineyard Precinct 7	Artefact scatter	Low	Low Density Residential	High
Vineyard Precinct 8	Isolated artefact	Low	Passive Open Space/ Water Management/ Environmental Protection	Low
Vineyard Precinct 10	Isolated artefact	Low	Passive Open Space	Low
Vineyard Precinct 11	Isolated artefact	Low	Medium Density Residential	High

*Note, sites identified as previously destroyed have not been considered.

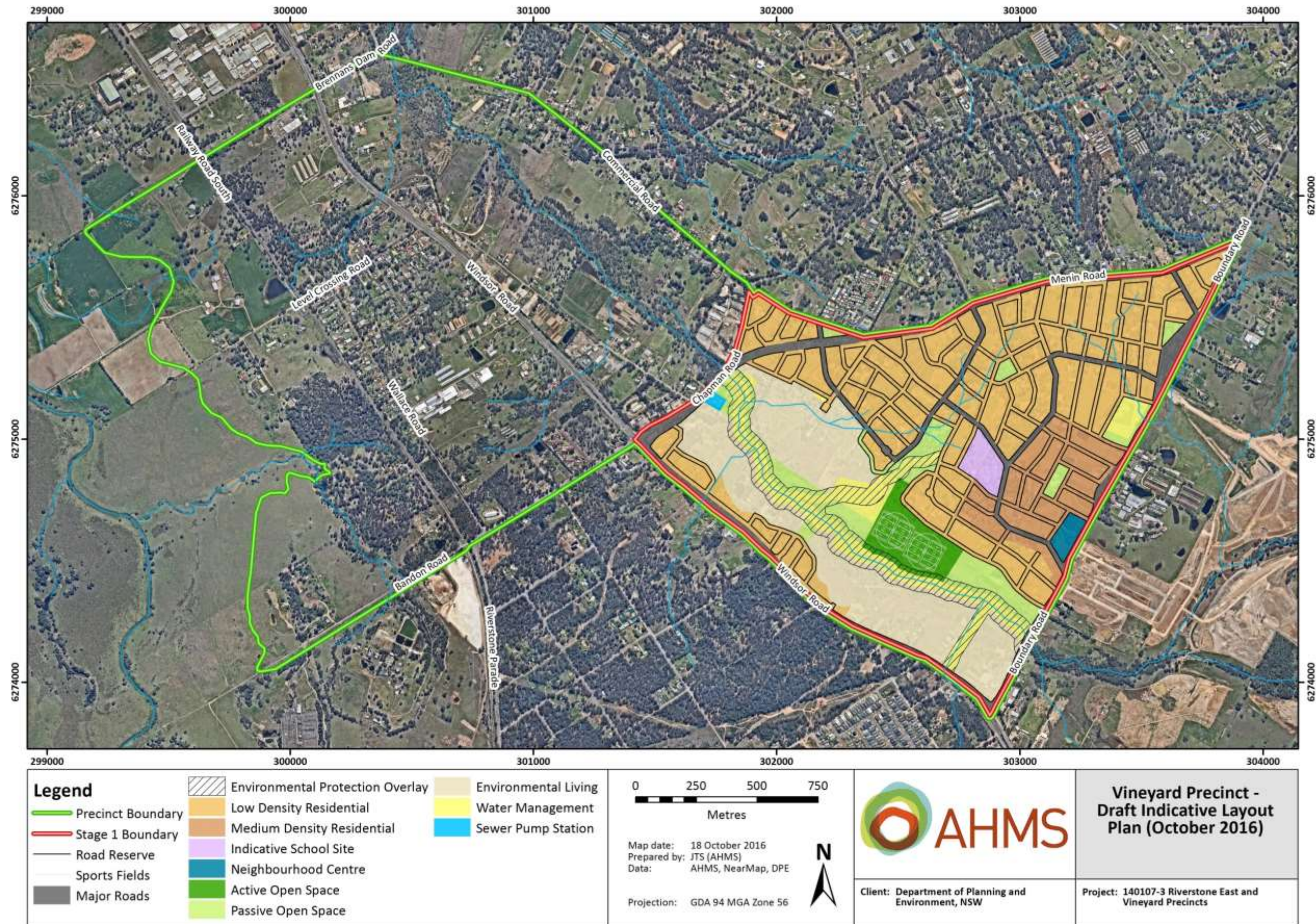


Figure 35. The proposed Indicative Layout Plan (Stage 1) for the study area.

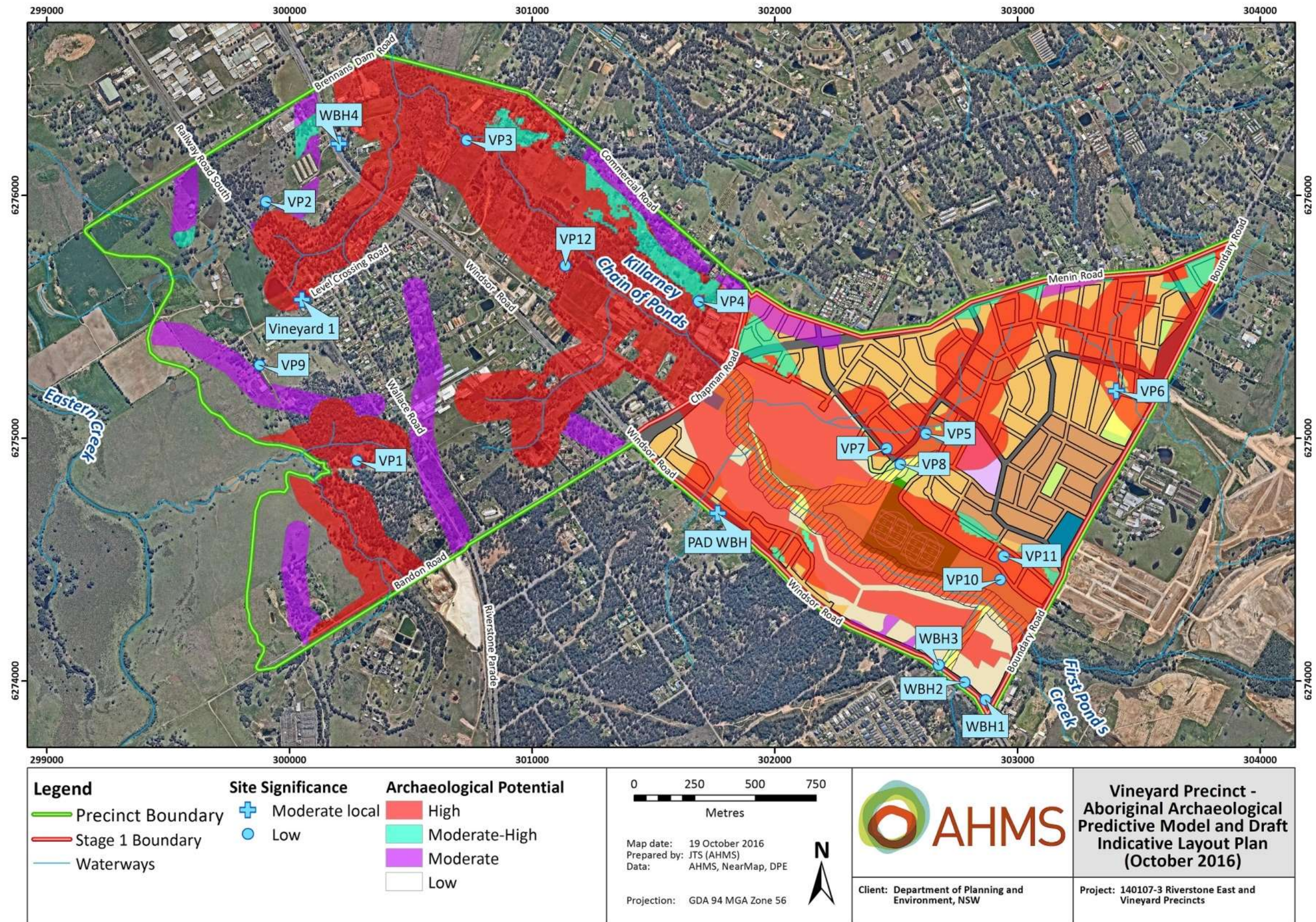


Figure 36. The identified Aboriginal objects/sites and areas of potential overlaying the proposed ILP.

11.2.1 Archaeological Potential

Due to the nature of the planning process and restrictions on access, no sub-surface investigations were undertaken as part of this assessment. As outlined in **Sections 6** and **8**, the likelihood of buried cultural material occurring is considered to be high based on the findings of previous regional and local studies. For this reason, areas of high, moderate-high, moderate and low archaeological potential or probability have been assigned across the study area, where it is considered likely for subsurface archaeological deposits to occur. These zones generally follow, and are within 250m of, the creeklines running through the precinct, with a focus along Killarney Chain of Ponds and its tributaries, and to a lesser extent the tributaries of Eastern Creek (**Figures 33** and **36**).

Of the areas considered to have high archaeological potential (~272ha), those situated in the southwest of Stage 1 are largely within zones proposed for low impact activities, including environmental living, water management, passive open space, and environmental protection. The remainder are located in zones proposed for a sewer pump station, sports fields/active open space, and low and medium density residential development, which have the potential to be high impact activities. Areas of moderate-high potential across the Vineyard Precinct are relatively minor in extent (~18ha). Within Stage 1, these areas are generally located in the north along the ridgeline in the vicinity of Commercial Road, and would be impacted by low density residential development. Areas of moderate and low probability encompass the remainder of the study area (~300ha), and while they would be impacted by a range of land uses, in Stage 1 the majority are located in zones proposed for low density residential development.

11.2.2 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.

11.2.3 Summary

A number of sites have been identified in the precinct. In accordance with OEH requirements, AHIMS Site Cards will be completed for the Aboriginal objects 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. Of the 19 Aboriginal sites recorded within the study area (of which 16 remain), six are located within the ILP (Stage 1) boundary. Five of the sites (VP5, VP7, VP8, VP 10 and VP 11) are considered to have low significance, and are isolated finds or artefact scatters composed of low densities of Aboriginal objects. One site (VP6) is a a dense scatter of artefacts considered to have moderate or local significance.

In summary, the adoption of the ILP would have the following outcomes for the known and expected Aboriginal cultural heritage as identified in this report:

- Three of the sites (VP5, VP8 and VP10) would be located within passive open space, water management and/or environmental protection zones, and subject to minimal (if any) impacts.
- The remaining three sites (VP6, VP7 and VP11) would be located within low or medium density residential zones, and are likely to be impacted by the proposed land use.

- Areas of high archaeological potential are extensive across the Vineyard Precinct (~272ha). Those areas situated along the banks of Killarney Chain of Ponds would be largely unchanged by the ILP (Stage 1), being within areas zoned for environmental living, water management, passive open space, and environmental protection. However, there is likely to be potential impacts in areas zoned for the sewer pump station, sports fields/active open space, and low and medium density residential land use.
- Areas of moderate-high archaeological probability encompass a smaller area within the Vineyard Precinct (~18ha), and within Stage 1 are generally situated along the ridgeline in the north. These areas are mostly within proposed low or medium density residential zones, and are likely to be subject to potential impacts.
- Areas of moderate and low archaeological probability encompass the remainder of the Vineyard Precinct (~300ha), and would be impacted by a range of land uses 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 (**Figure 356**). 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:

- This report 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.
- AHIMS Site Cards should be completed for the Aboriginal objects identified within the subject area. The Site Cards should be lodged with the AHIMS registrar.
- Any development proposed for the properties in which Aboriginal objects/sites or potential were identified would first require an Aboriginal Heritage Impact Permit to be obtained from OEH.
- Consultation with the Registered Aboriginal Parties should be maintained if the subject area is likely to be affected by development in the future.

Recommendations for further archaeological assessment:

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

- Sub-surface excavation should be implemented in areas of high, moderate/high and moderate archaeological potential (**Figure 33**) 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 significance 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 maintain a 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 peoples, 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 the following, 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 heritage 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.

References

Aboriginal and Torres Strait Islander Heritage Protection Act (Commonwealth) 1984

Aboriginal Land Rights Act (NSW) 1983

AECOM. 2012. Box Hill and Box Hill Industrial Precincts. Unpublished Report to Department of Planning and Infrastructure.

AHMS. 2007. Vineyard to Rouse Hill Electricity Upgrade. Aboriginal Archaeological Survey and Excavation Report. Unpublished Report to Integral Energy

AHMS. 2009a. Aboriginal Heritage Desktop Review and Sensitivity Mapping for Water Related Services to the North West and South West Growth Centres. *Unpublished Report to Sydney Water.*

AHMS. 2009b. Section 87 Aboriginal Heritage Impact Permit #1104269. Unpublished Report for PacLib.

AHMS. 2010. Water Related Services for North West and South West Growth Centres - Aboriginal Heritage Assessment Desktop Review. Unpublished *Report to Sydney Water.*

AHMS. 2011a. Aboriginal Heritage Part 3A Preliminary Assessment or Due Diligence Advice – Riverstone Additional Options. Unpublished Report to Sydney Water.

AHMS. 2011b. Water Related Services for North West and South West Growth Centres - Aboriginal Heritage Impact Assessment. Unpublished Report to Sydney Water.

AHMS. 2012. Additional Water Related Infrastructure for the North West Growth Centre – First Release Precincts. Aboriginal Heritage Impact Assessment. Unpublished Report for Sydney Water.

AHMS. in prep. North West Growth Centre Heritage Works. First and Second Release Precincts on behalf of Sydney Water. Unpublished Report to Sydney Water.

Attenbrow, V. 2002. *Sydney's Aboriginal Past: Investigating the Archaeological and Historical Records*. Sydney: UNSW Press.

Attenbrow, V. 2004. *What's Changing: Population Size or Land Use. The Archaeology of Upper Mangrove Creek, Sydney Basin*. In *Terra Australis* (Vol. 21). Canberra: Pandanus Books.

Attenbrow, V. 2010. *Sydney's Aboriginal Past. Investigating the Archaeological and Historical Records* (2nd edition – soft cover ed.). Sydney: UNSW Press.

Australia ICOMOS 2000. *The Burra Charter: The Australia ICOMOS charter for places of cultural significance 1999: with associated guidelines and code on the ethics of co-existence*.

Backhouse, J. 1843. *Narrative of a Visit to the Australian Colonies*. London: Hamilton, Adams and Co.

Banks, J. 1998. *The Endeavour Journal of Joseph Banks, 25 Aug 1768-12 Jul 1771, Volume 2*. Arranged by B.P. Sandford. Sydney: State Library of New South Wales.

Bannerman, S. M., & Hazelton, P. A. 2011. *Soil Landscapes of the Penrith 1:100,000 Sheet*. Sydney: Soil Conservation of NSW.

Barrallier, F. 1802. Journal of the expedition, undertaken by order of His Excellency Governor King, into the interior of New South Wales. In *Historical Records of New South Wales, Volume V*. Sydney: William Applegate Gullick, Government Printer, 1897.

- Bowdler, S. 1976. Hook, line and dillybag: an interpretation of an Australian coastal shell midden. *Mankind*, 10(4), 248-258.
- Bradley, W. 1969. *A Voyage to New South Wales, December 1786 - May 1792: The Journal of Lieutenant William Bradley of HMS Sirius*. Sydney: Ure Smith Pty Limited.
- Brayshaw McDonald Pty Ltd. 1987. Archaeological Investigation of Open Site Vineyard 1, Western Cumberland Plains, NSW.
- Brown, O. (2010b). Aboriginal Cultural Heritage Management and Mapping Aspects of Cultural Boundaries, Sub-bioregions and Site Distribution in the Sydney Basin. *Archaeological Heritage*, 2, 9-16.
- Brown, O. 2010b. Aboriginal Cultural Heritage Management and Mapping Aspects of Cultural Boundaries, Sub-bioregions and Site Distribution in the Sydney Basin. *Archaeological Heritage*, 2, 9-16.
- Byrne, D. and Nugent, M. 2004, *Mapping Attachment: a Spatial Approach to Aboriginal Post-Contact Heritage*, Dept. of Environment and Conservation (NSW) 1741370523
- Capell, A. 1970. *Aboriginal languages in the south central coast*, New South Wales: Fresh discoveries. *Oceania*, 41, 20-7.
- Collins, D. 1798. *An Account of the English Colony in New South Wales Vol 1*. London: T. Cadell Jun. and W. Davies, 1798.
- Cox, W. 1815. Journal, 7 July, 1814 - 6 January, 1815. SLNSW: Manuscript, C 708/1-2, filed at Safe 1/264-265, 15 September 1814.
- Dallas, M. 1982. An archaeological survey at Riverstone, Schofields and Quakers Hill, NSW. Unpublished Report to the Land Commission of NSW.
- Darwala-Lia 1999. Riverstone Land Release Area. Aboriginal Cultural Heritage Assessment. Keebah-Mudji – The Red Stone. Report to Blacktown City Council
- DECCW 2010 *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*.
- DECCW 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.
- DECCW 2010 *Aboriginal Cultural Heritage Consultation Requirements for Proponents*.
- DECCW 2011 *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*.
- Environmental Planning and Assessment Act (NSW) 1979*
- Environment Protection and Biodiversity Conservation Act (Commonwealth) 1999*
- ENSR AECOM 2008a. Aboriginal Heritage Assessment – Alex Avenue and Riverstone Growth Centre Precincts. Unpublished Report to NSW Growth Centres Commission.
- ENSR AECOM 2008b. Aboriginal Heritage Assessment – Sydney Water Infrastructure in the Northwest Growth Centres of Riverstone and Alex Avenue. Unpublished Report to Sydney Water.
- Godden Mackay Logan. 2008. Riverstone West Precinct, Sydney Aboriginal Archaeological Heritage Assessment. Unpublished Report for Northwest Transport Hub Pty Ltd.

- Haglund, L. 1980. Report on Archaeological Survey in the City of Blacktown. Unpublished Report to NPWS.
- Haglund, L. 1983. Riverstone Meatworks. Unpublished Report to Don Fox Planning Pty Ltd.
- Hiscock, P., & Attenbrow, V. 1998. Early Holocene Backed Artefacts from Australia. *Archaeology in Oceania*, 33(2).
- Holdaway, S., Fanning, P., & Rhodes, E. 2008. Challenging intensification: human—environment interactions in the Holocene geoarchaeological record from western New South Wales, Australia. *The Holocene*, 18(3), 403-412.
- Hunter, J. 1793. *An Historical Journal of the Transactions at Port Jackson and Norfolk Island*. London: Printed for John Stockdale.
- JMcDCHM 2011. Revised Assessment Schofields Road Upgrade, Stage 2 and 3 PACHI. Report prepared for the RTA.
- JMcDCHM and GML 2011. Pre AHIP Test excavation at SCR/PAD Schofields Road, Draft Report. Report prepared for NSW RTA.
- Karskens, G. 2009. *The Colony: A History of Early Sydney*. Crows Nest, NSW: Allen & Unwin.
- Kelleher Nightingale Consulting Pty Ltd. 2010. Area 20 Precinct North West Growth Centre: Aboriginal Heritage Assessment. Unpublished Report for NSW Department of Planning.
- Kelleher Nightingale Consulting Pty Ltd. 2012. Marsden Park Industrial Precinct. Aboriginal Heritage Assessment. Unpublished Report for NSW Department of Planning.
- Kohen, J. 1993. *The Darug and Their Neighbours: The Traditional Owners of the Sydney Region*. Sydney: Darug Link in association with Blacktown & District Historical Society.
- Kohen, J. L. 1986. *Prehistoric Settlement in the Western Cumberland Plain: Resources, Environment, Technology*. Sydney: PhD Thesis, School of Earth Sciences, Macquarie University.
- Lampert, R. 1971 Burrill Lake and Currarong, in *Terra Australis 1*. Department of Prehistory Research School for Asia and Pacific Studies, ANU, Canberra.
- McCarthy, F. 1948. The Lapstone Creek Excavation: Two Culture Periods Revealed in Eastern New South Wales. *Records of the Australian Museum* 22:1-34
- McDonald, J. 1997. Archaeological Test Excavation of PAD 1 CSIRO Laboratory, Ian Clunies Ross Research Laboratory. Report to CSIRO Australia.
- McDonald, J. 2005. Archaeological Salvage Excavation of Eight Archaeological Landscapes in the Second Ponds Creek Valley, Rouse Hill Development Area, NSW. Report to Rouse Hill Infrastructure Pty Ltd and Landcom.
- Mulvaney, D. J., & White, J. P. 1987. *Australians to 1788*. Broadway, NSW: Fairfax, Syme & Weldon Associates.
- Nanson, G. C., & Young, R. W. 1987. Comparison of thermoluminescence and radiocarbon age-determinations from Late-Pleistocene alluvial deposits near Sydney, Australia. *Quaternary research*, 27(3), 263-269.
- NSW NPWS, 2002. *The Native Vegetation of the Cumberland Plain, Western Sydney- Technical Report*. Department of Environment and Climate Change, Hurstville.

National Parks and Wildlife Service, N. 2003. *The Bioregions of New South Wales: their biodiversity, conservation and history*. Hurstville: NSW National Parks and Wildlife Service.

National Parks and Wildlife Act (NSW) 1974

Native Title Act (Commonwealth) 1993

Phillip, A. 15 May 1788. Historical Records of Australia, Series 1, Volume 1. To Lord Sydney. Sydney: William Applegate Guillick, Government Printer, 1914.

Ross, A. 1988. Tribal and linguistic boundaries: A reassessment of the evidence. In G. Aplin, A *Difficult Infant: Sydney Before Macquarie* pp. 42-53. Sydney: UNSW Press.

Sebba, R. The Landscapes of Childhood The Reflection of Childhood's Environment in Adult Memories and in Children's Attitudes. *Environment and Behavior* July 1991 vol. 23 no. 4 395-422

Sloss, C. R., Murray-Wallace, C. V., & Jones, B. G. 2007). Holocene sea-level change on the southeast coast of Australia: a review. *The Holocene*, 17(7), 999-1014.

southeast coast of Australia: a review. *The Holocene*, 17(7), 999-1014.

Smith, M. A., & Ross, J. 2008. What happened at 1500—1000 cal. BP in Central Australia? Timing, impact and archaeological signatures. *The Holocene*, 18(3), 379-388.

Steele, D., & Barton, H. 1998. Angel Place, Sydney. Archaeological Salvage of Site #45-6-2581, Angel Place, Sydney. Report prepared for AMP Investments Pty Ltd.

Steele, D., & Czastka, J. 2003. Archaeological Salvage Excavations at the Quadrant, Broadway. Australand Holdings.

Steele, D., & Czastka, J. 2005. Aboriginal Archaeological Salvage at KENS, Sydney. Unpublished report by Dominic Steele Consulting Archaeology for Leightons Pty Ltd.

Tench, W. 1791. *A Narrative of the Expedition to Botany Bay*. London: J. Debrett.

Tench, W. 1793. *A Complete Account of the Settlement at Port Jackson*. London: G. Nicol and J. Sewell.

Therin, M. 2002. Aboriginal Heritage Assessment for the Proposed Upgrade of Windsor Road between Boundary Road and Henry Road, Vineyard. Unpublished Report to Hyder Consulting.

Therin, M. 2003. Aboriginal Heritage Assessment for the Proposed Upgrade of Windsor Road between Boundary Road and Henry Road, Vineyard. Unpublished Report to Hyder Consulting.

Therin, M. 2004. Aboriginal Heritage Preliminary Research Permit Excavations for the Upgrade of Windsor Road between Mile End Road, Rouse Hill and Boundary Road, Vineyard. Unpublished Report to Hyder Consulting.

White, E., & McDonald, J. 2010. Lithic artefact distribution in the Rouse Hill Development Area, Cumberland Plain, New South Wales. *Australian Archaeology*, 70, 29-38.

White, J. 1788. *Journal of a Voyage to New South Wales*. London: J. Debrett, 1790.

Williams, A. N. 2013. A new population curve for prehistoric Australia. *Proceedings of the Royal Society B: Biological Sciences*, 280(1761), 20130486.

Williams, A. N., Mitchell, P., Wright, R. V., & Toms, P. 2012. A Terminal Pleistocene Open Site on the Hawkesbury River, Pitt Town, NSW. *Australian Archaeology*, 74, 85-97.

Appendix 1 - AHIMS Search Results



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

Your Ref Number : RiverstoneEast

Client Service ID : 128691

Archaeological & Heritage Management Solutions Pty Ltd (AHMS)

Date: 18 March 2014

Level 2, 729 Elizabeth Street
WATERLOO New South Wales 2017

Attention: Jodi Cameron

Email: jodic@ahms.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 298000 - 306000, Northings : 6273000 - 6278000 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:

83	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