Aldington Road Estate, Kemps Creek: Archaeological Report

FINAL REPORT

Prepared for Frasers Property Industrial

15 October 2021

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Glossary

ACHA	Aboriginal Cultural Heritage Assessment
ACHMP	Aboriginal Cultural Heritage Management Plan
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AR	Archaeological Report
ADI	Australian Defence Industries
BP	Before Present
Biosis	Biosis Pty Ltd
CBD	Central Business District
CEMP	Construction and Environmental Management Plan
Consultation requirements	*Aboriginal Cultural Heritage Consultation Requirements for Proponents*
DA	Development Application
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change and Water (now Heritage NSW)
DP	Deposited Plan
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically Sustainable Development
GPS	Global Positioning System
GSV	Ground Surface Visibility
Heritage Act	*Heritage Act 1977*
Heritage NSW	Heritage NSW, Department of Premier and Cabinet
ICOMOS	International Council on Monuments and Sites
JMCHM	Jo McDonald Cultural Heritage Management
KNC	Kelleher Nightingale Consulting
LALC	Local Aboriginal Land Council

LEP	Local Environmental Plan
LGA	Local Government Area
MGA	Map Grid of Australia
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NTSCORP	Native Title Services Corporation
PAD	Potential Archaeological Deposit
RAPs	Registered Aboriginal Parties
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy
SSD	State Significant Development
Study area	Lot 25 DP 255560, 26 DP 255560, 27 DP 255560, 28 DP 255560, 33 DP 255560
the Code	*Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*

Summary

Biosis Pty Ltd (Biosis) was commissioned by Frasers Property Industrial to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed warehouse and logistics hub at 155-217 Aldington Road (Lot 25 DP 255560, Lot 26 DP 255560, Lot 27 DP 255560, Lot 28 DP 255560, and Lot 33 DP 258949), Kemps Creek, New South Wales (NSW) (the study area). This Archaeological Report (AR) documents the findings of the archaeological investigations conducted as part of the ACHA. As required under Section 2.3 of The *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010a) (the Code), the AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

The project is to be assessed as a State Significant Development (SSD) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Secretary Environmental Assessment Requirements (SEARs) were obtained for the project on 12 May 2021. The SEARs stipulated that an Environmental Impact Statement (EIS) to be prepared by Frasers Property Industrial would need to include an ACHA which identifies, describes and documents Aboriginal cultural heritage values that exist within the study area in accordance with the Code and *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b) (consultation requirements). The Minister for planning under the Department of Planning, Industry and Environment (DPIE) is the consent authority and will assess the EIS accompanying the application to help them determine if the proposed development is likely to have a significant effect on the environment, including Aboriginal cultural heritage.

The study area is located in private farmland approximately 13 kilometres south east of Penrith and approximately 40 kilometres west of the Sydney central business district (CBD).

There are 117 Aboriginal cultural heritage sites registered with the Aboriginal Heritage Information Management System (AHIMS) register in the vicinity of the study area, with no registered Aboriginal sites located within the study area.

The Aboriginal community was consulted regarding the heritage management of the project throughout its lifespan. Consultation has been undertaken as per the process outlined in the consultation requirements.

A field investigation of the study area was conducted on 12 April 2021. The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed moderate. This was attributed to vegetation cover restricting ground surface visibility (GSV) combined with areas of higher exposure where market gardening had caused soil disturbance.

No Aboriginal objects were identified in the study area, however, one area of potential archaeological deposit (PAD) (Aldington PAD 1) was identified on a relatively undisturbed, flat, hill crest at the headwaters of a dammed drainage line. The area of PAD was identified in consultation with Deerubbin Local Aboriginal Land Council (LALC) representative, Steven Randall during the field investigation. Predictive modelling and previous archaeological assessments in the vicinity have shown such landforms to contain sporadic or low density artefact scatters.

Test excavations were undertaken within the study area in August 2021. These works identified a total of two artefacts from the 16 test pits that were excavated. Overall, soils across the extent of the testing area were shallow, reaching an average of 190 millimetres and a maximum of 300 millimetres. One Aboriginal site (AHIMS 45-5-5238/Aldington Road PAD 1) was identified as a result of these test excavations. The results of the test excavations support predictive modelling for the region, having identified a low density artefact

scatter (AHIMS 45-5-5238/Aldington Road PAD 1) within a flat hill crest landform, within approximately 100-250 metres of two first order creek lines which have been heavily disturbed by damming activities.

AHIMS 45-5-5238/Aldington Road PAD 1, was identified as having low scientific significance. The site contains moderate levels of disturbance from land clearance, ploughing and cattle grazing and the soil profile was consistent across the area. The low density scatter is considered a common site type in the region with limited potential to contribute further information about Aboriginal occupation and land use within the local region.

Strategies have been developed based on the archaeological significance of cultural heritage relevant to the study area. The strategies also take into consideration:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practice, widely considered to include:
  - The ethos of the Australia International Council on Monuments and Sites (ICOMOS) Burra Charter.
  - The Code.

The recommendations that resulted from the consultation process are provided below.

Management recommendations

Prior to any development impacts occurring within the study area, the following is recommended:

Recommendation 1: No further works within AHIMS 45-5-5238/Aldington Road PAD 1

AHIMS 45-5-5238/Aldington Road PAD 1 will be impacted by the proposed development. Further testing and salvage of this site is not recommended.

As per Section 4.41 of the EP&A Act an Aboriginal Heritage Impact Permit (AHIP) under the *National Parks and Wildlife Act 1974* (NPW Act) is not required for SSD projects authorised by a development consent. The proposed works may therefore proceed with caution in accordance with recommendations 2 to 5, following SSD approval in accordance with the SSD consent conditions.

Recommendation 2: Discovery of Unanticipated Aboriginal Objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW, Department of Premier and Cabinet (Heritage NSW) or SSD approval issued by DPIE. Should any unexpected Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Registered Aboriginal Parties (RAPs).

Recommendation 3: Discovery of Unanticipated Historical Relics

Relics are historical archaeological resources of local or State significance and are protected in NSW under the *Heritage Act 1977* (Heritage Act) or SSD approval issued by DPIE. Relics cannot be disturbed except with a permit or exception/exemption notification. Should unanticipated relics be discovered during the course of the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. Heritage NSW will require notification if the find is assessed as a relic.

Recommendation 4: Discovery of Human Remains

Human remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

Recommendation 5: Long term care agreement

The establishment of a long term care agreement in consultation with RAPs should be developed in order to ensure the artefacts identified as part of this assessment are adequately cared for. RAPs have requested that artefacts be reburied on site. Frasers Property Industrial have recommended a location for reburial which will be provided to RAPs. The reburial will occur after the proposed works have been completed on site.

This approach considers the principles of Ecologically Sustainable Development (ESD) and intergenerational equity and more importantly ensures that recovered artefacts are managed according to the wishes of RAPs.

Recommendation 6: Continued consultation with RAPs

As per the consultation requirements, it is recommended that Frasers Property Industrial should continue to inform RAPs about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

1 Introduction

1.1 Project background

Biosis was commissioned by Frasers Property Industrial to undertake an AR to support an ACHA for the proposed warehouse and logistics hub at 155-217 Aldington Road (Lot 25 DP 255560, Lot 26 DP 255560, Lot 27 DP 255560, Lot 28 DP 255560, and Lot 33 DP 258949), Kemps Creek NSW (the study area) (Figure 1 and Figure 2). This AR documents the findings of the archaeological investigations conducted as part of the ACHA. The AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA. The project is to be assessed as a SSD under Part 4 of the EP&A Act

This investigation has been undertaken in accordance with the Code, the consultation requirements and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage* (OEH 2011). The Code has been developed to support the process of investigating and assessing Aboriginal cultural heritage by specifying the minimum standards for archaeological investigation undertaken in NSW under the NPW Act. The archaeological investigation must be undertaken in accordance with the requirements of the Code.

The EP&A Act includes provisions for local government authorities to consider environmental impacts in land-use planning and decision making. Each Local Government Area (LGA) is required to create and maintain a Local Environmental Plan (LEP) that includes Aboriginal and historical heritage items. Local Councils identify items that are of significance within their LGA, and these items are listed on heritage schedules in the local LEP and are protected under the EP&A Act and Heritage Act.

1.2 Study area

The study area is located within Lot 25 DP 255560, Lot 26 DP 255560, Lot 27 DP 255560, Lot 28 DP 255560, and Lot 33 DP 258949 and is 13 kilometres south east of Penrith and approximately 40 kilometres west of the Sydney CBD (Figure 1). It encompasses approximately 43 hectares of private farm land.

The study area is within the:

- Penrith LGA.
- Parish of Melville.
- County of Cumberland (Figure 2).

The study area is bounded by Aldington road to the east, and private property to the north, south, and west.

1.3 Planning approvals

The proposed development will be assessed against Part 4 of the EP&A Act. Other relevant legislation and planning instruments that will inform this assessment include:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NPW Act.
- *National Parks and Wildlife Amendment Act 2010.*
- *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP).

- Penrith LEP 2010.
- *State Environmental Planning Policy (Western Sydney Employment Area) 2009.*

1.4 Response to project SEARs requirements

This project is to be assessed as a SSD under Part 4 of the EP&A Act. SEARs were obtained for the project on 12 May 2021. This AR has been prepared in response to the SEARs requirements, which stipulates that an EIS to be prepared by Frasers Property Industrial would need to include an ACHA which identifies, describes and documents Aboriginal cultural heritage values that exist within the study area in accordance with the Code and consultation requirements. This AR documents the findings of the archaeological investigations conducted as part of the ACHA.

Table 1 Response to project SEARs requirements

Section of SEARs	Requirement	Section of report responding to SEARs
Issues - Cultural heritage and Aboriginal cultural heritage	• An assessment of cultural heritage items and values of the site and surrounding area • The identification, description and documentation of the Aboriginal cultural heritage values that exist across the site in an Aboriginal Cultural Heritage Assessment Report (ACHAR), prepared in consultation with Aboriginal parties (including the local Aboriginal Council). The ACHAR must describe any impacts on Aboriginal cultural heritage values and the associated mitigation measures.	Refer to Sections 3, 4, 5, 6, and 7 of this report and refer to the ACHA.
Policies, Guidelines & Plans - Heritage	• *The Burra Charter* (Australia ICOMOS 2013). • The Code. • *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). • Consultation requirements.	• *The Burra Charter* is addressed in Section 5. • The Code addressed in Sections 1, 1.6, 2, 3, 4, 5, 6, and 7. • The *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* is addressed within the ACHA and within Sections 1, 1.6, 2, 3, 4, 5, 6, and 7 of the AR. • Consultation requirements are addressed within the ACHA.

1.5 Objectives of the investigation

The objectives of the investigation can be summarised as follows:

- To identify and consult with any registered Aboriginal stakeholders and the Deerubbin LALC.
- To conduct additional background research in order to recognise any identifiable trends in site distribution and location.
- To search statutory and non-statutory registers and planning instruments to identify listed Aboriginal cultural heritage sites within the study area.
- To highlight environmental information considered relevant to past Aboriginal occupation of the locality and associated land use and the identification and integrity/preservation of Aboriginal sites.

- To summarise past Aboriginal occupation in the locality of the study area using ethnohistory and the archaeological record.
- To formulate a model to broadly predict the type and character of Aboriginal sites likely to exist throughout the study area, their location, frequency and integrity.
- To conduct a field investigation of the study area to locate unrecorded or previously recorded Aboriginal sites and to further assess the archaeological potential of the study area.
- To assess the significance of any known Aboriginal sites in consultation with the Aboriginal community.
- To identify the impacts of the proposed development on any known or potential Aboriginal sites within the study area.
- To recommend strategies for the management of Aboriginal cultural heritage within the context of the proposed development.

1.6 Investigators and contributors

The roles, previous experience and qualifications of the Biosis project team involved in the preparation of this archaeological report are described below in Table 2.

Table 2 Investigators and contributors

Name and qualifications	Experience summary	Project role
Taryn Gooley BASc (Hons)	Taryn has over 10 years' experience in archaeological consulting and has successfully completed numerous projects throughout NSW. Taryn has extensive experience in undertaking ACHAs, archaeological surveys, and large scale archaeological testing and salvage excavation programs across NSW. Taryn is skilled in lithic analysis, technical report writing and project management. She is also adept in undertaking meaningful and effective Aboriginal community consultation.	• Quality assurance
Ashleigh Keevers-Eastman BA (Hons)	Ashleigh is a Project Archaeologist with over four years' experience. Ashleigh has gained experience in conducting Aboriginal heritage assessments, field surveys, archaeological test excavations and salvage works across New South Wales. Ashleigh's strengths are in consulting with the Aboriginal community to build strong relationships that assist in the assessment of Aboriginal cultural heritage. Ashleigh possesses skills in lithic identification, technical report writing and project management.	• Project management • Report writing
Maggie Butcher BSc/BA (Hons)	Maggie is an archaeologist with Biosis Sydney office. Maggie has over five years' experience as an archaeologist and has experience in conducting desktop assessments, archaeological survey and Aboriginal and historical excavation as well as consulting with Traditional Owners. She has also successfully managed a number of ACHAs to	• Report writing • Test excavations

Name and qualifications	Experience summary	Project role
	completion since her commencement at Biosis.	
Anthea Vella B.Arch, M.AHM	Anthea is a Project Archaeologist with over three years' experience. Anthea has experience in conducting Aboriginal and historical heritage assessments, surveys and archaeological test excavations for a variety of projects throughout NSW. Anthea has experience in undertaking desktop assessments, project management, and reporting.	• Test excavations
Samantha Keats BA (Hons)	Samantha is a senior archaeologist with Biosis Wollongong office. Samantha has over five years of experience as an archaeologist, with a particular research focus on rock art assemblages and ochre in the north-west Kimberley region of Australia. Samantha has experience in the successful completion of ACHA's, archaeological surveys, test excavations, and salvage excavations, as well as Aboriginal community consultation. She is also accomplished in obtaining approvals under the NPW Act.	• Project management • Report writing
Mathew Smith BA BSc (Hons)	Mathew is a consultant archaeologist with over five years experience in consulting and has successfully completed numerous projects throughout NSW. Mathew has extensive experience in undertaking Aboriginal archaeological assessments, archaeological surveys, and large scale archaeological testing and salvage excavation programs across NSW. Mathew has participated in and managed a number of long term archaeological programs and is an expert lithic analyst.	• Report writing • Field team
Madeleine Lucas BA (Hons) BSC	Madeleine joined Biosis as a Research assistant in 2019. Madeleine possesses skills in zooarchaeological analysis and is experienced in the identification of faunal remains and taphonomic analysis. Since joining Biosis, Madeleine has further developed her skills in historical and Aboriginal background research, data entry, and report production. Madeleine is also experienced in undertaking Aboriginal community consultation.	• Background research • Aboriginal community consultation • Reporting
Caitlin McManus BA Grad Cert MA Grad Cert Project Management	Caitlin completed her Bachelor of Arts, majoring in Archaeology and Anthropology, her Graduate Certificate in Maritime Archaeology in 2018, and joined Biosis in 2019. Since employment at Biosis, Catlin has participated in a variety of Aboriginal and historic projects, developing her skills in archaeological surveys, test excavations, salvage excavations, archival recording, historical excavations, and background research.	• Background research
James Shepherd BA Informatics	James is a Senior GIS Officer working with Biosis since February 2011, with over ten years' professional experience in	• Map production • GIS analysis

Name and qualifications	Experience summary	Project role
(Hons)	the use and application of GIS to various disciplines, particularly within the environmental and heritage consulting sectors. James is experienced in map production, spatial analysis and spatial data management and has applied these skills to work for a diverse range of clients across Australia. James is a qualified ESRI trainer in a number of official ESRI ArcGIS Desktop courses from beginner to advanced level. James has previously worked as an archaeological and heritage consultant both in NSW and Victoria including assisting with heritage and archaeological assessments and management plans. James has contributed to numerous consultant reports at Biosis for both the Natural and Cultural heritage teams in the form of figure production, field data preparation and management, spatial analysis, landscape interpretation and quantitative impact analysis (e.g. vegetation impacts calculations).	

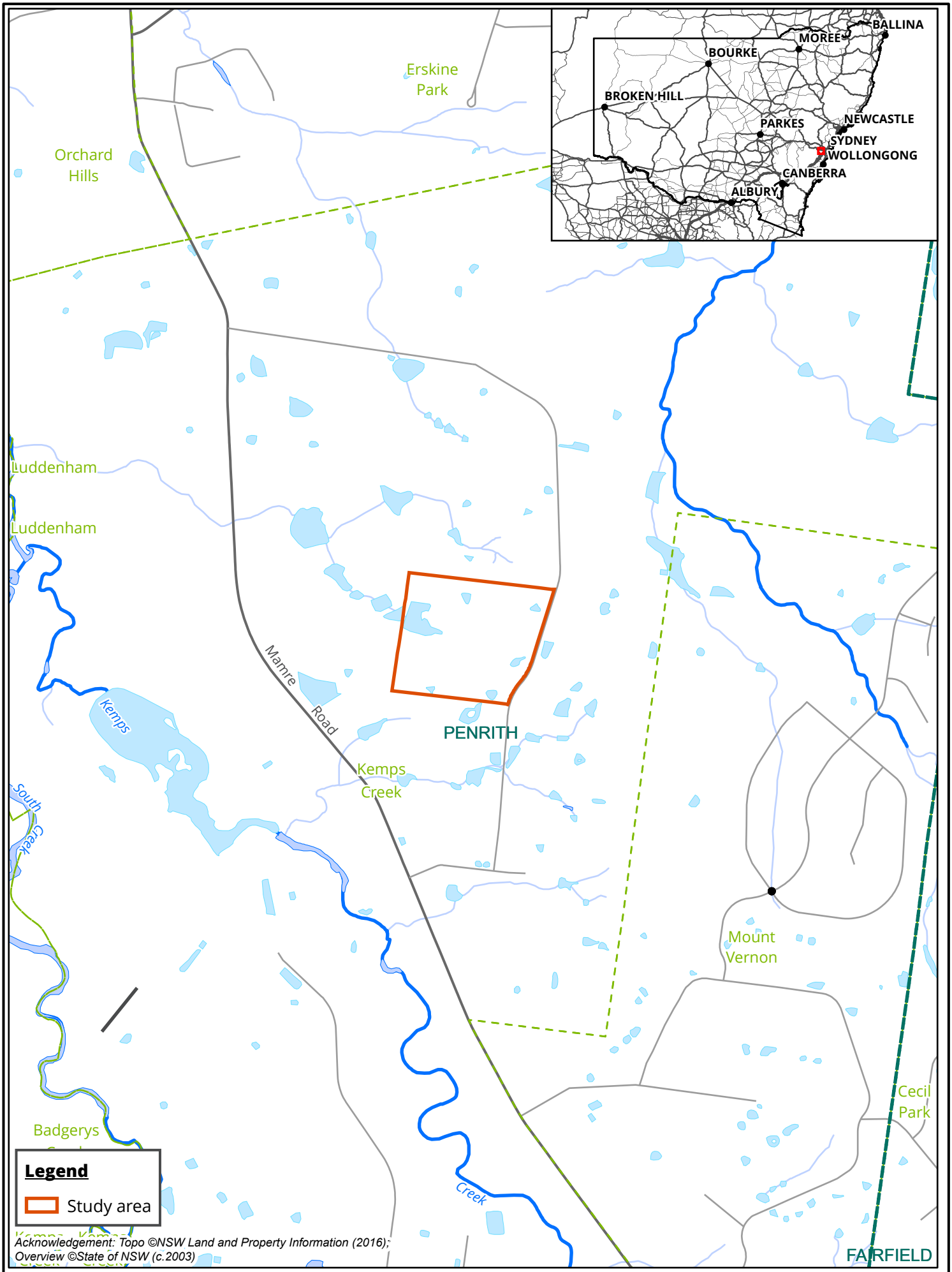

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Figure 1 Location of the study area

Matter: 34800
Date: 06 April 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: jshepherd
Location:P:\34800s\34800\Mapping\34800 ACHA AR\
34800 ACHA AR, Layout: 34800_AR_F1_Locality

0 200 400 600 800 1,000
Metres
Scale 1:1:25,000@ A4, GDA 1994 MGA Zone 56

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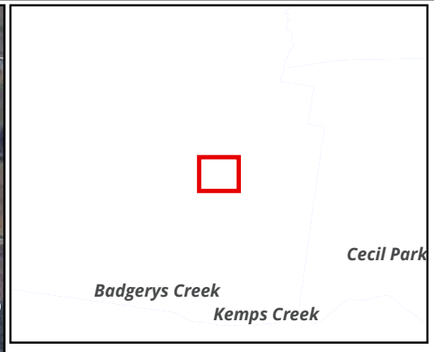

Legend

- Study area
- Lot

Figure 2 Study area detail

0 25 50 75 100 125

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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Matter: 34800, Date: 06 April 2021,
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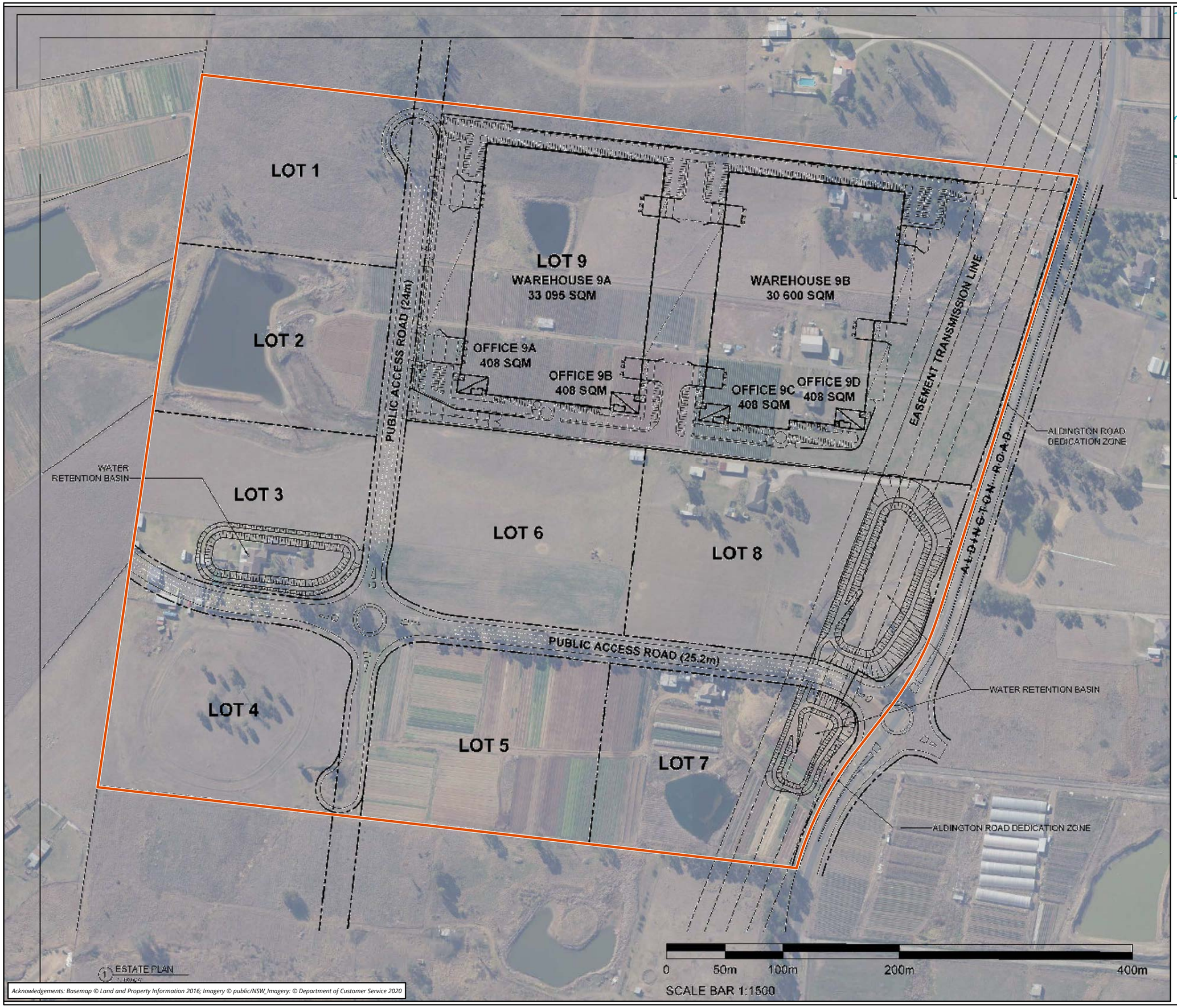
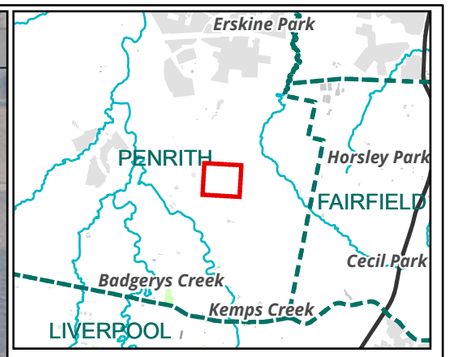
2 Proposed development

Frasers Property Industrial are proposing to develop 155 -217 Aldington Road, Kemps Creek, NSW. The intent is to redevelop the site for industrial purposes (Figure 3).

The development comprises:

- Construction, fit-out and operation of one warehouse with two parts and distribution buildings with a total floor area of 65,327 square metres including offices, loading docks, parking and hardstand areas, landscaping, utilities and services.
- Associated works including demolition, bulk earthworks, and vegetation removal across the site extent.
- Construction of internal roads and widening of Aldington Road.
- Construction of three basins totalling 10,592 square metres.





Legend

Study area

Figure 3 Proposed development

0 25 50 75 100 125

Metres

N

Scale: 1:3,000@ A3

Coordinate System: GDA 1994 MGA Zone 56

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3 Desktop assessment

The desktop assessment involves researching and reviewing existing archaeological studies and reports relevant to the study area and surrounding region. This information is combined to develop an Aboriginal site prediction model for the study area, and to identify known Aboriginal sites and/or places recorded in the study area. This desktop assessment has been prepared in accordance with requirements 1 to 4 of the Code.

3.1 Landscape context

It is important to consider the local environment of the study area in any heritage assessment. The local environmental characteristics can influence human occupation and associated land use and consequently the distribution and character of cultural material. Environmental characteristics and geomorphological processes can affect the preservation of cultural heritage materials to varying degrees or even destroy them completely. Lastly landscape features can contribute to the cultural significance that places can have for people.

3.1.1 Topography and hydrology

The study area is located within the Cumberland Lowlands physiographic region that consists of low lying, gently undulating plains and low hills, with a dense drainage net of predominantly northward flowing channels (Bannerman & Hazelton 1990a, p.2). Topographically, the study area is characterised by steep slopes within the northern portion of the study area which slope south to form moderately to gentle inclined slopes around drainage depressions and two hill crests. This landscape is situated on the Bringelly Shale formation which is part of the Wianamatta group (Figure 4). The Bringelly Shale formation consists of shale, carbonaceous claystone, laminate, lithic sandstone and rare coal. Artefact scatters are common in this geological unit, as are PADs.

Stream order is recognised as a factor which assists the development of predictive modelling in Sydney Basin Aboriginal archaeology, and has seen extensive use in predictive modelling for the Sydney region, most notably by Jo McDonald Cultural Heritage Management (JMCHM) (JMCHM 2000, JMCHM 2005a, JMCHM 2005b, JMCHM 2008). These predictive models have a tendency to favour higher order streams as the locations of campsites and therefore archaeological deposits. Larger water sources would have been more likely to provide a stable source of water and by extension other resources which would have been used by Aboriginal groups.

The stream order system used for this assessment was originally developed by Strahler (1952). It functions by adding two streams of equal order at their confluence to form a higher order stream, as shown in Photo 1. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

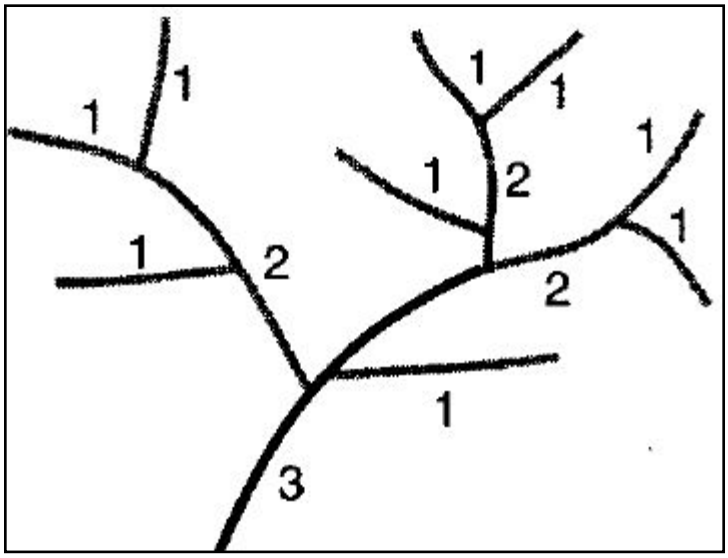


Photo 1 Diagram showing Strahler stream order (Ritter et al. 1995, p.151).

There are six dams located in the study area which were established during agricultural development in the study area post 1950s (Figure 5). A large dam has been constructed in the north western portion of the study area. This dam appears to have heavily modified a lower order creekline which transects the centre of the study area (Photo 2). The extents of the non-perennial water source are likely to have originally extended throughout the study area prior to damming activities. An unnamed first order creekline also appears to have been heavily modified by damming activities within the study area, and transects the south east corner. Both heavily modified creeklines are tributaries of South Creek, a third order perennial water source, located 2 kilometres west of the study area.

3.1.2 Soil landscapes

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. Because they are defined by a combination of soils, topography, vegetation and weathering conditions, soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure.

The Luddenham soil landscape is located within the study area (Figure 6). The topography of this soil landscape consists of low rolling to steep low hills with local reliefs of 50-120 metres, slopes of 5-20%, convex narrow ridges and hillcrests with moderately inclined slopes containing drainage lines (Bannerman & Hazelton 1990a, p.63). Shallow (less than 100 centimetres), dark podzolic soils or massive earthy clays area located upon crests, while moderately deep (70-150 centimetres) yellow podzolic soils and prairie soils can be found in drainage lines. This soil landscape is impacted by high soil erosion. The soil types that characterise the Luddenham soil landscape are summarised in Table 3.

The Luddenham soil landscape distribution patterns vary dependant on the landform type it is contained within, therefore altering the depths at which subsurface archaeological artefact deposits are found. The majority of the study area contains upper to mid-slopes, with 40 centimetres of clay loam, less than 50 centimetres of medium or heavy clay and less than 90 centimetres of mottled clay. On average, soil depth is less than 100 centimetres.

Table 3 Luddenham soil landscape characteristics (Bannerman & Hazelton 1990a, p.63)

Soil landscape	Description
lu1 - Friable dark brown loam	Dark brown, friable loam, silt loam or silty clay loam with moderate to strong structure and porous fabric. This material occurs as topsoil (A1 horizon). Surface condition is distinctly friable but may become hard setting when compacted and dry. Colour is dark brown (10YR 3/3, 7.5 YR 3/3) but can range from brownish black (5YR 3/1) to brown (10YR 4/4). This material is occasionally water repellent. The pH varies from moderately acidic (pH 5.0) to slightly acidic (pH 6.5). Roots are common to 10 centimetres becoming fewer with increasing depth. Charcoal fragments occur occasionally.
lu2 – Hard setting brown clay loam	This is a clay loam to fine sandy clay loam with an earthy or porous, rough faced fabric. This material occurs as an A2 horizon and is occasionally hard setting when exposed at the surface. Colour is brown (7.5YR 4/4) but can range between dull yellowish brown (10YR 5/4) and reddish brown (5YR 4/6). The pH varies between strongly acidic (pH 4.0) and slightly acidic (pH 6.5). Shale rock fragments, charcoal fragments and roots are present.
lu3 – Whole coloured, strongly pedal clay	This is a medium clay with strong structure and a smooth-faced, dense fabric. It occurs as subsoil (B horizon). Texture is commonly medium clay but can range from silty day to heavy clay. Colour is reddish brown (5YR 4/6- 8) and can range from bright reddish brown (2.5YR 4/8) to bright yellowish brown (10YR 6/6). The pH ranges from strongly acidic (pH 4.0) lo moderately acidic (pH 5.5). Shale rock fragments are common. Roots are rare and charcoal fragments are absent.
lu4 – Mottled grey plastic clay	A grey, mottled, medium clay with strongly pedal structure and dense, smooth fabric. It occurs as deep subsoil. Texture ranges to heavy clay. Colour is usually light grey (10YR 7/1) but ranges to light reddish grey (2.5YR 7/1). Yellow and red mottles are common. It is usually moist and is very plastic. The pH varies from strongly acidic (pH 4.0) to moderately acidic (pH 5.5). Shale rock fragments and gravel are common. Roots are rare, and other inclusions are absent.
lu5 – Apedal brown sandy clay	This is an apedal massive brown, sandy clay to light clay with a dense earthy fabric. It occurs as subsoil (B horizon). Occasionally weak sub angular blocky or polyhedral structure is evident. Colour is usually brown (7.5YR 4/4-6) but ranges from dull reddish brown (5YR 4/4) to dull yellowish brown (10YR 5/4). This material is moderately acidic (pH 5.0) to neutral (pH 7.0). Roots are common. Up to 10% of the volume may be small (2-6 millimetres) angular, well weathered shale fragments. Charcoal and other inclusions do not occur.

Erosional soils are generally subject to movement of shallow soils, which can result in poor preservation of the archaeological record. Dispersed sandy soils of sandstone bedrock and loose quartz sandy loam, and earthy clayey sands, which occur as A1 and B horizons, have a low erosion potential. However, when cleared of vegetation, the soils can be subject to high levels of erosion. As this soil landscape is characterised as highly erosional, the soil can be shallow and highly permeable, as well as producing low soil fertility. This would indicate that the presence of intact Aboriginal sites and objects is unlikely (Chapman et al. 2009, pp.64–67, McInnes 1997, p.45, cited by Umwelt (Australia) Pty Limited 2016, p.13)

The study area is also located partly within the Blacktown soil landscape with small portions present along the western and southern boundaries (Figure 6). The Blacktown soil landscape is a residual soil landscape and consists of gently undulating rises, broad rounded crests and gently inclined slopes with a gradient of less than 5%. Local relief within the Blacktown soil landscape is up to 30 metres and rocky outcropping is absent.

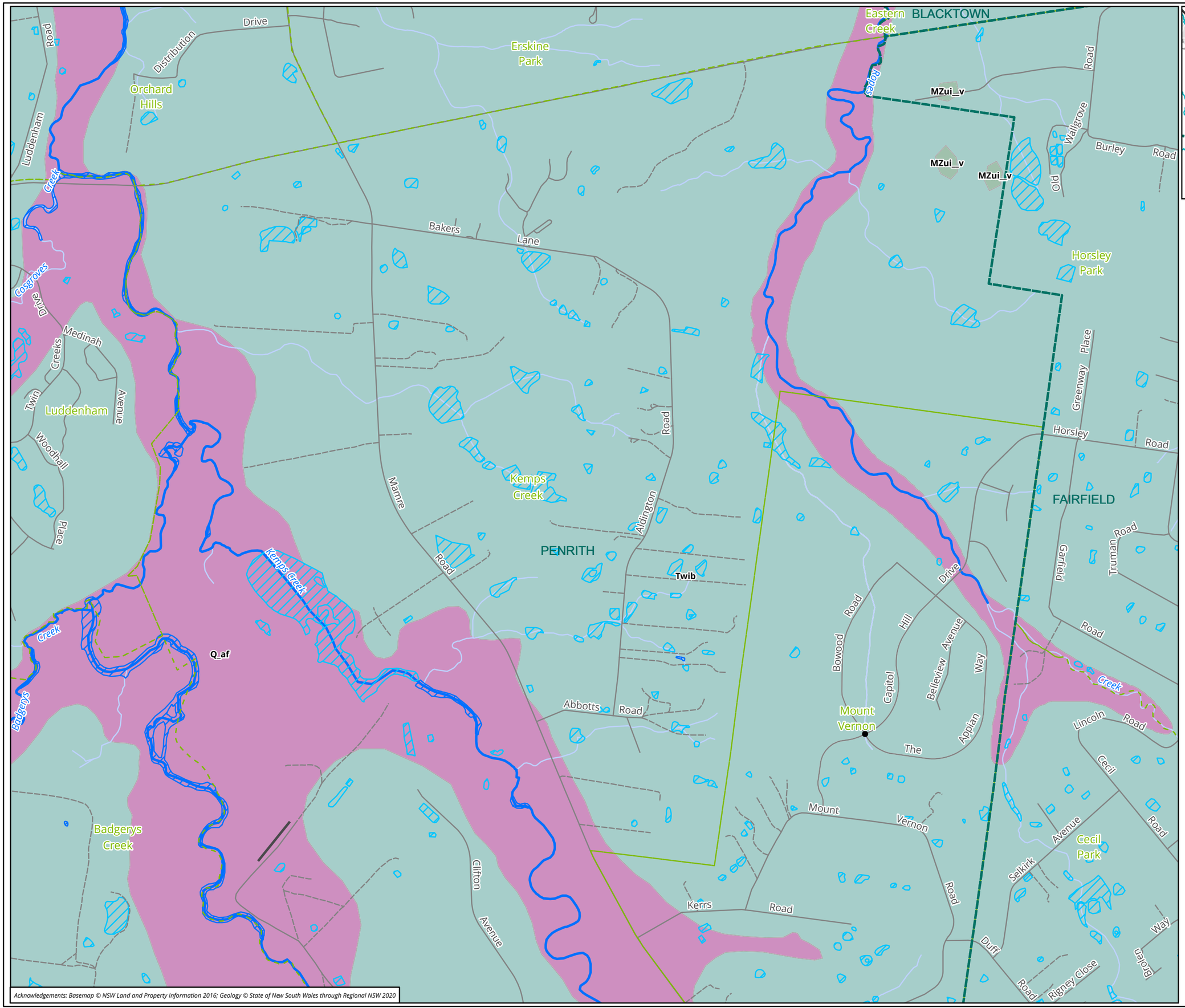
Dominant soils consist of shallow to moderately deep (<100 centimetres) red and brown podzols on crests and in well drained topographies, and deep (150-300 centimetres) yellow podzolic soils and soloths on lower slopes and drainage lines (Bannerman & Hazelton 1990b, p.28). A description of the soil types within the Blacktown soil landscape is provided in Table 4.

The Blacktown soil landscape distribution patterns vary dependant on the landform type it is contained within, therefore altering the depths at which subsurface archaeological artefact deposits are found. The majority of the study area contains upper to mid-slopes, with 20 centimetres of clay loam, less than 50 centimetres of strong pedal mottled clay and less than 100 centimetres of light grey plastic mottled clay. On average, soil depth is less than 200 centimetres.

Table 4 Blacktown soil landscape characteristics (Bannerman & Hazelton 1990a, pp.29–30)

Soil material	Description
bt1—Friable brownish black loam	This is a friable brownish black loam to clay loam with moderately pedal subangular blocky (2 – 20 millimetres) structure and rough-faced porous ped fabric. This material occurs as topsoil (A horizon). Colour is brownish black (10YR 2/2) but can range from dark reddish brown (5YR 3/2) to dark yellowish brown (10YR 3/4). Rounded iron indurated fine gravel-sized shale fragments and charcoal fragments are sometimes present. Roots are common.
bt2—Hard setting brown clay loam	This is a brown clay loam to silty clay loam which is hard setting on exposure or when completely dried out. It occurs as an A2 horizon. This material is water repellent when extremely dry. Colour is dark brown (7.5YR 4/3) but can range from dark reddish brown (2.5YR 3/3) to dark brown (10YR 3/3). Platy, iron indurated gravel-sized shale fragments are common. Charcoal fragments and roots are rarely present.
bt3—Strongly pedal, mottled brown light clay	This is a brown light to medium clay with strongly pedal polyhedral or sub-angular to blocky structure and smooth-faced dense ped fabric. This material usually occurs as subsoil (B horizon). Colour is brown (7.5YR 4/6) but may range from reddish brown (2.5YR 4/6) to brown (10YR 4/6). Frequent red, yellow or grey mottles occur often becoming more numerous with depth. Fine to coarse gravel-sized shale fragments are common and often occur in stratified bands. Both roots and charcoal fragments are rare.
bt4—Light grey plastic mottled clay	This is a plastic light grey silty clay to heavy clay with moderately pedal polyhedral to subangular blocky structure and smooth faced dense ped fabric. This material usually occurs as deep subsoil above shale bedrock (B3 or C horizon). Colour is usually light grey (10YR 7/1) or, less commonly, greyish yellow (2.5YR 6/2). Red, yellow or grey mottles are common. Strongly weathered ironstone concretions and rock fragments are common. Gravel-sized shale fragments and roots are occasionally present. Charcoal fragments are rare.

Residual soils form from the in-situ weathering of bedrock material, resulting in slow accumulation of soils over long periods of time. Due to their age and slow accumulation, residual soil landscapes have reasonable potential to preserve archaeological deposits in an open context, such as stone artefacts derived from occupation sites. However, this slow accumulation when combined with extensive land clearing and land use (usually associated with pastoral and civic development) will result in an increased likelihood that soils will have been disturbed. This results in poor preservation of archaeological material in these locations.



Legend

Study area

Geological Units

- MZui__v,Ungrouped Mesozoic igneous units - breccia
- Q_af,Alluvial floodplain deposits
- Twib,Bringelly Shale

Figure 4 Geological units in the vicinity of the study area

0 160 320 480 640 800

Metres

Scale: 1:20,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 34800, Date: 06 April 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: jshepherd
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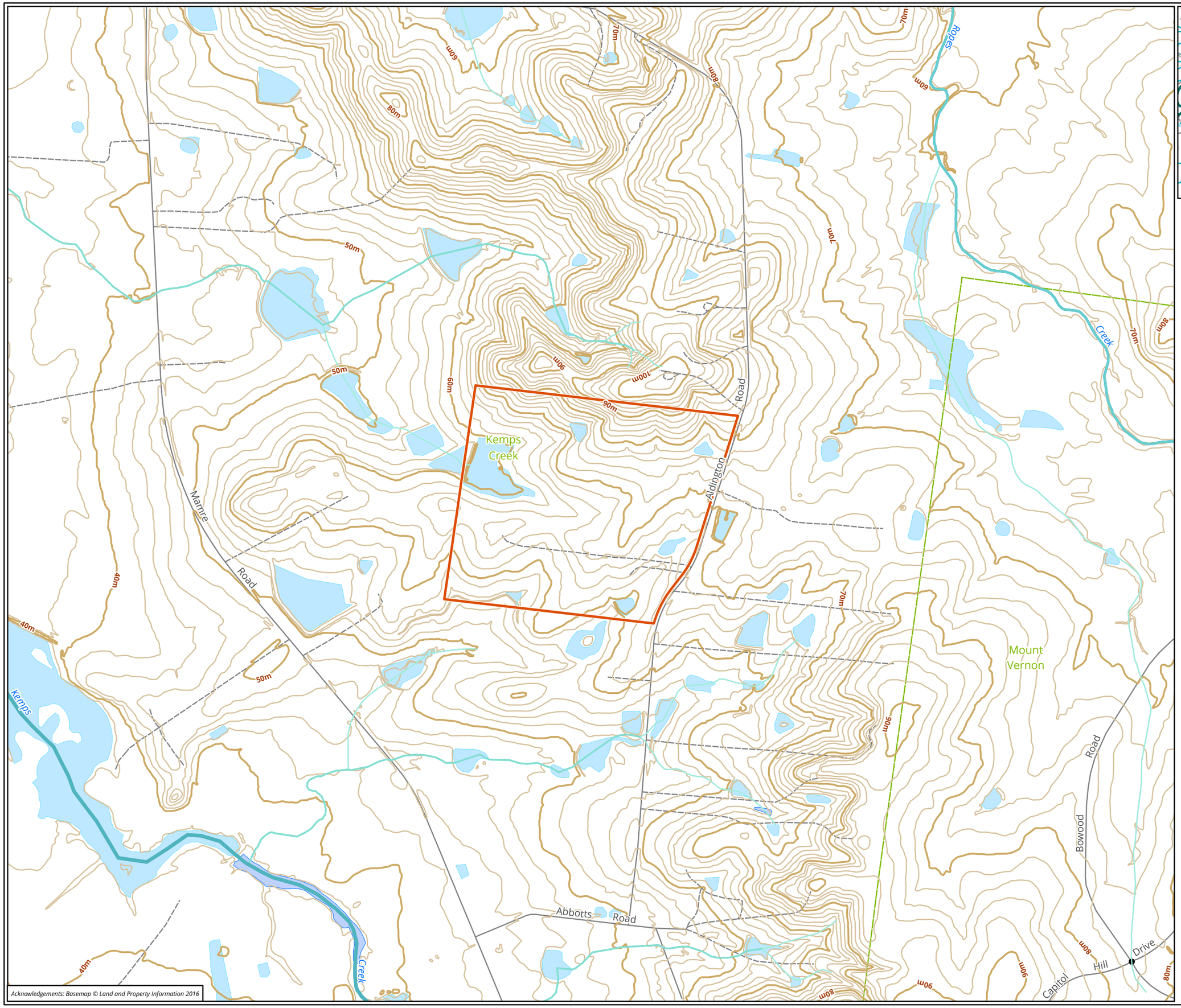

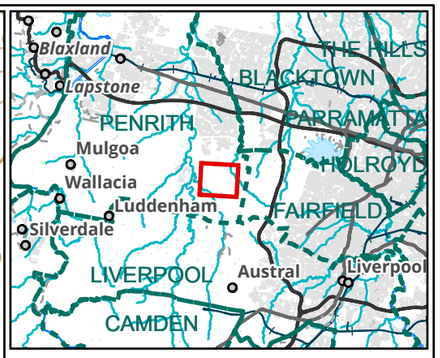

Legend

- Study area
- Contour (2m)

Strahler Order

- 1
- 2
- 3
- 4

Figure 5 Hydrology and topography in the vicinity of the study area

0 75 150 225 300 375

Metres

Scale: 1:10,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

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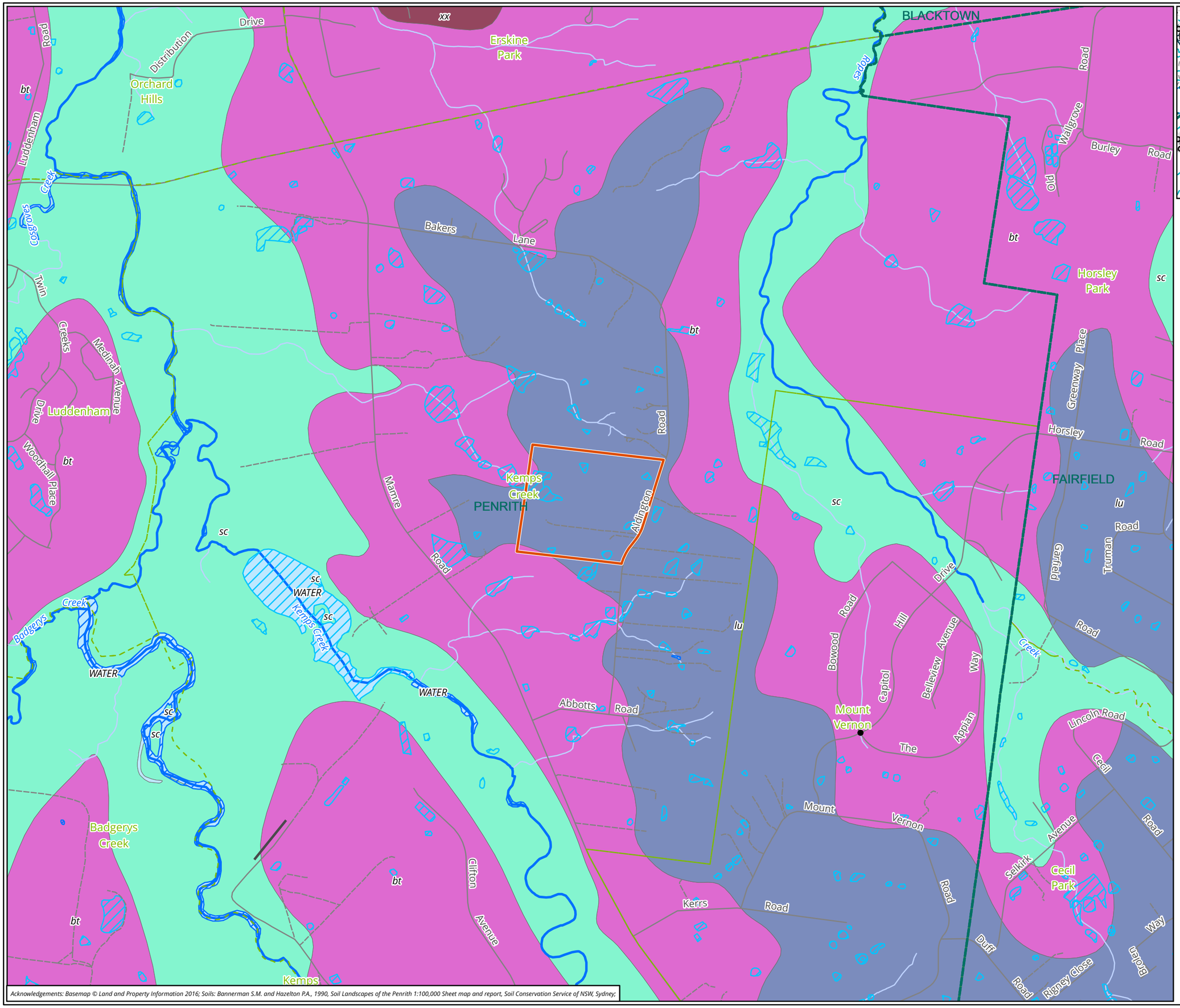

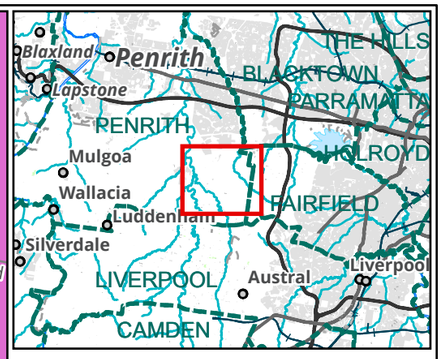

Legend

Study area

Soil Landscape units

- bt - BLACKTOWN
- lu - LUDDENHAM
- sc - SOUTH CREEK
- WATER - WATER
- xx - DISTURBED TERRAIN

Figure 6 Soil landscapes in the vicinity of the study area

0 160 320 480 640 800

Metres

Scale: 1:20,000@ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 34800Date: 06 April 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: jshepherd
Location: P:\34800s\34800\Mapping\34800 ACHA AR\
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Acknowledgements: Basemap © Land and Property Information 2016; Soils: Bannerman S.M. and Hazelton P.A., 1990, Soil Landscapes of the Penrith 1:100,000 Sheet map and report, Soil Conservation Service of NSW, Sydney.

3.1.3 Landscape resources

Within the Cumberland subregion of the Sydney Basin Bioregion a variety of vegetation types are present, with Grey Box *Eucalyptus microcarpa*, Forest Red Gum *E. tereticornis*, Narrow-leaved Ironbark *E. crebra* woodland, and Spotted Gum *Corymbia maculata* present on shale hills. Hard-Leaved Scribbly Gum *E. sclerophylla*, Rough-Barked Apple *Angophora floribunda*, and Old Man Banksia *Banksia serrata* are identified on alluvial sands and gravels. Broad-Leaved Apple *Angophora subvelutina*, Cabbage Gum *E. amplifolia*, Forest Red Gum *E. tereticornis*, and Swamp Oak *Casuarina glauca* are present on river flats. Tall Spike Rush *Eleocharis sphacelata*, and Juncus *Juncus effuses* and Parramatta Red Gum *E. parramattensis* are noted around lagoons and swamps (NPWS 2003, p.193).

The type of vegetation found within the Luddenham soil landscape includes extensively cleared open dry sclerophyll forest (Bannerman & Hazelton 1990a, p.64). The dominant tree species include Spotted Gum *E. maculata* and Grey Box *E. moluccana.* Broad-leaved Iron Bark *E. fibrosa,* Narrow Leaved Ironbark *E. crebra*, Forest Red Gum *E. tereticornis* and Woolybutt *E. longifolia* are also present. The understory shrub species include Blackthorn *Bursaria spinose*, Coffee Bush *Breynia oblongifolia*, Forest Oak *Alocasuarina torulosa*, Hickory *Acacia implexa* and *Clerodendrum tomenlosum*. While common grasses include Speargrass *Aristida vagans*, Bordered Panic Grass *Entolasia marginate* and Paddock Lovegrass *Theineda australis* (Bannerman & Hazelton 1990a, p.64).

Common tree species include Broad-leaved Apple *Angophora subvelutina*, Cabbage Gum *E. amplifolia* and Swamp Oak *Casuarina glauca.* On elevated stream banks a tall shrubland of Paperbark *Melaleuca spp.* and Tea Tree *Leptospernum spp.* may occur.

The Blacktown soil landscape typically supports dry sclerophyll forest; predominantly species of eucalypt, including Forest Red Gum *E. tereticornis*, Narrow Leaved Ironbark *E. crebra*, and Grey Box *E. moluccana* (Bannerman & Hazelton 1990a, p.29). Broad Leaved Ironbark *E. fibrosa* and White Stringy Bark *E. globoidea* are also occasionally present.

Native fauna that would have been present in the vicinity of the study area include Australian Wood Duck *Chenonetta jubata*, White-Faced Heron *Egretta novaehollandiae*, Eastern Long-Necked Tortoise *Chelodina longicollis*, Eastern Water Skink *Eulamprus quoyii*, Garden Skink *Lampropholis guichenoti*, Welcome Swallow *Hirundo neoxena*, Western Swamphen *Porphyrio porphyrio*, as well as arboreal fauna including owls *Strigiformes*, Ringtailed Possum *Pseudocheirus peregrinus* and Brushtailed Possums *Trichosrus vulpecula*, and gliders *Petauridae*.

Aboriginal people used plant resources in a variety of ways. Fibres were twisted into string, which was used for many purposes, including the weaving of nets, baskets and fishing lines. String was also used for personal adornment. Bark was used in the provision of shelter; a large sheet of bark being propped against a stick to form a gunyah (Attenbrow 2002).

As well as being important food sources, animal products were also used for tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to have been used to make fastening cord, while 'bone points', which would have functioned as awls or piercers, are sometimes present as part of the archaeological record. Animals such as Brush-tailed Possums were highly prized for their fur, with possum skin cloaks worn fastened over one shoulder and under the other. Kangaroo teeth were incorporated into decorative items, such as head bands (Attenbrow 2002).

3.1.4 Land use history

The earliest exploration of the Penrith region was led by Captain Watkin Tench, an officer in the Marine Corps, accompanied by Mr Lowe (surgeon's mate of the Sirius), Mr Arndell (assistant surgeon to the Colony), two other marines, and a convict, in 1789. The group reached the Nepean River on 28 June 1789 (Oehm, A. 2006, Paul Davies Pty Ltd 2007a, p.11). Later that year, the Penrith Ford was crossed, and in 1791 the course of the Nepean had been explored from the ford to Grose River. By 1791, it had been confirmed that the Hawkesbury and Nepean rivers were the same watercourse; however, each of the names were kept, transitioning from one to the other at the junction with the Grose River (Thorpe 1986, p.12). From 1803, Charles Grimes and James Meehan surveyed areas of the eastern bank of the Nepean following the sanctioning of settlement in this area by Governor Philip Gidley King, likely in part for the fertile soils associated with the Nepean River floodplain. The portions of land ranged from 40 to 200 acres (approximately 16.2 to 81 hectares), with several of 1,000 acres (404.6 hectares) and above. These were granted to officials, free settlers and military staff (Paul Davies Pty Ltd 2007a, p.11, Thorpe 1986, p.12). Over time, around 1,699 Europeans had settled in the Nepean region, most of whom were of Irish and English heritage and were emancipists or convicts assigned to free settlers or those associated with the government or military (Paul Davies Pty Ltd 2007b). Until the establishment of the Great Western Road around 1815, there was no official passage to the Nepean area. In the same year, Governor Lachlan Macquarie conducted his inspection tour of the region (Thorpe 1986, p.12). The Great Western Road had developed into a main route for travel and communication for the Nepean region by 1817, and in this year the government town of Penrith was also established. Penrith remained a small, roadside settlement into the 1830s (Thorpe 1986, p.12).

A review of Melville Parish maps and crown plans for Aldington Road indicates that the study area was previously part of a 550 acre plot of land granted to Nicholas Bayly, an English Parliamentarian, in 1810, known as Bayly Park (Paul Davies Pty Ltd 2007a, pp.112–113). According to Paul Davies, a house was built by 1814 which was surrounded by gardens and cultivated grounds and in 1823 Bayly engaged government road gangs to undertake extensive clearing across his estate (Paul Davies Pty Ltd 2007b, p.114). Bayly Park was utilized by Bayly for grazing and agricultural activities.

Following Nicholas Bayly's death in 1823, Balyly Park was then acquired by Richard Jones in 1826, and became known as Fleurs Estate (Paul Davies Pty Ltd 2007b, p.114). The homestead for Bayly Park/Fleurs Estate is not located within the study area.

In 1891, Thomas Morse acquired the Fleurs Estate, which still contained the study area (NSW Land Registry Services, Certificate of Title Volume 912 Folio 55). An attempt was made in 1895 to subdivide and sell off the Estate; the auction advertisement describes the land as suitable for farms, orchards and dairies; but no structures were recorded on the plan (Richardson & Wrench & McCarron, Stewart & Co & Chatfield & Brown 1895).

An historical aerial from the 1950s (Photo 2) shows the study area to be mostly cleared of vegetation with no development in the study area.

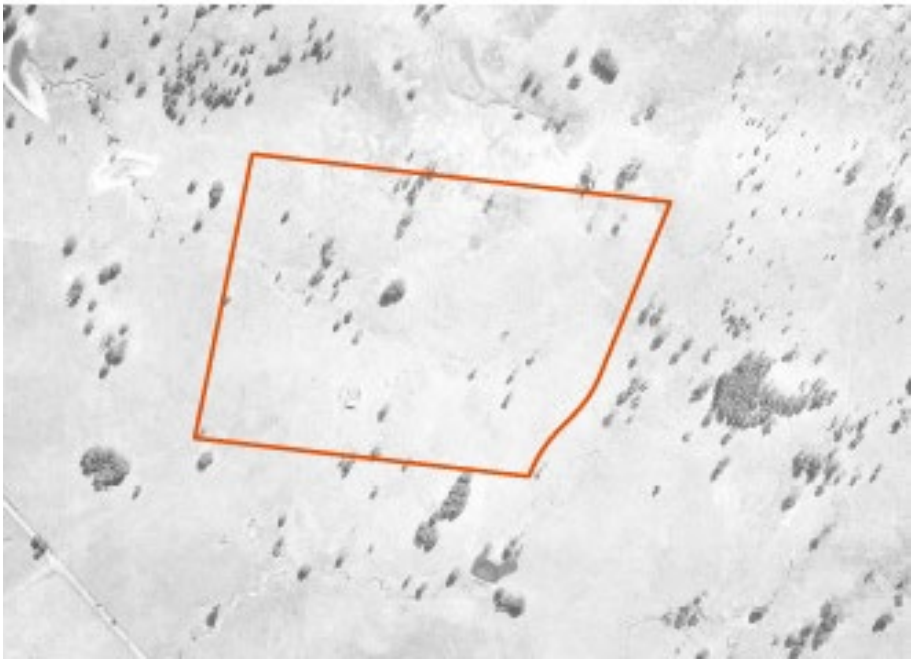


Photo 2 1950s aerial photograph of the study area (Source: NSW aerial imagery)

In 1970, the study area has had further development, specifically roads to the southern and eastern portion of the study area (Photo 3). There is also small clearings noticeable in the west and south east corner of the study area.

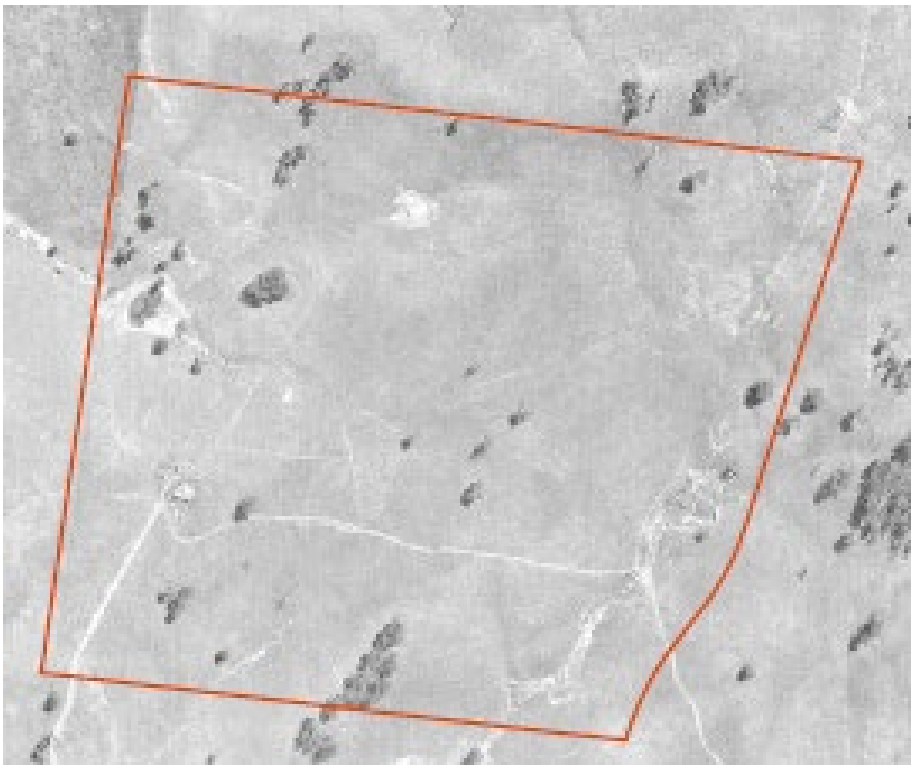


Photo 3 1970s aerial photograph of the study area (Source: NSW aerial imagery)

By 1986, there is significant agricultural and residential development in the southern and eastern side of the study area (Photo 4). There are additional residential properties in the north-east, in the east, in the south,

and on the western side of the study area. Aldington Road has been constructed since 1970s, and can be seen abutting the eastern side of the study area.

Photo 4 1986s aerial photograph of the study area (Source: NSW aerial imagery)

A later aerial taken in 1998 (Photo 5) shows expansive growth in agricultural farming practices in the study area. The residential property and associated buildings in the southern portion of the study area have been cleared for agricultural use. This appears to be quite dynamic as crops visible in the 1989 aerial are only located in the northern portion of the study area. Aside from the heavy disturbance associated with the construction of the dams and demolition of the residential property in the southern portion, it is likely that farming practices caused little disturbance to subsurface archaeological deposits.

Photo 5 1998s aerial photograph of the study area (Source: NSW aerial imagery)

3.2 Previous archaeological work

A large number of cultural heritage surface (surveys) and sub-surface (excavations) investigations have been conducted throughout NSW in the past 30 years. There has been an increasing focus on cultural heritage assessments in NSW due to ever increasing development, along with the legislative requirements for this work and greater cultural awareness of Aboriginal cultural heritage.

The timing for the human occupation of the Sydney Basin is still uncertain. While there is some possible evidence for occupation of the region around 40,000 years ago, the earliest known radiocarbon date for the Aboriginal occupation of the Sydney Basin is associated with a cultural/archaeological deposit at Parramatta, which was dated to 30,735 ± 407 BP (JMCHM 2005c, JMCHM 2005d).

Archaeological evidence of Aboriginal occupation of the Cumberland Plains indicates that the area was intensively occupied from approximately 4,000 years BP (Dallas 1982). Such 'young' dates are probably more a reflection of the conditions associated with the preservation of this evidence and the areas that have been subject to surface and sub-surface archaeological investigations, rather than actual evidence of Aboriginal occupation prior to this time.

3.2.1 Regional overview

A number of Aboriginal cultural heritage investigations have been conducted for the Cumberland region. Models for predicting the location and type of Aboriginal sites with a general applicability to the Cumberland lowlands region and thus relevant to the study area have also been formulated, some as a part of these investigations and others from cultural heritage investigations for relatively large developments.

Brayshaw McDonald (1994) completed the Liverpool Rural Lands Study which included a broad predictive study relating to Aboriginal sites in rural areas to the west of Liverpool, located approximately 12 kilometres south-east of the current study area. The report identified that the distribution of sites was mostly dependent on topography and the bedrock formation of the area, or geology. Background research supported predictive models 10 kilometres from the study area.

It identified that shelter sites, art sites, and grinding grooves were likely to occur on overlying sandstone formations where the appropriate topography was present. Sites over the remainder of the Cumberland Plain were likely to consist of open artefact scatters, quarries, modified trees, and stone arrangements. The report noted that occupation within the area was likely to be similar to the northern Cumberland Plain, as the landscape and geology were extremely similar. As such, predictive site modelling was summarised from an assessment which included test excavations completed by Rich and McDonald in (1993):

- *"Most of the areas tested [either with sparse or no surface manifestations] contained subsurface archaeological deposits.*
- *Sites which are on permanent water are more complex [ie they represent foci for larger groups or are used repeatedly by smaller groups over a long period of time] than sites on ephemeral or temporary water lines. Major confluences are prime site locations. Sparse sites also occur on major creeklines and not all confluences are locations of prime sites.*
- *Alluvial terraces [and other depositional environments] contain the best potential for intact archaeological remains. Some hillslope zones may also be intact and have good potential. In areas where there is deep alluvium many sites also have intact material below the plough zone. These sites often have artefact bearing deposit to a depth of 70-90 centimetres; the plough zone is [max] 25 centimetres deep.*
- *Temporary and minor gullies tend to have one-off or occasionally repeated Aboriginal visits in prehistory and hence low density sites.*
- *Few ridgetop sites were located by the testing programme mostly because the associated development was located close to the creeklines, but also because of the higher levels of destructive disturbance in the more elevated locations, e.g. housing and ploughing of shallower deposit.*
- *While much of the Rouse Hill study area had been severely disturbed over the last 200 years, the areas tested on the whole revealed intact patterns in the archaeological material."* (Brayshaw McDonald Pty Ltd 1994, pp.20–21).

Jo McDonald Cultural Heritage Management (JMCHM) (1997) conducted an archaeological investigation of the Australian Defence Industries (ADI) Site, at Saint Marys, for ADI-Lend Lease Joint Venture, located approximately 6.5 kilometres north west of the study area. The investigation included the refinement of existing Aboriginal site predictive models, by developing a framework for assessing Aboriginal site representativeness (JMCHM 1997, pp.1–2). A model was presented for the ADI site that predicted the character of Aboriginal sites in relation to landscape features; particularly water permanence, lithic resources and landscape unit. The study concluded that the model is applicable to the Cumberland Plains region, and provides a framework for which the correlation between sites and permanent water can be tested. The model predicts the following (JMCHM 1997, pp.56–57):

- The frequency and density of Aboriginal sites located in the headwaters of upper tributaries (first order watercourse) is likely to be low, and such sites are likely to represent a background scatter.
- The frequency and density of Aboriginal sites located in the middle reaches of minor tributaries (second order watercourses) is likely to be low, and such sites are likely to represent single events, for example, one-off camping locations or knapping episodes.
- The frequency and density of Aboriginal sites located in the lower reaches of tributary creeks (third order watercourses) is likely to be greater, and such sites are likely to represent repeated occupation, knapping events and more concentrated activities.
- The frequency and density of Aboriginal sites located on major creek lines is likely to be greater, and such sites are likely to represent or more permanent occupation and consequently will be more complex.

- The junctions of creeks may have been a focus of Aboriginal activity.
- The frequency and density of Aboriginal sites located on ridge tops between drainage lines is likely to be low, and such sites are likely to represent single event.
- Outcrops of silcrete would have been exploited if known.
- The general size of stone artefacts is likely to decrease the further they are located from the quarry from which they were obtained. Similarly, the presence of cortex on artefacts is less likely to be present, or occur as smaller percentages that further artefacts are located from the quarry from which they were obtained due to the continued reduction sequence.
- Sandstone outcrops may have been the focus of camping and art production for sandstone overhangs as well as axe production/sharpening for sandstone platforms.

JMCHM (2001) undertook an assessment at West Hoxton, approximately 12 kilometres south from the study area, in aid of the South Hoxton Park Aerodrome Master Plan. The background research for the area suggested that artefact scatters would likely be associated with streams, with the size and number of sites increasing with stream order. It also noted that smaller scatters and isolated finds have the potential to be identified across a variety of landforms within the landscape, including hillslopes and ridges away from water (JMCHM 2001, p.9).

Survey efforts were hampered by land access issues, as the majority of the land in the area studied was privately owned; however a total of two artefact scatters and nine PADs were identified by the investigation, with one previously identified site (also an artefact scatter) being relocated. The majority of the PADs were assessed as having low to moderate potential, with JMCHM noting that the true potential of sites was difficult to assess in the absence of test excavations.

White & McDonald (2010) undertook a review of previous work in the Rouse Hill development area, discussing lithic artefact distribution in previous excavations carried out by JMCHM, approximately 20 kilometres north east from the study area. The study considered a number of factors including stream order, distance from water, landform, aspect, and distance to silcrete sources. As a result of the assessment, the following statements were made:

- Stream Order: water supply was a significant factor influencing Aboriginal land use and habitation in the area. There was a correlation between increasing stream order and larger numbers and higher densities of artefacts (from a comparison of first, second, and fourth order streams).
- Distance from water: the results showed that an assumption that sites would be clustered within 50 metres of water sources was not entirely correct from the data available. In first order stream landscapes, there was no significant correlation between artefact distribution and distance to water. In second order landscapes, artefact density was highest within 50 metres of water, and then declined with increasing distance. In fourth order landscapes, density was highest between 51-100 metres from water.
- Landform: Artefact density was considered to be lowest on upper slopes and ridgetops, with density increasing on mid and lower slopes. Density was highest in terrace landforms, and lower on creek flats, likely due to repeated flooding events and the erosion this caused.
- Distance to silcrete sources: the results of the study showed no significant difference between sites located closer to or further away from silcrete sources. However, 6 kilometres was the maximum tested distance from silcrete sources, so the sample is only representative of a limited area.
- Aspect: only appeared to have an influence on sites in the lower parts of valley. Locations may have been sited to take advantage of constant factors such as the rising/setting sun and wind direction. Sites in higher parts of valleys may have been influenced by weather and other factors.

The study concluded that landform and distance from water had an impact on site distribution, with artefacts becoming more numerous closer to creeks, and along higher order creeks. The study also found that although artefacts are found on all landforms, landform type influences artefact distribution, with the preference being for slightly elevated, well-drained areas in the lower parts of valleys.

Kelleher Nightingale Consulting (2011) undertook an assessment of a 10 kilometre strip of Bringelly Road, approximately 12 kilometres south of the study area, in advance of a proposed upgrade (taking the road from two to four lanes in size). Predictive modelling employed by KNC suggested that artefact scatters and isolated finds were the site types most likely to be identified, where exposure and visibility were high. These sites were considered most likely to be identified in close proximity to water sources, on either flat or gently sloping landforms. A total of 44 sites were identified in the design corridor of the proposed upgrade, all of which were either artefact scatters or isolated finds.

AMBS (2012) conducted a wide ranging report, assessing the entirety of the Austral and Leppington North precincts, approximately 11 kilometres south east from the study area. Although surveys were targeted at specific properties, which at the time represented accessible properties, the results of the survey were combined with the existing regional model and a review of studies within the local area in order to produce sensitivity mapping for the entirety of the Austral and Leppington North precincts.

Regionally, trends noted as influencing this sensitivity model include the following statements:

- Sites are most frequently located in close proximity to permanent water courses on creek banks, alluvial flats, or high ground.
- Large artefact scatters may be identified up to 200 – 250 metres away from water courses.
- Additional factors need to be considered than just the presence or absence of surface artefacts when characterising an archaeological site.

The predictive model employed by AMBS stated that the most common site type occurring in the area would be stone artefacts scatters, and that undisturbed alluvial soils have the potential to be associated with stratified archaeological deposits (AMBS 2012, p.56). The results of the survey largely confirmed this predictive model, with AMBS identifying seven new sites including six isolated finds and one artefact scatter/PAD.

GML (2016) conducted an archaeological excavation and assessment of Stockland's land in East Leppington approximately 12 kilometres south-east of the study area, prior to the development of the residential estate Willowdale. Predictive modeling of the area has shown that Aboriginal people occupied East Leppington for over 5,000 years. Areas along Bonds Creek were used as camping sites meanwhile areas of tool manufacture and procurement was resource specific. Both survey and hand excavation were used to understand the area. In total, 12 locations were excavated over a total of 487 square metres. Of these, 7,956 lithic artefacts and 21 features were identified. Features included eight ground ovens, hearths, clay extraction pits and modified trees. Dominant material types were silcrete, mudstone (IMSTC) and quartz, comprising 66%, 25% and 8% of finds respectively. Tool types included anvils, hammers and a possible grindstone fragment. Backing was visible in artefacts from all but two excavation areas (OA4 and OA11). A total of 253 cores and core fragments were also recovered, mostly of silcrete.

Overall, GML identified an area of domestic activity (associated with hearths and ovens), and an area of ceremonial activity associated with red paint pits, culturally modified trees and unusual stone arrangements. Pits at the base of these trees suggest evidence of landscape use unique to this particular area of the site.

3.2.2 Local overview

A number of Aboriginal cultural heritage investigations have been conducted within the local area (within approximately 10 kilometres of the study area). Most of these investigations were undertaken as part of development applications and included surface and sub-surface investigations. These investigations are summarised below.

JMCHM (2000) undertook a survey in advance of a proposed light industrial subdivision on Mamre Road, Erskine Park, 1.5 kilometres north west of the current study area. The predictive modelling undertaken primarily identified the potential for sites to be present in association with water sources, with the size and density increasing with stream order. It was also noted that creek junctions provide a focus for activity. Other locations such as ridgetops between drainage lines may provide evidence of occupation (JMCHM 2000)**.** The area surveyed contained first and second order creeks, and so it was predicted that background scatters of artefacts may be associated with first order creeks, and that higher density sites may be identified in association with the second order creek.

The survey identified nine sites, including six artefact scatters and three isolated finds. Six of the identified sites were located on lower hillslopes, two on creek bank/lower hillslopes, and one on a creek bank/floodplain. The majority of sites were identified between 50 and 200 metres from water sources. Subsequently, sensitivity mapping was developed and it was recommended that subsurface investigation take place in areas of higher sensitivity within the study area.

Excavations of the site were subsequently carried out by JMCHM (2008)**.** These salvage excavations retrieved a total of 8,867 lithics from 298 square metres, indicating a density of 29.8 artefacts per square metre. It was identified that the pattern of artefact distribution within the Austral Land site was typical for the Cumberland Plain and was likely higher due to the presence of second and third order streams (which indicates a permanent or semi-permanent water source).

Based on the review of previous work undertaken, a number of predictive statements were formulated for the study area, including the following (JMCHM 2008):

- There may be evidence of long or short term occupation with sporadic use and re-use of locations.
- Occupation may date to the pre-Bondaian period (30,000 – 9,000BP), but is more likely to date to the Bondaian period (9,000 BP – European Contact).
- A variety of activities are likely to have been carried out within the study area and discrete knapping floors may have been present in association with both creeks and the area of their confluence.
- The proximity of the salvage locations adjacent to second order streams and the confluence of these creeks (where they become a third order stream) would have suggested that there would be evidence for sparse, but focussed activity and potentially repeated occupation by small groups, knapping floors and evidence for more concentrated activities.

In addition to these predictions, a number of more general statements about the Cumberland Plain were made, including that large scale patterning of sites is identifiable based on environmental patterns, particularly stream order, with permanent sources of water being associated with more complex sites than ephemeral sources. Most sites will be dated to the mid to late Holocene, as geomorphic conditions necessary for the preservation of earlier sites are not common on the Cumberland Plain, most areas contain subsurface deposits, regardless of the presence or absence of surface artefacts, and that where silcrete outcrops are present, there will be evidence for quarrying (JMCHM 2008).

The excavations consisted of testing followed by open area salvage at two locations, EP6+7/1 and EP6+7/2 (a total of 145 square metres and 153 square metres at each location). Both locations were located relatively close (within 100 metres) of creeklines in the study area.

Table 5 Lithologies from excavation conducted by JMCHM (2008 p.139)

Area	Silcrete	Silicified tuff	Quartz	S Wood	Fine-grained siliceous	Quartzite	Igneous	Unidentified	Total artefacts
Testing	863	107	53	9	1			2	1,035
A	390	24	3						417
B	2,482	194	40	7	6	11	1	5	2,746
C	2,302	130	125	5	1	1		2	2,566
D	1,750	177	426	4	14			3	2,374
Total	7,491	637	666	25	22	12	2	12	8,867

It is evident from the data presented in Table 5 that across all areas excavated that the dominant material type encountered is silcrete. It has been noted that silcrete outcrops have been identified in the vicinity of the study area, and this may be a contributing factor to the result.

Table 6 Artefact types from excavation conducted by JMCHM (2008 p.140)

Area	Multi cobble	Backed artefacts	Backing debitage	Tools & possible tools	Other retouched	Cores	Bipolar artefacts	Platform Debitage	FF/FP Debitage	Remnant flaked	Total artefacts
Testing		19	1	8	8	19	9	334	543	94	1,035
Area A		10		1	3	11		130	223	39	417
Area B		88	2	11	11	23	8	847	1,648	108	2,746
Area C	1	62	6	21	22	74	7	998	1,259	116	2,566
Area D		37	1	10	7	46	30	621	1,439	183	2,374
Total	1	211	9	51	50	166	58	2,831	4,958	535	8,867

Analysis of the artefacts conducted shows that the dominant artefact types recovered from excavations were flake fragments/flaked pieces debitage followed by platform debitage (Table 6). It is notable that there are a large number of cores and other retouched and backed artefacts.

It was concluded that the site patterning in the area was typical of the Cumberland Plain, however artefact density was influenced by a number of landscape and resource features in the area, with it being noted that artefact density decreases with stream order and use of silcrete as a raw material decreases with increasing distance from silcrete sources. As a whole, the site displayed a higher than average artefact density, likely due to the presence of nearby sources of silcrete (JMCHM 2008 p. i).

DSCA (2003) undertook test excavation at Wallgrove Road, Eastern Creek approximately 8 kilometres north east of the study area. The assessment built on a number of previous surveys conducted between 1980 and 2002 within the study area. The assessment included predictive statements determined by JMCHM study from (1997), which stated that surface artefacts were not an effective way to characterise archaeological sites, and that at the time of writing:

- 17 out of the 61 excavated sites on the Cumberland Plain had no artefacts present on the surface prior to excavation however, most areas with sparse or no surface manifestations contained considerable archaeological deposits.
- The ratio of recorded surface to excavated artefacts is 1:25 across the Cumberland Plain.
- None of the excavated sites could be properly characterised on the basis of their surface artefacts alone.
- Open campsites are located in all landscapes on the Cumberland Plain. The predominance of sites recorded along creek banks is likely to be indicative of surface visibility conditions and taphonomic factors, rather than the human distribution of artefacts across the landscape (DSCA 2003, pp.19–20).

This statement notes a number of issues with predictive models that base their assessment of subsurface potential based entirely on the presence or absence of surface artefacts. Steele also reviewed previous work carried out in the Rouse Hill area to create a predictive model for the nature and extent of subsurface deposits (DSCA 2003, pp.20–21). Some of the key factors noted include:

- Sites along permanent water courses tended to be more complex than those along ephemeral water courses, and the ideal site locations were at major confluences.
- Within the Rouse Hill area, alluvial areas along with intact hillslopes had the greatest potential to retain intact archaeology, with artefact deposits extending from 70 to 90 centimetres, while the typical plough zone extended to 30 centimetres.
- Hillslopes and ephemeral water courses which revealed sites typically showed evidence of limited occupation, with few producing artefact densities of greater than 20 artefacts per square metre.
- Sites located at the interface of sandstone and shale geologies tended to demonstrate evidence of single occupations by large groups, or multiple occupations by smaller groups.
- There is greater potential for complex archaeological sites to be located subsurface than is demonstrated by surface artefacts, with knapping floors, backed blade manufacturing sites, and other complex sites have been identified.
- There may be a correlation between artefact density and site function.

A total of 20 1 by 1 metre squares were excavated using a backhoe, and sieved through nested 5 and 2.5 millimetre sieves. The deposit encountered tended to be relatively shallow, with most pits not exceeding 20 centimetres. A total of 38 artefacts were identified by surface survey and excavation, with a density characterised by Steele as extremely low. The area was interpreted as being visited sporadically, and not the site of any sort of knapping or camping, but rather a general background scatter.

The deposit consisted primarily of silcrete, with quartz, tuff, and volcanic rock present in much lesser quantity. The vast majority of the deposit was identified as manuport, with some flake and core fragments present, and one potential broken axe.

Navin Officer Heritage Consultants (2005) conducted machine testing at the CSR lands, Erskine Park, approximately 2 kilometres to the north west of the current study area. A total of 256 test pits were excavated, with 285 artefacts being identified across 88 of these pits. It is noted (JMCHM 2008, p.14) that only a sample of the excavated deposit was sieved, and that this may be a contributing factor to the relatively low number of artefacts identified at the site relative to other excavations in the area.

The assemblage was primarily comprised of silcrete and silicified tuff, making up about 81% of the total assemblage, and contained a range of artefact types, including microblades, Bondi points, and backed artefacts. Based on the results of this testing, Navin Officer characterised the site as having been used as a

transient camp, or for peripheral activities in relation to a larger camping area, and stated that it had been subject to low intensity occupation (Navin Officer Heritage Consultants Pty Ltd 2005).

Biosis (2017, 2018) completed an Aboriginal heritage assessment of the Mamre West Precinct located approximately 3 kilometres north-west of the study area. The initial assessment recorded a number of archaeological sites including MWP-AD3 which identified the highest density of artefacts. In total, 43 stone artefacts were recovered from 20 of the 39 test pits. The majority of these were recorded in the first 200 millimetres of the soil deposit, and were intermixed with European cultural material signalling disturbance of the deposit.

Biosis found that the dominance of material types differed to those of the surrounding region. At MWP-AD3, chert and mudstone artefacts were found in higher proportions to silcrete, which is seen in higher proportions to other sites in the region.

Biosis (2019) carried out an ACHA as part of a two stage industrial development along Mamre Road,, Kemps Creek, that incorporated Lots 210–215 DP 1013539, and Lots 1 and 2 DP 1233392, located approximately 3.5 kilometres north-west of the study area. The ACHA included archaeological survey and test excavations in an area of high subsurface archaeological potential. The results of the test excavations identified one subsurface archaeological deposit (AHIMS 41-5-0016/MNPAD01) consisting of 14 artefacts dispersed across an area of 105 metres by 17 metres of a gently sloping plain landform.

Biosis (2020) completed a ACHA of 160- 228 Aldington Road, Kemps Creek, located adjacent to the current study area. The ACHA included archaeological survey of the study area and test excavations in three areas of moderate archaeological potential. The areas of moderate archaeological potential were located on creek terraces and hill crests in proximity to water sources within Blacktown and Luddenham soil landscapes. A total of 248 artefacts were identified across the three areas of potential.

In Area 1 located on a hill crest, soils consisted of loam to loamy clay deposits of moderate to high compaction, with little disturbance identified. Test excavations within this portion of the study area encountered a low density archaeological deposit, with 19 artefacts identified.

In Area 2 on a creek terrace, soils consisted of to loamy clay deposits of moderate to high compaction, with little disturbance identified. Test excavations within this portion of the study area encountered a low density archaeological deposit, with 28 artefacts identified.

Area 3 consisted of loosely to moderately compacted sandy to clay loamy soils on a creek terrace landform. A high density, intact subsurface archaeological deposit within 70 metres of Ropes Creek and 25 metres of a tributary of Ropes Creek was identified within Area 3 with a total of 201 artefacts recovered. The results of the test excavation supported predictive modelling within the local region.

3.2.3 AHIMS site analysis

A search of the AHIMS database (Client Service ID: 580317) identified 117 Aboriginal archaeological sites within a 2.45 kilometre radius of the study area. None of these registered sites are located within the study area (Figure 7). AHIMS search results are provided in Appendix 1. Table 7 provides the frequencies of Aboriginal site types in the vicinity of the study area. The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports where available. These descriptions and maps were relied where notable discrepancies occurred.

It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area. Some recorded sites consist of more than one element, for example artefacts and a modified tree, however for the purposes of this breakdown and the predictive modelling, all

individual site types will be studied and compared. This explains why there are 126 results presented here, compared to the 117 sites identified in AHIMS.

Table 7 AHIMS site type frequency

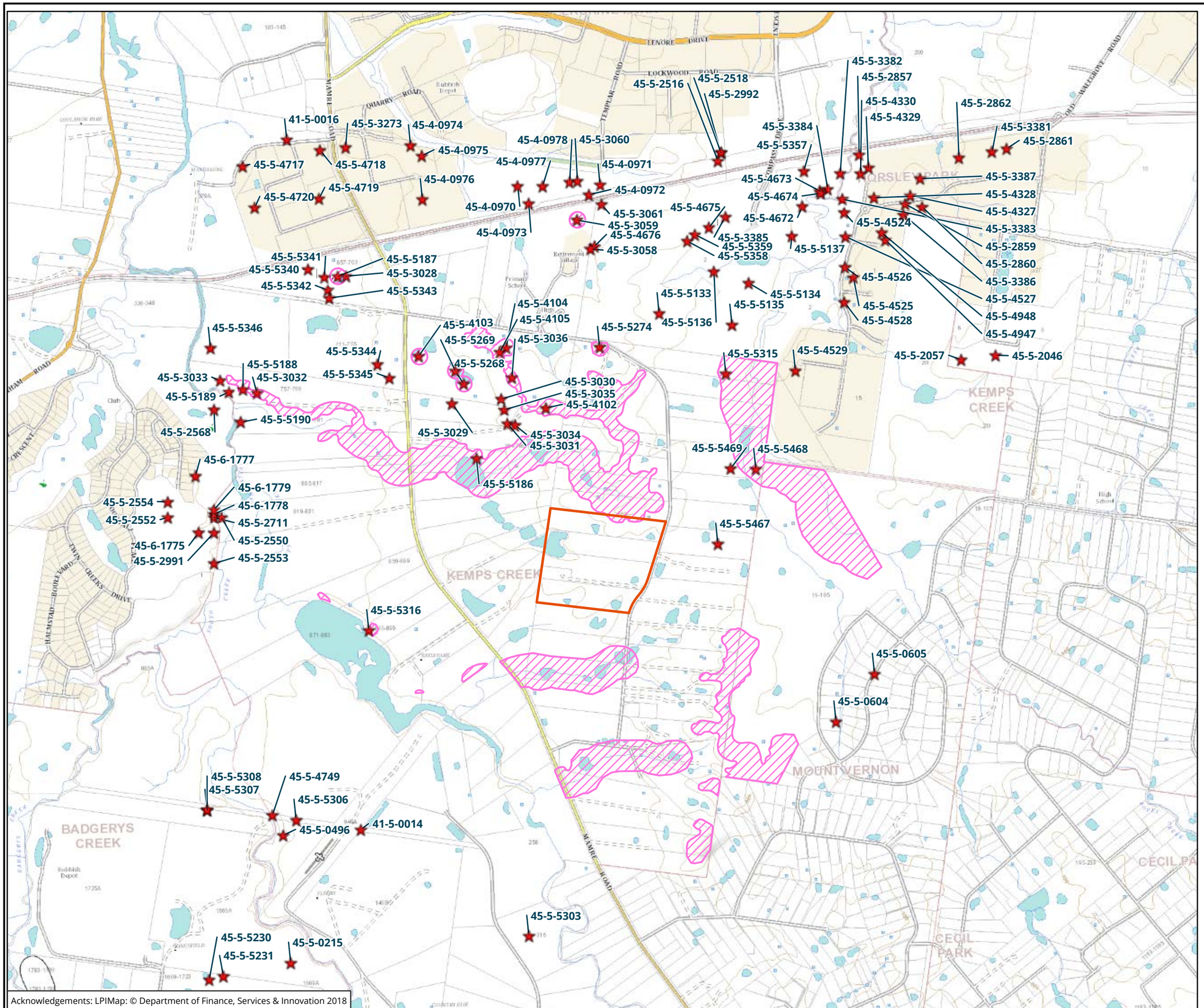
Site type	Number of occurrences	Frequency (%)
Artefact	112	88.9%
Potential archaeological deposit (PAD)	11	8.7%
Modified tree	2	1.6%
Grinding Groove	1	0.8%
Total	126	100%

A simple analysis of the Aboriginal cultural heritage sites registered within the 2.45 kilometre radius of the study area indicates that artefact sites are the most dominant, representing 89% (n=112) of the sites, with PAD representing 9% (n=11) of sites, with modified trees and grinding grooves representing 2% (n=2) and 1% (n=1) respectively.

3.3 Mamre Road Precinct Draft Development Control Plan

The Mamre Road Precinct Draft Development Control Plan (DCP) aims to ensure that Aboriginal heritage values are managed appropriately in order to produce conservation outcomes. This includes archaeological and culturally significant areas. The draft DCP has mapped areas of high and moderate Aboriginal archaeological potential; however, it was noted by Heritage NSW in their review of the DCP that the designations of potential were primarily based on a desktop assessment and predictive modelling with very limited field survey. The study area contains an area of moderate-high Aboriginal potential (Figure 7).

The DCP has a list of controls for completing assessments for Aboriginal heritage. For ground disturbing works this includes completing an Aboriginal Due Diligence Assessment for areas that have not yet been mapped or areas of low potential as a first step. If land is within or adjacent to land that contains a known Aboriginal cultural heritage site, assessments must consider and comply with the requirements of the NPW Act. The draft DCP determines that an ACHA is required as the study area contains an area of Aboriginal archaeological potential. These areas will be impacted by the proposed development. The draft DCP also states that an AHIP will be required if impacts to Aboriginal heritage cannot be avoided. This project is a SSD and as such an AHIP will not be required. This is due the overall assessment of State significant projects that addresses all heritage issues. These projects do not require an AHIP under the NPW Act.



Acknowledgements: LPIMap: © Department of Finance, Services & Innovation 2018

Legend

- AHIMS
- Study area
- Sites of known Aboriginal heritage and areas of high and moderate-high Aboriginal potential

-

Figure 7 AHIMS within the vicinity of the study area

NOT TO BE MADE PUBLIC

0 230 460 690 920 1,150

Metres

Scale: 1:23,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

biosis

N

Matter: 34800 Date: 21 June 2021, Drawn by: JMS, Checked by: CAM, Last edited by: smitchell Location:P:\34800s\34800\Mapping\34800 ACHA AR\ 34800 ACHA AR

3.4 Discussion

The study area is situated within the Cumberland Lowlands which features undulating plains and low hills with dense drainage lines. The study area itself reflects this, possessing undulating hills with steeply to moderately inclined upper to mid slopes, and moderately to gently inclined lower slopes, and crests atop the Bringelly Shale formation. Artefact sites and PADs are the most commonly occurring Aboriginal site type within the local region, with suitable sandstone exposures unlikely to be present in the Bringelly Shale geological unit, indicating an absence of grinding groove and rock shelter sites.

As discussed above, there are six dams located in the study area which were established during agricultural development post 1950s. These dams have disturbed the natural course of fresh water sources which would have originally been visible within the study area. A review of the local hydrology suggests that two first order creek lines; one in the north west and another in the south east, would have been present in the study area, and are considered positive indicators for past Aboriginal land use.

The study area contains two soil landscapes; the Luddenham soil landscape, and small portions of Blacktown soil landscape in the western and southern boundaries. The Luddenham soil landscape is the dominant soil type, and is considered erosional (Bannerman & Hazelton 1990a, p.63). Because of lateral movement, especially on inclined landforms like those found within the study area, archaeological material is unlikely to be preserved on the surface or *in situ* as soil material is removed by erosional forces down slopes.

European history of the Kemps Creek region is largely one of rural development. Early exploration and movement into the region accompanied early land grants which were subdivided and sold, not often developed. Nicholas Bayly, the original owner of the land likely used it for pastoral purposes, as did subsequent owners. More recent aerial images show this to be the case until the 1980s when agricultural practices such as cropping can be seen to increase within the study area. Tree clearing would have removed a majority of modified trees and disturbed the top layer of soil due to uprooting. Likewise, pastoral activities would have also caused disturbances to shallow topsoils within the study area, likely resulting in higher levels of soil erosion.

A review of regional and local archaeological assessments has shown that the size and extent of water sources is the greatest predictor of the types of archaeological sites to be identified within the region (White, B & McDonald, J 2010, McDonald, J. & Rich, E. 1993, Brayshaw McDonald Pty Ltd 1994, AMBS 2012). Large archaeological assemblages indicative of open campsites have been found proximity to streams of second order or greater, with focus points for Aboriginal occupation at creek junctions (JMCHM 2000, KNC 2011, AMBS 2012). Alluvial deposits (sediments moved via water) have also been found to contain archaeological deposits (Brayshaw McDonald Pty Ltd 1994), although artefacts have been found on all landforms in the region, in particular on undisturbed crests and gentle slopes near creek lines, in lower densities (DSCA 2003, Biosis 2019, Biosis 2020).

The presence of fresh water sources and suitable landforms such as hill crests and gentle slopes within the study area therefore suggests that there is potential for Aboriginal sites to be present. However, these sites are likely to be low density sites representative of background scatter or resource gathering within the local region. Despite the disturbance resulting from agricultural activities, there is also potential for *in situ* archaeological deposits to found below the 25 centimetre plough barrier established by Brayshaw Mcdonald (1994) where deeper deposits may be present.

3.4.1 Predictive statements

A number of predictive statements have been formulated to broadly predict the type and character of Aboriginal cultural heritage sites likely to exist throughout the study area and where they are more likely to be located.

These statements are based on:

- Site distribution in relation to landscape descriptions within the study area.
- Consideration of site type, raw material types and site densities likely to be present within the study area.
- Findings of the ethnohistorical research on the potential for material traces to present within the study area.
- Potential Aboriginal use of natural resources present or once present within the study area.
- Consideration of the temporal and spatial relationships of sites within the study area and surrounding region.

Table 8 indicates the site types most likely to be across the present study area. The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 8 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	**High**: Stone artefact sites have been previously recorded in the region across a wide range of landforms including alluvial landforms, crests and gentle slopes, they have the high potential to be present in undisturbed areas within the study area.
Potential archaeological deposits (PADs)	Potential sub surface deposits of cultural material.	**Moderate**: PADs have been previously recorded in the region across a wide range of landforms including alluvial flats, gentle slopes, terraces and crests. The presence of gentle slopes and crests in the study area therefore suggests there is moderate potential for PAD sites.
Modified trees	Trees with cultural modifications	**Moderate**: A small number of mature native trees have survived within the study area, and there has been recorded modified trees within the vicinity of the study area.
Axe grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	**Low**: There has been no previously recorded grinding groves within the vicinity of the study area. There is low potential for axe grinding grooves to be present as suitable sandstone exposures are unlikely to occur within the study area due to the underlying geology.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	**Low**: Shell midden sites have not been recorded within proximity to the study area. There are no perennial water sources within the study area therefore the potential for shell midden sites is considered low.
Aboriginal ceremony and	Such sites are often intangible places and features and are identified through oral	**Low**: There are currently no recorded mythological stories for the study area.

Site type	Site description	Potential
Dreaming Sites	histories, ethnohistoric data, or Aboriginal informants.	
Post-contact sites	These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with post-contact Aboriginal use.	**Low**: There are no post-contact sites previously recorded in the study area and historical sources do not identify one.
Aboriginal places	Aboriginal places may not contain any 'archaeological' indicators of a site, but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings.	**Low**: There are currently no recorded Aboriginal historical associations for the study area.
Burials	Aboriginal burial sites.	**Low**: Aboriginal burial sites are generally situated within deep, soft sediments, caves or hollow trees. Areas of deep sandy deposits will have the potential for Aboriginal burials. The soil profiles associated with the study area are not commonly associated with burials.
Quarries	Raw stone material procurement sites.	**Low**: There is no record of any quarries being within or surrounding the study area.
Rock shelters with art and / or deposit	Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground characterised by cliff lines and escarpments. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	**Low**: The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist, which are not present in the study area.

4 Field investigation

A field investigation consisting of an archaeological survey of the study area was undertaken on 12 April 2021 by Biosis archaeologist Mathew Smith, and Deerubbin LALC representative Steven Randall. The survey sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological survey objectives

The objectives of the survey were to:

- Provide RAPs an opportunity to view the study area and to discuss previously identified Aboriginal object(s) and/or place(s) in or within close proximity to the study area.
- Undertake a systematic survey of the study area targeting areas with the potential for Aboriginal heritage.
- Identify and record Aboriginal archaeological sites visible on the ground surface.
- Identify and record areas of PADs.

4.2 Archaeological survey methodology

The survey methods were intended to assess and understand the landforms and to determine whether any archaeological material from Aboriginal occupation or land use exists within the study area.

4.2.1 Sampling strategy

The survey effort targeted all landforms that will potentially be impacted, but focused on landforms with a higher potential for Aboriginal heritage or areas of exposure which would allow for Aboriginal objects to be identified on the ground surface.

4.2.2 Survey methods

The survey was conducted on foot with a field team of two members. Recording during the survey followed the archaeological survey requirements of the Code and industry best practice methodology. Information that recorded during the survey included:

- Aboriginal objects or sites present in the study area during the survey.
- Survey coverage.
- Any resources that may have potentially have been exploited by Aboriginal people.
- Landform.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.

Where possible, identification of natural soil deposits within the study area was undertaken. Photographs and recording techniques were incorporated into the survey including representative photographs of survey units, landform, vegetation coverage, ground surface visibility (GSV) and the recording of soil information for each survey unit were possible. Any potential Aboriginal objects observed during the survey were

documented and photographed. The location of Aboriginal cultural heritage and points marking the boundary of the landform elements were recorded using a hand-held Global Positioning System (GPS) and the Map Grid of Australia (MGA) (94) coordinate system.

4.3 Archaeological survey results

A meandering transect was walked across each landform within the study area with the surveyors walking two metres apart (Figure 8). This follows the methodology set out in Burke and Smith (2004, p.65) which states that a single person can only effectively visually survey an area of two linear metres. No Aboriginal sites were identified in the study area but one PAD was identified on a relatively undisturbed, flat hill crest at the head waters of a drainage line. The results from the survey have been summarised in Table 9 below.

4.4 Constraints to the survey

With any archaeological survey there are several factors that influence the effectiveness (the likelihood of finding sites) of the survey. The factors that contributed most to the effectiveness of the survey within the study area were ground surface visibility (GSV). The study area had uneven GSV due to extensive grass coverage and infrastructure related to market gardening activities across the study area, as well as areas of exposure resulting from these activities and vehicle tracks. Furthermore, the survey was able to access all portions of the study area.

4.4.1 Visibility

In most archaeological reports and guidelines visibility refers to GSV, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (DECCW 2010a). Average GSV across the study area was typically low, at approximately 50%, but varied significantly due to grass cover or disturbance. Areas of extensive grass coverage had significantly reduced GSV between 0-20% (Photo 6); while areas of disturbance which had removed vegetation coverage such as at recently cleared market gardens or locations of geotechnical investigations, displayed significantly higher GSV ranging from 80-100% (Photo 7). Areas of low GSV did not allow for the detection of surface sites such as stone artefacts and were therefore not targeted by this survey. Areas of high GSV were associated with disturbance in the study area, which would have moved or destroyed any Aboriginal artefacts on the surface; however, these areas provided better opportunities to identify any potential Aboriginal objects that might have been present.

Photo 6 **Photo showing extensive grass coverage in the study area which reduced the GSV, facing west**

Photo 7 **Photo showing high GSV in areas disturbed by market gardening, photo facing south**

4.4.2 Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed, and attempts to describe the relationship between those conditions and the likelihood that they provide for the exposure of (buried) archaeological materials. Whilst also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke & Smith 2004, p.79, DECCW 2010a). Overall, areas of exposure accounted for less than 30% of the study area due to extensive grass coverage and disturbances from market gardens. Areas of exposure were located where market gardening activities and geotech investigations had excavated into ground surface (Photo 8), as well as scours at the base of trees and dam edges where livestock and water runoff had removed grass cover (Photo 9).

Photo 8 **Photo showing areas of exposure from geotech investigations**

Photo 9 **Photo showing areas of exposure around dam edge, facing west**

4.4.3 Disturbances

Disturbance in the study area is associated with natural and human agents. Natural agents generally affect small areas and include the burrowing and scratching in soil by animals, such as wombats, foxes, rabbits and wallabies, and sometimes exposure from slumping or scouring. Disturbances associated with recent human action are prevalent in the study area and cover large sections of the land surface. The agents include residential and commercial development such as landscaping and construction of buildings; farming practices, such as initial vegetation clearance for creation of paddocks, fencing and stock grazing.

The study area has been subjected to extensive vegetation clearance, and large portions have undergone extensive disturbance from market gardening activities, construction of residential buildings, access roads and associated amenities, and construction of dams (Photo 10, Photo 11 and Photo 12). The results of the visual inspection are outlined below and in Figure 9.

Photo 10 **Extensive disturbances on lower slopes as a result of market gardens, photo facing north**

Photo 11 **Construction of residential buildings on flats within the study area, photo facing south west**

Photo 12 **Disturbances from large dam covering flats and lower slopes landforms in the study area, photo facing west**

Table 9 Survey coverage

Survey unit	Landform	Survey unit area (m²)	Visibility (%)	Exposure (%)	Effective coverage area (m²)	Effective coverage (%)
1	Mid slope	5500	1	1	55	1
1	Lower slope	14564	50	50	7282	50
1	Crest	2876	1	1	28.76	1
1	Drainage depression	1176	10	10	117.6	10

Table 10 Landform summary

Landform	Landform area (m²)	Area effectively surveyed (m²)	Landform effectively surveyed (%)	No. of Aboriginal sites	No. of artefacts or features
Mid slope	75962	55.00	0.07	0	0
Lower slope	273085	7282	2.67	0	0
Crest	13144	28.76	0.22	1 (PAD)	0
Drainage depression	68314	117.60	0.17	0	0

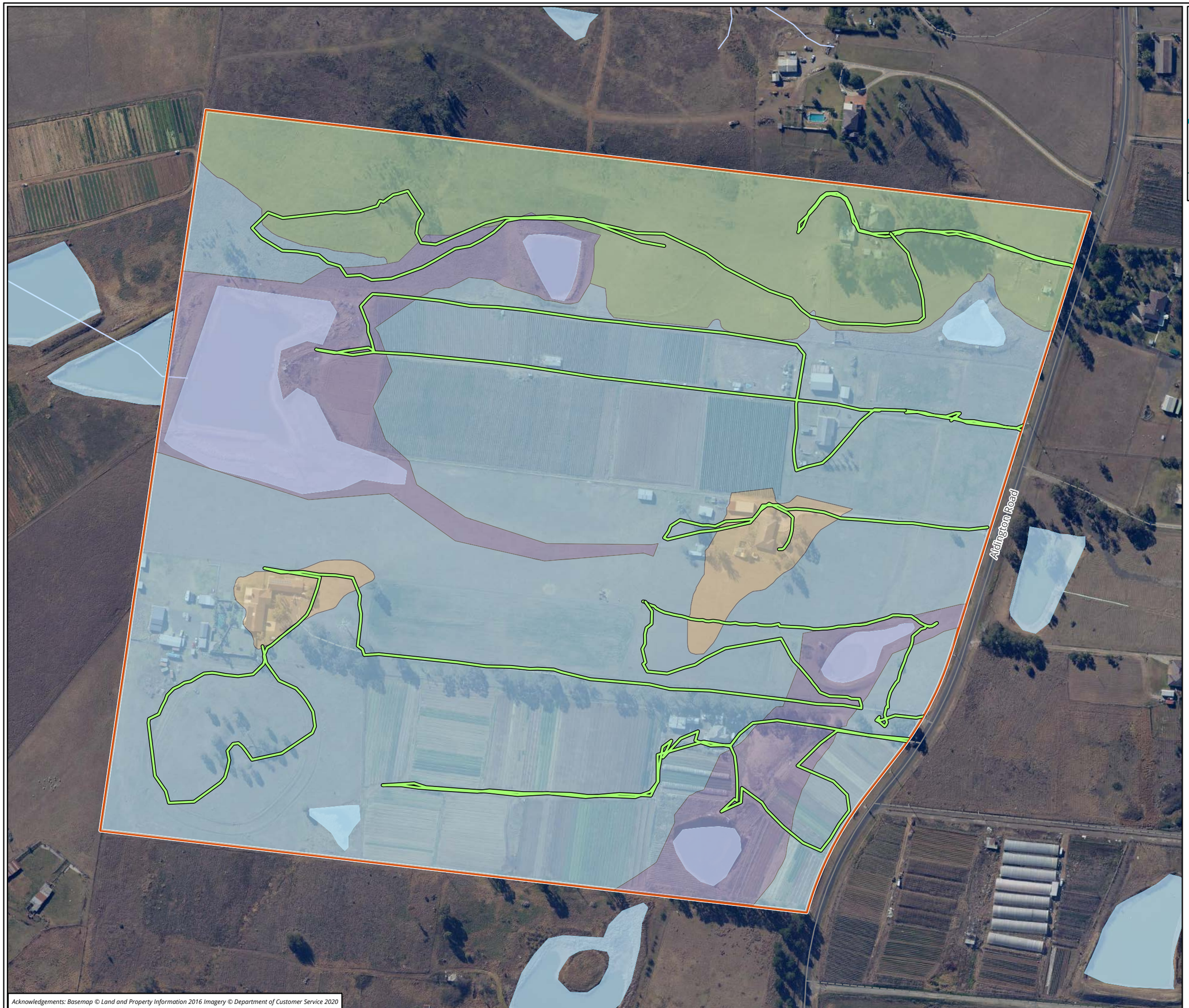
4.4.4 Discussion of archaeological survey results

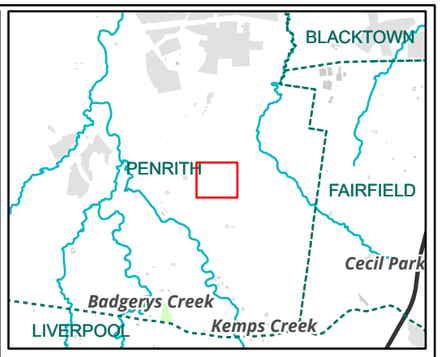
Visibility during the survey was low outside of disturbed market gardens areas due to extensive ground surface vegetation. This made it difficult to identify any potential Aboriginal objects in the study area; however, the visual inspection of the study area identified an area of PAD (Aldington PAD 1) in consultation with Deerubbin LALC representative, Steven Randall.

Aldington PAD 1 was found to be located on a flat hill crest landform within approximately 100-250 metres of two first order creek lines which have been heavily disturbed by damming activities. A review of predictive modelling on the Cumberland plain and the results of previous assessments in the vicinity of the study area have shown that this landform type has potential to contain Aboriginal sites, although they will be sporadically placed and consisting of isolated or low density artefact sites (JMCHM 2000, JMCHM 2005a, JMCHM 2005b, JMCHM 2008) (Biosis 2020). Historical aerial imagery over Aldington PAD 1 shows that this area has been cleared of trees but has not undergone intensive market gardening or disturbance like the rest of the study area indicating intact archaeological deposits may be present.

The remainder of the study area has been assessed as possessing low archaeological potential. Disturbances from market gardening, extensive modification to drainage lines as a result of damming activities, and past residential development were evident across much of the study area and were focused on the lower slopes below steep to moderately inclined hill landforms and crests above drainage depressions. These disturbances would have likely removed any potential Aboriginal sites present as they have resulted in significant disturbances to the shallow soils present across the study area. Portions of the study area which are considered to have low archaeological potential are also located across steeply to moderately inclined hillslopes that are considered less likely to retain sites due to soil movement down slope. These portions of the site are also considered to be less opportune occupation areas due to the steepness of slopes and proximity of level well drained topographies such as hill crests which would have been considered more favourable for Aboriginal land use.

Photo 13 Photo looking across Aldington PAD 1, photo facing north east





Legend

- Study area
- Survey transcect

Landforms

- Crest
- Drainage depression
- Lower slope
- Middle slope

Acknowledgements: Basemap © Land and Property Information 2016 Imagery © Department of Customer Service 2020

Figure 8 Survey coverage

0 20 40 60 80 100

Metres

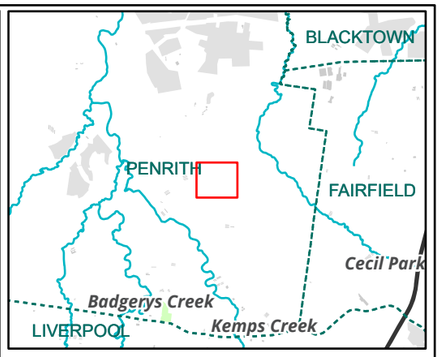
Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 34800, Date: 02 September 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: mknudsen
Location: P:\34800s\34800\Mapping\34800 ACHA AR\
34800 ACHA AR, Layout: 34800_AR_F8_SurveyResults



Legend

- Study area
- Lot
- Aldington PAD 1

Archaeological potential

- Low potential

Figure 9 Survey results

0 20 40 60 80 100

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 34800, Date: 10 September 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: mknudsen
Location: P:\34800s\34800\Mapping\34800 ACHA AR\
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5 Test excavation

Following the results of the field investigation a test excavation program was undertaken to characterise the extent, nature and archaeological value of Aboriginal cultural heritage within Aldington PAD 1. The sampling strategy, methodology and results of the test excavation program are discussed below

5.1 Test excavation objectives

The objectives of the sub-surface investigation were to characterise the extent, nature and archaeological (scientific) value of cultural heritage within the area of PAD identified during the survey (Aldington PAD 1). Test excavations were also undertaken within the area of low potential to test the predictive model.

The aims of the testing program were to:

- Determine the nature and extent of any sub-surface archaeological deposits identified in the study area.
- Inform the current knowledge regarding the occupation density and timeline of Aboriginal occupation of the study area.
- Identify if the archaeological material occurs in an intact, undisturbed context, by examining the soil profile and stratigraphy.
- Analyse and interpret any archaeological finds (such as stone artefacts, hearths, etc.) recovered during the testing program.
- Inform current knowledge of Aboriginal occupation and land use models of the region.
- Provide management and mitigation measures for Aboriginal archaeological objects located during the subsurface testing program.
- Test the predictive model and answer the research questions developed as part of this assessment.

5.2 Test excavation methodology

Test excavations were undertaken in accordance with Requirement 16 of the Code in order to determine the nature, extent and significance of Aboriginal sites that have the potential to exist within the study area.

Test excavations within the study area conformed to the following methodology:

- Test excavations will be conducted in 50 by 50 centimetre units.
- The test pits will be excavated by hand (inclusive of trowels, spades and other hand tools) along transects at intervals of between 10 and 20 metres or other justifiable and regular spacing (being no smaller than five metres).
- The first test pit within a site or PAD area will be excavated in five centimetre spits; the subsequent test pits conducted within the site or PAD area can then be excavated in either 10 centimetre spits or stratigraphic units (whichever is smaller) to the base of Aboriginal object-bearing units being the removal of the A-horizon soil deposit down to the sterile clay or bedrock layer (B-horizon).

- If the depth of deposit prevents reaching sterile deposits within the 50 by 50 centimetre test pit, additional 50 by 50 centimetre test pits may be excavated adjacent to the original test pit (for example expanding the test pit to 50 by 100 centimetres) to reach the sterile deposits.
- Test pits may be combined and excavated as necessary in 50 by 50 centimetre units for the purposes of further understanding site characteristics. Note that under the Code, the maximum area that can be excavated in any one continuous area is three metres squared (3 m²).
- The Code dictates that the maximum surface area of all test excavation units must be no greater than 0.5% of the PAD or area being investigated.
- All excavated soil will be sieved in 5 millimetre sieves. Dry sieving will be attempted in the first instance, however wet sieving may be used if deposits cannot be dry sieved.
- All cultural material will be collected, bagged and clearly labelled. They will be temporarily stored in the Biosis office for analysis (Unit 14, 17-27 Power Avenue Alexandria NSW 2015).
- For each test pit that is excavated, the following documentation will be taken:
  - Unique test pit identification number.
  - GPS coordinate of each test pit.
  - Munsell soil colour and texture.
  - Amount and location of cultural material within the deposit.
  - Nature of disturbance where present.
  - Stratigraphy.
  - Archaeological features (if present).
  - Photographic records.
  - Spit records.
- Test excavation units will be backfilled as soon as practicable.
- An AHIMS Site Impact Recording form will be completed and submitted to the AHIMS Registrar for any sites impacted during test excavations.
- In the event that suspected human remains are identified works will immediately cease and the NSW Police and Heritage NSW, Department of Premier and Cabinet (Heritage NSW) will be notified.
- Test excavations will cease when enough information* has been recovered to adequately characterise the objects present with regard to their nature and significance.

**Enough information is defined by Heritage NSW as meaning "the sample of excavated material clearly and self-evidently demonstrates the deposit's nature and significance. This may include things like locally or regionally high object density: presence of rare or representative objects: presence of archaeological features: or locally or regionally significant deposits stratified or not."*(DECCW 2010a, p.28).

5.3 Test excavation results

Test excavations were carried out from 19 August 2021 to 20 August 2021. Test excavations were carried out by a team of two Biosis archaeologists and three representatives of the RAPs.

A total of 16 test pits were excavated across four transects within the area of PAD and in the area of low potential adjacent to it at the request of the RAPs (Figure 9). Individual test pit and soil analysis results are provided in Appendix 2.

A total of two artefacts were identified across the 16 test pits, one in transect 2 test pit 3 and the other in transect 2 test pit 5.

Table 11 Test excavation coverage and results by transect

Transect	Landform	Area (m^2)	Area tested (m^2)	Area effectively tested (%)	No. of sites	No. of artefacts
1, 2, 3	Hill crest	5,707	4	0.07	1	2
4	Moderate/gentle slope	574	0.75	0.13	0	0

5.3.1 Transect 1

Transect 1 was within the area of PAD located upon a crest landform within Lot 27 DP 255560. It is within an elevated landform located approximately 100-250 metres of two first order creek lines. A total of four test pits were excavated at 20 metre intervals across this transect in order to test the archaeological potential of Aldington PAD 1. No artefacts were identified within the test pits in this transect.

Two contexts were present within Transect 1 (Photo 14, Photo 15, Photo 16). Context 1 ranged from a dark reddish brown (5YR 3/4) to a dark brown (7.5YR 3/3, 7.5YR 3/4) silty clay to clay of moderate to high compaction containing rootlets and reaching a depth between 100 to 170 millimetres. Disturbance caused by ploughing most likely caused the mixing of the in situ soils into this context. Two of the test pits in this transect ended at Context 1.

A clear horizon to Context 2 was present, which contained a dark reddish brown (5YR 3/4) to dark brown (7.5YR 3/4) clay and silty clay of moderate to high compaction with rootlets and charcoal inclusions. Orange clay mottling was present and it appeared that this context may have also been disturbed by ploughing. Clay mottling increased with depth. Two of the test pits ended at Context 2.

Photo 14 Typical test pit from Transect 1, TP4

Photo 15 **Typical section from Transect 1, TP4**

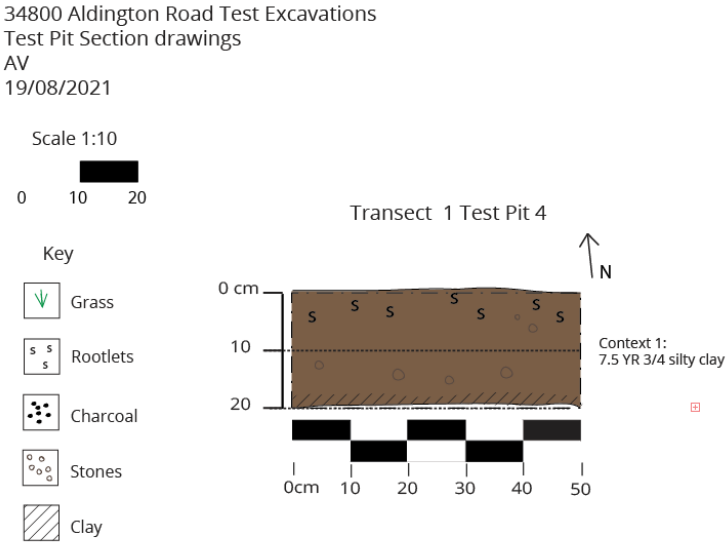


Photo 16 **Section drawing from Transect 1, TP4**

5.3.2 Transect 2

Transect 2 was within the area of PAD located upon a crest landform within Lot 27 DP 255560. It is within an elevated landform located approximately 475 metres to the south east of a first order drainage line. A total of five test pits were excavated at 20 metre intervals across this transect in order to test the archaeological potential of Aldington PAD 1.

Three contexts were present within Transect 2 (Photo 17, Photo 18, Photo 19). Context 1 ranged from a very dark brown (7.5YR 2.5/2) to a dark brown (7.5YR 3/3, 7.5YR 3/4) silt, silty loam or silty clay of moderate compaction containing rootlets and reaching a depth between 50 to 130 millimetres. Disturbance caused by ploughing most likely caused the mixing of the in situ soils into this context.

A clear horizon to Context 2 was present, which contained a very dark brown (7.5YR 2.5/3), dark reddish brown (5YR 3/4) and dark brown (7.5YR 3/4) loamy clay, silty clay and clay of moderate to high compaction. Orange clay mottling was present in the clay and increased with depth. This context reached a depth of 104 – 200 millimetres. It appeared that this context may have also been disturbed by ploughing. Four of the test pits ended at Context 2.

A diffuse horizon to Context 3 was present, which consisted of a dark reddish brown (5YR 3/4) highly compacted clay. This context ended at 200 millimetres.

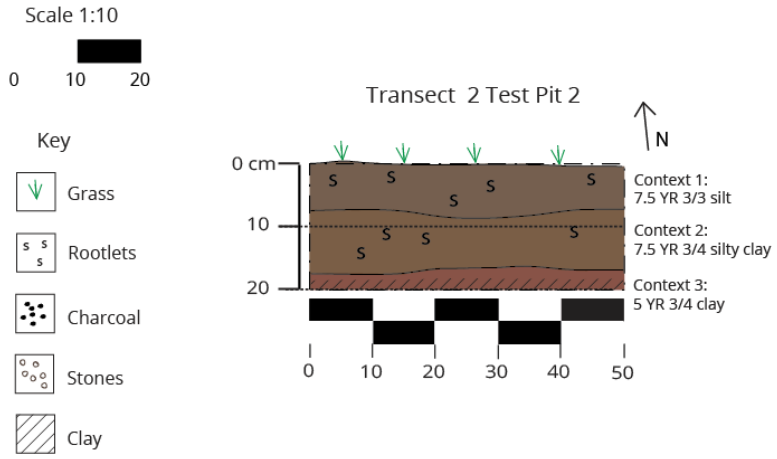
Two artefacts were identified from this transect, one from T2P3 and the other from T2P5. One was a chert angular fragment identified in spit 1 (T2P3), the other was a silcrete angular fragment identified in spit 2 (T2TP5). These are most likely not in situ as it appears that both contexts had been disturbed from ploughing.

Photo 17 Typical test pit from Transect 2, TP2

Photo 18 Typical section from Transect 2, TP2

34800 Aldington Road Test Excavations
Test Pit Section drawings
AV
19/08/2021

Photo 19 Section drawing from Transect 2, TP2



5.3.3 Transect 3

Transect 3 was within the area of PAD located upon a crest landform within Lot 27 DP 255560. It is within an elevated landform located approximately 500 metres to the south east of a first order drainage line. A total of four test pits were excavated at 20 metre intervals across this transect in order to test the archaeological potential of Aldington PAD 1. No artefacts were identified within the test pits in this transect.

Two contexts were present within Transect 3 (Photo 20, Photo 21, Photo 22). Context 1 ranged from a brown (7.5YR 4/3) to a dark brown (7.5YR 3/4) silt, silty loam or silty clay of moderate to high compaction containing rootlets and orange mottled clay reaching a depth between 150 to 200 millimetres. The clay increased towards the base of this context. Disturbance caused by ploughing most likely caused the mixing of the in situ soils into this context. Three test pits ended on this context.

A clear horizon to Context 2 was present in one test pit. This contained a dark brown (7.5YR 3/3), silty loamy clay of moderate compaction. Orange clay mottling was present in the clay and increased with depth. This context reached a depth of 250 millimetres. It appeared that this context may have also been disturbed by ploughing.

Photo 20 **Typical test pit from Transect 3,TP2**

Photo 21 **Typical section from Transect 3, TP2**

34800 Aldington Road Test Excavations
Test Pit Section drawings
AV
19/08/2021

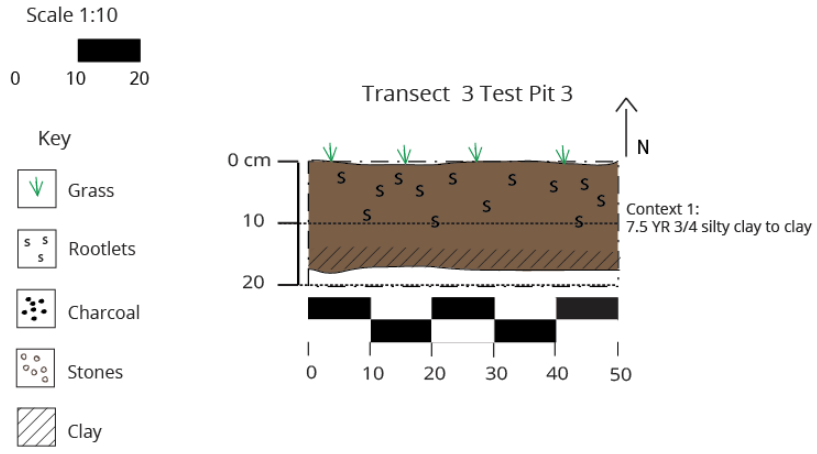


Photo 22 **Section drawing from Transect 3, TP2**

5.3.4 Transect 4

Transect 4 was located upon a gentle slope below the crest landform within Lot 27 DP 255560. It is located approximately 525 metres to the south east of a first order drainage line. A total of three test pits were excavated at 20 metre intervals across this transect in order to test the archaeological potential of an area identified as low potential from the archaeological survey. No artefacts were identified within the test pits in this transect.

Two contexts were present within Transect 4 (Photo 23, Photo 24, Photo 25). Context 1 consisted of a dark brown (7.5YR 3/4) silty loam or silty clay of moderate to high compaction containing rootlets and orange clay mottling. It reached a depth between 150 to 190 millimetres. Disturbance caused by ploughing most likely caused the mixing of the in situ soils into this context. One test pit ended on this context.

A clear horizon to Context 2 was present in two test pits. This contained a dark brown (7.5YR 3/4), silty loam and silty clay of moderate compaction. Orange clay mottling was present in the walls and base of this context and increased with depth. This context reached a depth of 300 millimetres in one test pit and 200 millimetres in the other test pit. It appeared that this context may have also been disturbed by ploughing.

Photo 23 Typical test pit from Transect 4, TP1

Photo 24 Typical section from Transect 4, TP1

34800 Aldington Road Test Excavations
Test Pit Section drawings
AV
20/08/2021

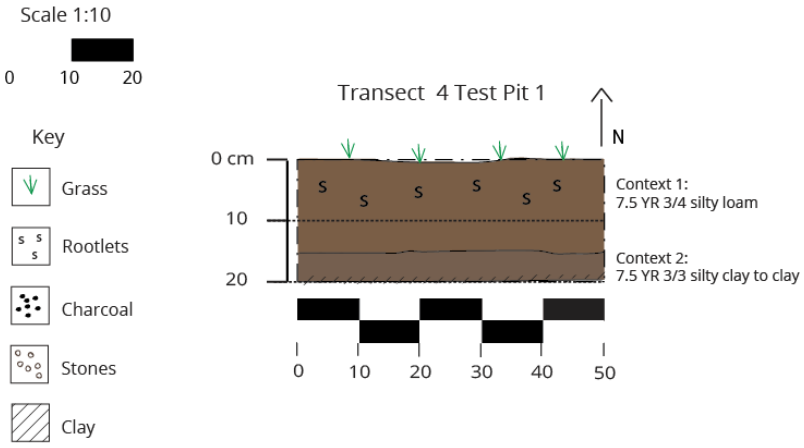
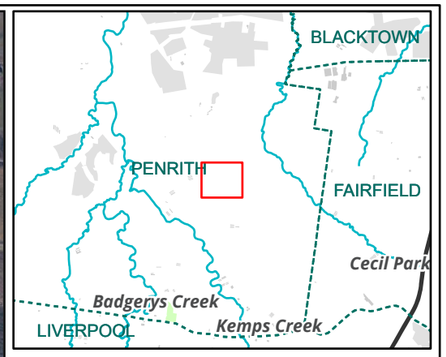


Photo 25 **Section drawing from Transect 4, TP1**



Legend

- Study area
- Lot
- Aldington PAD 1
- Aldington Road PAD 1

Test pits

- No artefact
- Artefact present

Figure 10 Test excavation coverage and results

0 20 40 60 80 100

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 34800, Date: 10 September 2021,
Drawn by: MK, Checked by: CAM, Last edited by: mknudsen
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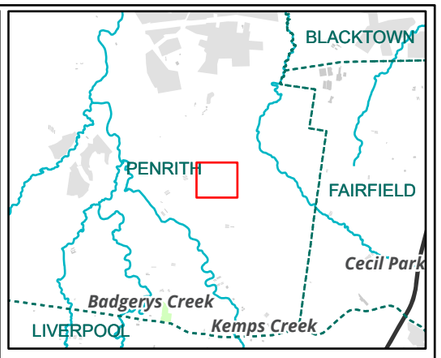


Legend

- Study area
- Lot

Test Pit Number

- No artefact present
- Artefact found

Landforms

- Crest
- Drainage depression
- Lower slope
- Middle slope

Figure 11 Landform coverage in the study area

0 20 40 60 80 100

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 34800, Date: 02 September 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: mknudsen
Location: P:\34800s\34800\Mapping\34800 ACHA AR\
34800 ACHA AR, Layout: 34800_AR_F8_SurveyResults

5.4 Aboriginal sites identified by the assessment

The results of the test excavation program identified one sub-surface artefact scatter (AHIMS 45-5-5238/Aldington Road PAD 1) within Aldington PAD 1. A summary of AHIMS 45-5-5238/Aldington Road PAD is provided below.

5.4.1 AHIMS 45-5-5238/Aldington Road PAD 1

Site location

AHIMS 45-5-5238/Aldington Road PAD 1 is located approximately 230 metres west of Aldington Road, and 115 metres to the south of the property boundary between Lot 27 and 28 DP255560 (Table 12 and Figure 11).

Table 12 Grid reference site Aldington Road PAD 1 (GDA94/MGA56) (approximate centre point of site)

Easting (mE)	Northing (mN)
296008	6252610

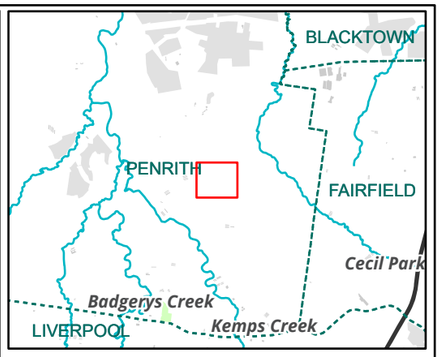
Site environment

AHIMS 45-5-5238/Aldington Road PAD 1 is located on a hill crest landform located within approximately 100-250 metres of two first order creek lines which have been heavily disturbed by damming activities. Disturbances observed within the area relate to the clearing and ploughing as a result of agricultural and pastoral land use.

Site description

AHIMS 45-5-5238/Aldington Road PAD 1 consists of a low density sub-surface archaeological deposit containing two artefacts, both of which are angular fragments. One artefact is chert, the other is silcrete. The site covers an area of approximately 77 metres by 20 metres. Artefacts occurred at depths between 0-300 millimetres.

Soils within AHIMS 45-5-5238/Aldington Road PAD 1 varied from moderately to highly compacted very dark brown, dark brown and dark reddish brown silt, silty loam, silty clay, loamy clay or clay. The soil profile was consistent across the area and all test pits ended on clay. The soil profile became increasingly clayey with depth, and inclusions featured rootlets and charcoal. This area has been disturbed by land clearance and ploughing activities, which has most likely caused mixing of soil contexts indicating this site is not *in situ*.



Legend

- Study area
- Lot
- Aldington Road PAD 1

Test pit

- Artefact found

Archaeological potential

- Low potential

Figure 12: Aboriginal sites identified within the study area

0 20 40 60 80 100

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 34800, Date: 02 September 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: mknudsen
Location: P:\34800s\34800\Mapping\34800 ACHA AR\
34800 ACHA AR, Layout: 34800_AR_F8_SurveyResults

5.5 Discussion

Information gathered during background research was analysed in order to formulate predictive modelling statements that were applicable to the landscape context of the study area. Predictive models for the study area were informed by a review of previous assessments undertaken across the region. Predictive modelling indicated that the most likely site types to occur within the study area are artefact sites and PADs upon gentle slope and crest landforms. A review of regional and local archaeological assessments has shown that the size and extent of water sources is the greatest predictor of the types of archaeological sites to be identified within the region (White, B & McDonald, J 2010, McDonald, J. & Rich, E. 1993, Brayshaw McDonald Pty Ltd 1994, AMBS 2012). Large archaeological assemblages indicative of open campsites have been found in proximity to streams of second order or greater, with focus points for Aboriginal occupation at creek junctions (JMCHM 2000, KNC 2011, AMBS 2012). Whilst smaller assemblages have been found on all landforms in the region in association with first order water sources like those identified within the study area, in particular on undisturbed crests and gentle slopes (DSCA 2003, Biosis 2019, Biosis 2020).

A field investigation of the study area was undertaken in April 2021 to assess levels of disturbance and archaeological sensitivity in line with the results of the predictive modelling. One PAD (Aldington PAD 1) was identified in the study area within flat hill crest landform at the head of a potential first order drainage depression which has now been dammed. It was determined that levels of disturbance across the area of PAD were typically low, associated with ploughing and vegetation clearance.

The remainder of the study area was assessed as possessing low archaeological potential due to disturbances from market gardening, modification to drainage lines, and past residential development. This was particularly evident upon the gentle lower slopes below moderate to steep slope landforms and crests above drainage depressions. The field investigation concluded that these areas of disturbance would have resulted in poor soil preservation as soils were observed to be shallow soils across the study area. Portions of the study area which are considered to have low archaeological potential are also located across steeply to moderately inclined hillslopes that are considered less likely to retain sites due to soil movement down slope. These portions of the site are also considered to be less opportune occupation areas due to the steepness of slopes and proximity of level well drained topographies such as hill crests which would have been considered more favourable for Aboriginal land use.

Test excavations were undertaken within Aldington Road PAD 1 in August 2021. These works identified a total of two artefacts from the 16 test pits that were excavated. Overall, soils across the extent of the testing area were shallow, reaching an average of 190 millimetres and a maximum of 300 millimetres. One Aboriginal site (AHIMS 45-5-5238/Aldington Road PAD 1) was identified as a result of these test excavations within the flat hill crest landform. Test excavations within the upper slope previously assessed as having low potential adjacent to Aldington PAD 1 did not identify any Aboriginal sites. This is likely due to the moderately steep nature of the slope which possesses poor potential for site preservation due to the erosional nature of the Luddenham soil landscape with dominates the site extent (Bannerman & Hazelton 1990a, p.63). Test excavations were not undertaken in the lower slopes as these areas were assessed as possessing low archaeological potential due to extensive historical disturbances within the study as a result of dam construction, and residential, pastoral and agricultural land use.

Soils within AHIMS 45-5-5238/Aldington Road PAD 1 varied from moderately to highly compacted very dark brown, dark brown, and dark reddish brown silt, silty loam, silty clay, loamy clay or clay. The soil profile was consistent across the area and all test pits ended on clay. The soil profile became increasingly clayey with depth, and inclusions featured rootlets and charcoal. The site extent had likely been disturbed by land clearance and ploughing activities, most likely resulting in the mixing of soils and associated archaeological deposits.

The results of the test excavation therefore support predictive modelling for the region, having identified a low density artefact scatter (AHIMS 45-5-5238/Aldington Road PAD 1) within a flat hill crest landform, located within approximately 100 to 250 metres of two first order creek lines. The site is considered to be indicative of resource gathering activities within the study area with limited potential to contribute further information about Aboriginal occupation and land use within the local region due to the nature of the assemblage.

6 Scientific values and significance assessment

The two main values addressed when assessing the significance of Aboriginal sites are cultural values to the Aboriginal community and archaeological (scientific) values. This report will assess scientific values while the ACHA report will detail the cultural values of Aboriginal sites in the study area.

6.1 Introduction to the assessment process

Heritage assessment criteria in NSW fall broadly within the significance values outlined in the Australia International Council on Monuments and Sites (ICOMOS) Burra Charter (Australia ICOMOS 2013). This approach to heritage has been adopted by cultural heritage managers and government agencies as the set of guidelines for best practice heritage management in Australia. These values are provided as background and include:

- **Historical significance** (evolution and association) refers to historic values and encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. 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.
- **Aesthetic significance** (Scenic/architectural qualities, creative accomplishment) refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.
- **Social significance** (contemporary community esteem) refers to the spiritual, traditional, historical or contemporary associations and attachment that the place or area has for the present-day community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed. These aspects of heritage significance can only be determined through consultative processes with local communities.
- **Scientific significance** (Archaeological, industrial, educational, research potential and scientific significance values) refers to the importance of a landscape, area, place or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.

The cultural and archaeological significance of Aboriginal and historic sites and places is assessed on the basis of the significance values outlined above. As well as the ICOMOS Burra Charter significance values guidelines, various government agencies have developed formal criteria and guidelines that have application when assessing the significance of heritage places within NSW. Of primary interest are guidelines prepared by the Commonwealth Department of the Environment and Energy, Heritage NSW, NSW Department of Planning, Industry and Environment. The relevant sections of these guidelines are presented below.

These guidelines state that an area may contain evidence and associations which demonstrate one or any combination of the ICOMOS Burra Charter significance values outlined above in reference to Aboriginal heritage. Reference to each of the values should be made when evaluating archaeological and cultural significance for Aboriginal sites and places.

In addition to the previously outlined heritage values, the Heritage NSW Guidelines (OEH 2011) also specify the importance of considering cultural landscapes when determining and assessing Aboriginal heritage values. The principle behind a cultural landscape is that 'the significance of individual features is derived from their inter-relatedness within the cultural landscape'. This means that sites or places cannot be 'assessed in isolation' but must be considered as parts of the wider cultural landscape. Hence the site or place will possibly have values derived from its association with other sites and places. By investigating the associations between sites, places, and (for example) natural resources in the cultural landscape the stories behind the features can be told. The context of the cultural landscape can unlock 'better understanding of the cultural meaning and importance' of sites and places.

Although other values may be considered – such as educational or tourism values – the two principal values that are likely to be addressed in a consideration of Aboriginal sites and places are the cultural/social significance to Aboriginal people and their archaeological or scientific significance to archaeologists. The determinations of archaeological and cultural significance for sites and places should then be expressed as statements of significance that preface a concise discussion of the contributing factors to Aboriginal cultural heritage significance.

6.2 Archaeological (scientific significance) values

Archaeological significance (also called scientific significance, as per the ICOMOS Burra Charter) refers to the value of archaeological objects or sites as they relate to research questions that are of importance to the archaeological community, including indigenous communities, heritage managers and academic archaeologists. Generally the value of this type of significance is determined on the basis of the potential for sites and objects to provide information regarding the past life-ways of people (Burke & Smith 2004, p.249, NPWS 1997), For this reason, the NPWS summarises the situation as 'while various criteria for archaeological significance assessment have been advanced over the years, most of them fall under the heading of archaeological research potential' (NPWS 1997, p.26). The NPWS criteria for archaeological significance assessment are based largely on the ICOMOS Burra Charter.

Research potential

Research potential is assessed by examining site content and site condition. Site content refers to all cultural materials and organic remains associated with human activity at a site. Site content also refers to the site structure – the size of the site, the patterning of cultural materials within the site, the presence of any stratified deposits and the rarity of particular artefact types. As the site contents criterion is not applicable to scarred trees, the assessment of scarred trees is outlined separately below. Site condition refers to the degree of disturbance to the contents of a site at the time it was recorded.

Table 13 and Table 14 outline the site content and site condition rating used for archaeological sites.

Table 13 Site contents ratings used for archaeological sites

Rating	Description
0	No cultural material remaining.
1	Site contains a small number (e.g. 0–10 artefacts) or limited range of cultural materials with no evident stratification.
2	Site contains a larger number, but limited range of cultural materials; and/or some intact stratified deposit remains; and/or are or unusual example(s) of a particular artefact type.
3	Site contains a large number and diverse range of cultural materials; and/or largely intact stratified deposit; and/or surface spatial patterning of cultural materials that still reflect the way in which the cultural materials were deposited.

Table 14 Site condition ratings used for archaeological sites

Rating	Description
0	Site destroyed.
1	Site in a deteriorated condition with a high degree of disturbance; lack of stratified deposits; some cultural materials remaining.
2	Site in a fair to good condition, but with some disturbance.
3	Site in an excellent condition with little or no disturbance. For surface artefact scatters this may mean that the spatial patterning of cultural materials still reflects the way in which the cultural materials were laid down.

Pearson and Sullivan (1995, p.149) note that Aboriginal archaeological sites are generally of high research potential because 'they are the major source of information about Aboriginal prehistory'. Indeed, the often great time depth of Aboriginal archaeological sites gives them research value from a global perspective, as they are an important record of humanity's history. Research potential can also refer to specific local circumstances in space and time – a site may have particular characteristics (well preserved samples for absolute dating, or a series of refitting artefacts, for example) that mean it can provide information about certain aspects of Aboriginal life in the past that other less or alternatively valuable sites may not (Burke & Smith 2004, pp.247–8). When determining research potential value particular emphasis has been placed on the potential for absolute dating of sites.

The following sections provide statements of significance for the Aboriginal archaeological sites recorded during the sub-surface testing for the assessment. The significance of each site follows the assessment process outlined above. This includes a statement of significance based on the categories defined in the Burra Charter. These categories include social, historic, scientific, aesthetic and cultural (in this case archaeological) landscape values. Nomination of the level of value—high, moderate, low or not applicable—for each relevant category is also proposed. Where suitable the determination of cultural (archaeological) landscape value is applied to both individual sites and places (to explore their associations) and also, to the Study Area as a whole. The nomination levels for the archaeological significance of each site are summarised below.

Representativeness

Representativeness refers to the regional distribution of a particular site type. Representativeness is assessed by whether the site is common, occasional, or rare in a given region. Assessments of representativeness are subjectively biased by current knowledge of the distribution and number of archaeological sites in a region. This varies from place to place depending on the extent of archaeological research. Consequently, a site that is assigned low significance values for contents and condition, but a high significance value for representativeness, can only be regarded as significant in terms of knowledge of the regional archaeology. Any such site should be subject to re-assessment as more archaeological research is undertaken.

Assessment of representativeness also takes into account the contents and condition of a site. For example, in any region there may only be a limited number of sites of any type that have suffered minimal disturbance. Such sites would therefore be given a high significance rating for representativeness, although they may occur commonly within the region.

Table 15 outlines the site representativeness ratings used for archaeological sites.

Table 15 Site representativeness ratings used for archaeological sites

Rating	Description
1	Common occurrence.
2	Occasional occurrence.
3	Rare occurrence.

Overall scientific significance ratings for sites, based on a cumulative score for site contents, site integrity and representativeness are provided in Table 16

Table 16 Scientific significance ratings used for archaeological sites

Rating	Description
1-3	Low scientific significance.
4-6	Moderate scientific significance.
7-9	High scientific significance.

Each site is given a score on the basis of these criteria – the overall scientific significance is determined by the cumulative score. This scoring procedure has been applied to the Aboriginal archaeological sites identified during the sub-surface testing. The results are in Table 19.

6.2.1 Statements of archaeological significance

The following archaeological significance assessment is based on Requirement 11 of the Code. Using the assessment criteria detailed in Scientific Values and Significance Assessment, an assessment of significance was determined and a rating for each site was determined. The results of the archaeological significance assessment are given in Table 17 below.

Table 17 Scientific significance assessment of archaeological sites recorded within the study area

Site name	Site content	Site condition	Representativeness	Scientific significance
AHIMS 45-5-5238/Aldington Road PAD 1	1	1	1	3 – Low

Table 18 Statements of scientific significance for archaeological sites recorded within the study area

Site name	Statement of significance
AHIMS 45-5-5238/Aldington Road PAD 1	AHIMS 45-5-5238/Aldington Road PAD 1 is a low density sub-surface archaeological deposit located on a flat hill crest located within approximately 100-250 metres of two first order creek lines which have been heavily disturbed by damming activities. The site extends across an area of 77 by 20 metres. The site contains moderate levels of disturbance from land clearance, ploughing and cattle grazing, The soil profile was consistent across the area and contained moderately to highly compacted very dark brown, dark brown, and dark reddish brown silt, silty loam, silty clay, loamy clay or clay. The low density scatter is considered a common site type in the region with limited potential to contribute further information about Aboriginal occupation and land use within the local region. The archaeological significance of this site has been assessed as low.

7 Impact assessment

As previously outlined, the project proposes to develop the study area and will include:

- Construction, fit-out and operation of one warehouse with two parts and distribution buildings with a total floor area of 65,327 square metres including offices, loading docks, parking and hardstand areas, landscaping, utilities and services.
- Associated works including demolition, bulk earthworks, and vegetation removal across the site extent.
- Construction of internal roads and widening of Aldington Road.
- Construction of three basins totalling 10,592 square metres.

7.1 Predicted physical impacts

The proposed works will have a direct impact upon AHIMS 45-5-5238/Aldington Road PAD 1, with a total loss of value (Figure 12).

A summary of impacts to Aboriginal sites is provided below in Table 19.

Table 19 Summary of potential archaeological impacts

AHIMS site no.	Site name	Significance	Type of harm	Degree of harm	Consequence of harm
45-5-5238	Aldington Road PAD 1	Low	Direct	Total	Total loss of value

7.2 Management and mitigation measures

Ideally, heritage management involves conservation of sites through the preservation and conservation of fabric and context within a framework of 'doing as much as necessary, as little as possible' (Marquis-Kyle & Walker 1994, p.13). In cases where conservation is not practical, several options for management are available. For sites, management often involves the salvage of features or artefacts, retrieval of information through excavation or collection (especially where impact cannot be avoided) and interpretation.

Avoidance of impact to archaeological and cultural heritage sites through design of the development is the primary mitigation and management strategy, and should be implemented where practicable. In this instance redesign to avoid impacts to AHIMS 45-5-5238/Aldington Road PAD 1 is not feasible due to the nature of the development. Therefore the following mitigation measures, which consider the principles of ESD and intergenerational equity in their design, are proposed.

7.2.1 No further assessment required for AHIMS 45-5-5238/Aldington Road PAD 1

As avoidance was not possible, a program of archaeological test excavations was undertaken in an attempt to mitigate total loss of value. An analysis of AHIMS 45-5-5238/Aldington Road PAD 1 and data collected throughout test excavations identified a low density subsurface artefact scatter located on a flat hill crest, consisting of two angular fragments of chert and silcrete. AHIMS 45-5-5238/Aldington Road PAD 1 is considered a common site type of low archaeological significance, and supports the predictive model for the region. Further salvage and analysis of in the study area is not likely to provide any additional information

relating to Aboriginal land use, therefore no further assessment is recommended. The information obtained test excavations within AHIMS 45-5-5238/Aldington Road PAD 1 contributes to our understanding of Aboriginal occupation and allows future generations to access and build on this knowledge in accordance with principles of intergenerational equity and ESD.

7.2.2 Long term care agreement

The establishment of a long term care agreement in consultation with RAPs should be developed in order to ensure the artefacts are adequately cared for. Several management options are possible depending on the wishes of RAPs. The artefacts recovered from the test excavations can be given back to the Aboriginal community through a long term care agreement where they can then be used to teach subsequent generations about Aboriginal culture or can be reburied in a culturally appropriate place. This approach considers the principles of ESD and intergenerational equity and more importantly ensures that recovered artefacts are managed according to the wishes of RAPs.

Ngunawal Heritage Aboriginal Corporation (16 June 2021), and Darug Custodian Aboriginal Corporation (14 Septemeber 2021) have indicated during Aboriginal community consultation that reburial of artefacts on site was preferred if a suitable location on site could be identified. Discussions with Frasers Property Industrial have identified a potential location for reburial which will be provided to RAPs (Figure 14). The reburial will occur after the proposed works have been completed on site.

e.

7.2.3 Unexpected finds procedure

As no further archaeological works are required, an unexpected finds procedure should be developed as part of the future management of study area. An Aboriginal Cultural Management Plan detailing an unexpected finds procedure and mitigation measures may be required by DPIE to be incorporated into the Construction and Environmental Management Plan to be prepared by Fraser Property Industrial.

7.2.4 Continued Aboriginal community consultation

As per the consultation requirements it is recommended that the proponent provides a copy of this Final report to the RAPs. It is also recommended that the proponent should continue to inform RAPs about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project. Kamilaroi-Yankuntjatjara Working Group (28 September 2021) have also recommended that further consultation be undertaken should an interpretative plan be commissioned by the proponent.

Legend

- Study area
- Aldington Road PAD 1

Test pits

- Artefact present

Figure 13 Impact assessment

0 25 50 75 100 125

Metres

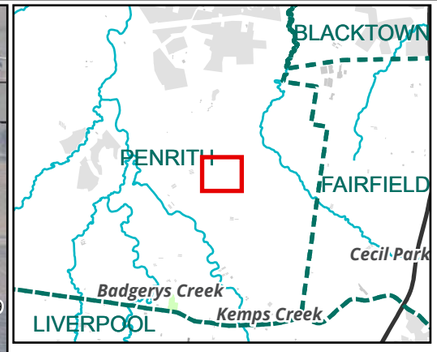
Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 34800, Date: 09 September 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: mknudsen
Location: P:\34800s\34800\Mapping\34800 ACHA AR\
34800 ACHA AR Layout:



Legend

- Study area
- Lot
- Reburial location

Figure 14 Proposed reburial location

0 25 50 75 100 125

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 34800, Date: 15 October 2021,
Drawn by: JMS, Checked by: CAM, Last edited by: mknudsen
Location: P:\34800s\34800\Mapping\34800 ACHA AR\
34800 ACHA AR, Layout: 34800_ACHA_F14_Reburial

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © Nearmap 20## public/NSW_Imagery: © Department of Customer Service 2020

8 Recommendations

Strategies have been developed based on the archaeological (significance) of cultural heritage relevant to the study area and influenced by:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practise, widely considered to include:
  - Ethos of the Australia ICOMOS Burra Charter.
  - The Code.

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further works within AHIMS 45-5-5238/Aldington Road PAD 1

AHIMS 45-5-5238/Aldington Road PAD 1 will be impacted by the proposed development. Further testing and salvage of this site is not recommended.

As per Section 4.41 of the EP&A Act an AHIP under the NPW Act is not required for SSD projects authorised by a development consent. The proposed works may therefore proceed with caution in accordance with recommendations 2 to 5, following SSD approval in accordance with the SSD consent conditions.

Recommendation 2: Discovery of Unanticipated Aboriginal Objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW or SSD approval issued by DPIE. Should any unexpected Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying Heritage NSW and RAPs.

Recommendation 3: Discovery of Unanticipated Historical Relics

Relics are historical archaeological resources of local or State significance and are protected in NSW under the Heritage Act or SSD approval issued by DPIE. Relics cannot be disturbed except with a permit or exception/exemption notification. Should unanticipated relics be discovered during the course of the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. Heritage NSW will require notification if the find is assessed as a relic.

Recommendation 4: Discovery of Human Remains

Human remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

Recommendation 5: Long term care agreement

The establishment of a long term care agreement in consultation with RAPs should be developed in order to ensure the artefacts identified as part of this assessment are adequately cared for. RAPs have requested that artefacts be reburied on site. Frasers Property Industrial have recommended a location for reburial which will be provided to RAPs. The reburial will occur after the proposed works have been completed on site.

This approach considers the principles of ESD and intergenerational equity and more importantly ensures that recovered artefacts are managed according to the wishes of RAPs.

Recommendation 6: Continued consultation with RAPs

As per the consultation requirements, it is recommended that Frasers Property Industrial should continue to inform RAPs about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

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Appendices

Appendix 1 AHIMS results

THE FOLLOWING APPENDIX IS NOT TO BE MADE PUBLIC

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 34800

Client Service ID : 580317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2057	PGH1;Monier PGH;	GDA	56	298268	6254015	Open site	Destroyed	Artefact : -	Isolated Find	98435,103366
	Contact	**Recorders**	Noeleen Curran					**Permits**		
45-5-2046	PGH2;Monier PHG;	GDA	56	298493	6254045	Open site	Destroyed	Artefact : -	Isolated Find	98435,103366
	Contact	**Recorders**	Noeleen Curran					**Permits**		
45-5-2711	CDG1	AGD	56	293300	6252800	Open site	Valid	Artefact : -		1345,1539,4737
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
45-5-3381	Oakdale IF 1	AGD	56	298365	6255179	Open site	Valid	Artefact : 1		
	Contact Searle	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	2836	
45-5-3382	Oakdale Campsite 1	AGD	56	297377	6255038	Open site	Partially Destroyed	Artefact : 3		103482
	Contact Searle	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	3728	
45-5-3383	Oakdale Campsite 2	AGD	56	297391	6254871	Open site	Valid	Artefact : 3		
	Contact Searle	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
45-5-3384	Oakdale Campsite 3	AGD	56	297295	6254935	Open site	Valid	Artefact : 3		
	Contact Searle	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
45-5-3385	Oakdale Campsite 4	GDA	56	296733	6254945	Open site	Destroyed	Artefact : 3		
	Contact Searle	**Recorders**	Dominic Steele Archaeological Consulting,Artefact - Cultural Heritage Management					**Permits**		
45-5-3386	Oakdale Campsite 5	AGD	56	297788	6254770	Open site	Valid	Artefact : 3		
	Contact Searle	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
45-5-3387	Oakdale Campsite 6	AGD	56	297897	6255005	Open site	Valid	Artefact : 3		
	Contact Searle	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
41-5-0016	MNPAD01	GDA	56	293879	6255448	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**	4655	
45-5-4672	Oakdale West Artefact Scatter 1 (OW AS 1)	GDA	56	297234	6255014	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		
45-5-4673	Oakdale West Isolated Find 1 (OW IF 1)	GDA	56	297349	6255114	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Mr.Josh Symons,Mr.ryan tadde					**Permits**		
45-5-4674	Oakdale West Artefact Scatter 2 (OW AS 2)	GDA	56	297355	6255099	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		
45-5-4675	Oakdale West Isolated Find (OW IF 2)	GDA	56	296627	6254876	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Mr.Josh Symons,Mr.ryan tadde					**Permits**		
45-5-4676	Oakdale West Isolated Find 3	GDA	56	295882	6254754	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Mr.Josh Symons,Mr.ryan tadde					**Permits**		
45-5-4717	Mamre West Precinct - Archaeological Deposit 1 (MWP-AD1)	GDA	56	293591	6255274	Open site	Valid	Artefact : -		104138

Report generated by AHIMS Web Service on 31/03/2021 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 293262 - 298593, Northings : 6250117 - 6255298 with a Buffer of 200 meters. Additional Info : Report. Number of Aboriginal sites and Aboriginal objects found is 117

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 34800

Client Service ID : 580317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Miss.Shannon Smith					**Permits**		
45-5-4718	Mamre West Precinct - Archaeological Deposit 2 (MWP-AD2)	GDA	56	294095	6255380	Open site	Valid	Artefact : -		104138,104145
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Miss.Shannon Smith					**Permits**		
45-5-4719	Mamre West Precinct - Archaeological Deposit 4 (MWP-AD4)	GDA	56	294089	6255064	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Miss.Shannon Smith					**Permits**		
45-5-4720	Mamre West Precinct - Archaeological Deposit 3 (MWP-AD3)	GDA	56	293670	6255005	Open site	Valid	Artefact : -		104138
	Contact	**Recorders**	Biosis Pty Ltd - Sydney,Biosis Pty Ltd - Wollongong,Mr.James Cole,Miss.Shannon Sn					**Permits**		
45-5-5274	Bakers Lane SLR AFT 1	GDA	56	295915	6254097	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Matthew Kelleher,Kelleher Nightingale Consulting Pty Ltd (Generic users)					**Permits**		
45-5-5268	Kemps Creek IF-02	GDA	56	295030	6253859	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Urbis Pty Ltd - Angel Place L8 123 Pitt Street,Miss.Meggan Walker					**Permits**		
45-5-5269	Kemps Creek IF-01	GDA	56	294976	6253943	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Urbis Pty Ltd - Angel Place L8 123 Pitt Street,Miss.Meggan Walker					**Permits**		
45-5-5230	Elizabeth Precinct Isolated Find 03 (EPIF 03)	GDA	56	293375	6249980	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Ms.Jennifer Norfolk					**Permits**		
45-5-5231	Elizabeth Precinct Isolated Find 02 (EPIF 02)	GDA	56	293466	6250004	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Ms.Jennifer Norfolk					**Permits**		
45-5-5303	Kemps North West (KNW) PAD	GDA	56	295455	6250265	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Andrew Costello,Jacobs Group (Australia) Pty Ltd - North Sydney					**Permits**		
45-5-5306	South Creek East (SCE)	GDA	56	293940	6251020	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Andrew Costello,Jacobs Group (Australia) Pty Ltd - North Sydney					**Permits**		
45-5-5307	South Creek West T1 (SCW T1)	GDA	56	293360	6251085	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Jacobs Group (Australia) Pty Ltd - North Sydney,Mr.Andrew Costello					**Permits**		
45-5-5308	South Creek West T2 (SCW T2)	GDA	56	293360	6251085	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Andrew Costello,Jacobs Group (Australia) Pty Ltd - North Sydney					**Permits**		
45-5-5315	MRP-OS2	GDA	56	296737	6253925	Open site	Valid	Artefact : -		
	Contact	**Recorders**	EMM Consulting - St Leonards - Individual users,Ms.Taylar Reid					**Permits**		
45-5-5316	MRP-OS1	GDA	56	294413	6252254	Open site	Valid	Artefact : -		

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	EMM Consulting - St Leonards - Individual users,Ms.Taylar Reid					Permits		
45-4-0971	EP3 - "Erskine Park 3"	AGD	56	295814	6254965	Open site	Valid	Artefact : -	Open Camp Site	97503
	Contact	Recorders	Doctor.Jo McDonald					Permits		
45-4-0972	EP4 - "Erskine Park 4 "	AGD	56	295740	6254900	Open site	Valid	Artefact : -	Open Camp Site	97503,98435
	Contact	Recorders	Doctor.Jo McDonald					Permits		
45-4-0973	EP5 - " Erskine Park 5 "	AGD	56	295349	6254843	Open site	Valid	Artefact : -	Isolated Find	97503,98435
	Contact	Recorders	Doctor.Jo McDonald					Permits		
45-4-0974	EP7 - "Erskine Park 7"	AGD	56	294580	6255220	Open site	Valid	Artefact : -	Open Camp Site	97503,98435
	Contact	Recorders	Doctor.Jo McDonald					Permits	2256	
45-4-0975	EP6 - " Erskine Park 6 "	AGD	56	294652	6255153	Open site	Valid	Artefact : -	Open Camp Site	97503,98435
	Contact	Recorders	Doctor.Jo McDonald					Permits		
45-4-0976	EP8 - " Erskine Park 8 "	AGD	56	294657	6254870	Open site	Valid	Artefact : -	Open Camp Site	97503,98435
	Contact	Recorders	Doctor.Jo McDonald					Permits		
45-4-0977	EP9 - " Erskine Park 9 "	AGD	56	295440	6254955	Open site	Valid	Artefact : -	Open Camp Site	97503,98435
	Contact	Recorders	Doctor.Jo McDonald					Permits		
45-4-0978	EP2 - " Erskine Park 2 "	AGD	56	295615	6254982	Open site	Valid	Artefact : -	Open Camp Site	97503,98435
	Contact	Recorders	Doctor.Jo McDonald					Permits		
45-5-2568	CGD5	AGD	56	293300	6253500	Open site	Valid	Artefact : -	Open Camp Site	98435
	Contact	Recorders	Dominic Steele Archaeological Consulting					Permits		
45-4-0970	EP1 - "Esrkine Park 1"	AGD	56	295277	6254955	Open site	Valid	Artefact : -	Open Camp Site	97503,98435
	Contact	Recorders	Doctor.Jo McDonald,Stephanie Garling					Permits		
45-5-2550	CGD1	AGD	56	293350	6252800	Open site	Valid	Artefact : -	Open Camp Site	98435
	Contact	Recorders	Dominic Steele Archaeological Consulting					Permits		
45-5-2552	CGD3	AGD	56	293000	6252800	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	98435
	Contact	Recorders	Dominic Steele Archaeological Consulting					Permits		
45-5-2553	CGD4	AGD	56	293300	6252500	Open site	Valid	Artefact : -, Modified Tree (Carved or Scarred) : -	Open Camp Site,Scarred Tree	98435
	Contact	Recorders	Dominic Steele Archaeological Consulting					Permits		
45-5-2554	CGD2	AGD	56	293000	6252900	Open site	Valid	Artefact : -	Open Camp Site	98435
	Contact	Recorders	Dominic Steele Archaeological Consulting					Permits		
45-5-2516	Erskine Park Quarry 6 (EPQ6)	AGD	56	296580	6255120	Open site	Valid	Artefact : -	Open Camp Site	98435
	Contact	Recorders	Doctor.Jo McDonald,Mr.Mark Rawson					Permits	2076,2188	
45-5-0604	Cecil Park 1	AGD	56	297350	6251470	Open site	Valid	Artefact : -	Open Camp Site	1283,98435

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Smith,M Hanckel					**Permits**	694	
45-5-0605	Cecil Park 2	AGD	56	297600	6251780	Open site	Valid	Artefact : -	Open Camp Site	1283,98435
	Contact	**Recorders**	Smith,M Hanckel					**Permits**		
45-6-1775	Lec 9;	AGD	56	293200	6252700	Open site	Valid	Artefact : -	Open Camp Site	1345,98435
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**		
45-6-1777	Lec10;	AGD	56	293180	6253070	Open site	Valid	Artefact : -	Open Camp Site	1345,97496,98435,99352
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**	1586,2056	
45-6-1778	Lec 11;	AGD	56	293300	6252820	Open site	Valid	Artefact : -	Open Camp Site	1345,98435
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**		
45-6-1779	Lec 12;	AGD	56	293300	6252850	Open site	Valid	Artefact : -	Open Camp Site	1345,98435,99352
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**	2056	
45-5-0215	South Creek	AGD	56	293800	6249900	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	362
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
45-5-0496	Fleurs1 Fleurs Radio Telescope	AGD	56	293750	6250730	Open site	Valid	Artefact : -	Open Camp Site	961,1018,98435
	Contact	**Recorders**	University of Sydney					**Permits**		
45-5-3058	EV1	AGD	56	295751	6254547	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Jim Wheeler					**Permits**		
45-5-3059	EV2	AGD	56	295663	6254735	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Jim Wheeler					**Permits**	2237	
45-5-3060	EV3	AGD	56	295666	6254988	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Jim Wheeler					**Permits**	2237,2391	
45-5-3061	EV4	AGD	56	295822	6254837	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Alan Wheatley					**Permits**	2391	
45-5-3028	EPTA3	AGD	56	294160	6254370	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	
45-5-3029	EPTA4	AGD	56	294850	6253540	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	
45-5-3030	EPTA5	AGD	56	295170	6253570	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-3031	EPTA6	AGD	56	295210	6253410	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	
45-5-3032	EPTA10	AGD	56	293580	6253610	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	
45-5-3033	EPTA11	AGD	56	293340	6253690	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	
45-5-3034	EP-I 1	AGD	56	295260	6253400	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	
45-5-3035	EP-I 2	AGD	56	295190	6253500	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	
45-5-3036	EP-I 3	AGD	56	295240	6253710	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2188	
45-5-2992	Erskine Park Quarry (EPQ1)	AGD	56	296600	6255175	Open site	Valid	Artefact : -		
	Contact T Russell	**Recorders**	Doctor.Jo McDonald,Mr.Mark Rawson					**Permits**	2076,2188	
45-5-2991	TCE 1	AGD	56	293300	6252700	Open site	Valid	Artefact : -		99352
	Contact T Russell	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	2056	
45-5-2518	Erskine Park Quarry 1 (EPQ1)	AGD	56	296600	6255175	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Unknown Author					**Permits**		
45-5-4102	Kemps Creek IF1	GDA	56	295565	6253701	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
45-5-4103	Kemps Creeks IF2	GDA	56	294737	6254040	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
45-5-4104	Kemps Creek (logosoc1)	GDA	56	295307	6254094	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
45-5-4105	Kemps Creek (logosoc2)	GDA	56	295265	6254066	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**		
45-5-4524	Oakdale South AS1	GDA	56	297508	6254973	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Mr.Alex Timms					**Permits**		
45-5-4525	Oakdale South IF2	GDA	56	297566	6254552	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Mr.Alex Timms					**Permits**		
45-5-4526	Oakdale South AS2	GDA	56	297513	6254618	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Mr.Alex Timms					**Permits**		
45-5-4527	Oakdale South IF1	GDA	56	297516	6254817	Open site	Valid	Artefact : -		104331
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Mr.Alex Timms					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 34800

Client Service ID : 580317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-4528	Oakdale South AS3	GDA	56	297508	6254390	Open site	Valid	Artefact : -		104331
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Mr.Alex Timms						Permits		
45-5-4529	Oakdale South AS4	GDA	56	297190	6253944	Open site	Valid	Artefact : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Mr.Alex Timms						Permits		
45-5-4947	Oakdale South AS5	GDA	56	297775	6254796	Open site	Valid	Artefact : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Mr.ryan taddeucci						Permits		
45-5-4948	Oakdale South IF3	GDA	56	297752	6254842	Open site	Valid	Artefact : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Mr.ryan taddeucci						Permits		
45-5-5133	Oakdale West 18 Isolated Find 01	GDA	56	296303	6254317	Open site	Destroyed	Artefact : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma						Permits		
45-5-5134	Oakdale West 18 Artefact Scatter 02	GDA	56	296886	6254515	Open site	Destroyed	Artefact : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma						Permits		
45-5-5135	Oakdale West 18 Artefact Scatter 03	GDA	56	296777	6254242	Open site	Destroyed	Artefact : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma						Permits		
45-5-5136	Oakdale West 18 Isolated Find 02	GDA	56	296659	6254589	Closed site	Destroyed	Artefact : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma						Permits		
45-5-5137	Oakdale West 18 Artefact Scatter 01	GDA	56	297167	6254820	Closed site	Destroyed	Artefact : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma						Permits		
45-5-5187	MSP-01	GDA	56	294210	6254558	Open site	Valid	Artefact : -		
Contact	Recorders	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats						Permits		
45-5-5188	MSP-02	GDA	56	293594	6253823	Open site	Valid	Artefact : -		
Contact	Recorders	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats						Permits		
45-5-5189	MSP-03	GDA	56	293501	6253805	Open site	Valid	Artefact : -		
Contact	Recorders	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats						Permits		
45-5-5190	MSP-04	GDA	56	293580	6253610	Open site	Valid	Artefact : -		
Contact	Recorders	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats						Permits		
41-5-0014	M12-AS-04	GDA	56	294361	6250957	Open site	Valid	Artefact : 1		
Contact	Recorders	Jacobs Group (Australia) Pty Ltd - Newcastle,Miss.Chelsea Jones						Permits		
45-5-5186	Mamre Road Artefact Scatter 1901 (MAM AS1901)	GDA	56	295114	6253373	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Ms.Jennifer Norfolk						Permits		
45-5-5467	ARKC Area 1	GDA	56	296685	6252817	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
Contact	Recorders	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats						Permits		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 34800

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-5468	ARKC Area 3	GDA	56	296932	6253304	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-5469	ARKC Area 2	GDA	56	296768	6253309	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-2861	NWRL PAD 2	GDA	56	298564	6255389	Open site	Destroyed	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Colin Gale,Kelleher Nightingale Consulting Pty Ltd,Miss.Kristen Taylor					**Permits**	1683,2836	
45-5-2862	HP 2	AGD	56	298150	6255140	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.John Appleton					**Permits**	1683,2133,2836	
45-5-2859	DTAC 1	AGD	56	297800	6254840	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Colin Gale					**Permits**	1683	
45-5-2860	DTAC 2	AGD	56	297910	6254820	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Colin Gale					**Permits**	1683	
45-5-2857	HP1	AGD	56	297500	6255160	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.John Appleton					**Permits**		
45-5-3273	erskine park roadworks (EPR 7)	GDA	56	294262	6255398	Open site	Valid	Artefact : 1		
	Contact Searle	**Recorders**	Doctor.Susan (left ahms) Mcintyre-Tamwoy,Mrs.Tessa Boer-Mah					**Permits**		
45-5-4327	Oakdale Central 1	GDA	56	297937	6255084	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	GML Heritage Pty Ltd - Surry Hills,Miss.Diana Cowie					**Permits**		
45-5-4328	Oakdale Central 2	GDA	56	297701	6255070	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	GML Heritage Pty Ltd - Surry Hills,Miss.Diana Cowie					**Permits**		
45-5-4329	Oakdale Central 3	GDA	56	297665	6255265	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	GML Heritage Pty Ltd - Surry Hills,Miss.Diana Cowie					**Permits**		
45-5-4330	Oakdale Central 4	GDA	56	297614	6255227	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	GML Heritage Pty Ltd - Surry Hills,Miss.Diana Cowie					**Permits**		
45-5-4749	M12 A4	GDA	56	293785	6251051	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Nicola Hayes					**Permits**		
45-5-5358	OW 19 IF 2	GDA	56	296486	6254788	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma					**Permits**		
45-5-5359	OW 19 IF 1	GDA	56	296535	6254830	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma					**Permits**		

Report generated by AHIMS Web Service on 31/03/2021 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 293262 - 298593, Northings : 6250117 - 6255298 with a Buffer of 200 meters. Additional Info : Report. Number of Aboriginal sites and Aboriginal objects found is 117

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 34800

Client Service ID : 580317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-5340	MSP-05	GDA	56	294016	6254604	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-5341	MSP-06	GDA	56	294123	6254552	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-5342	MSP-07	GDA	56	294146	6254469	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-5343	MSP-08	GDA	56	294155	6254417	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-5344	MSP-09	GDA	56	294469	6253984	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-5345	MSP-10	GDA	56	294548	6253896	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-5346	MSP-11	GDA	56	293382	6254091	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-5-5357	Oakdale West Industrial Estate Artefact Reburial	GDA	56	297245	6255243	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Mr.ryan taddeucci					**Permits**		

Report generated by AHIMS Web Service on 31/03/2021 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 293262 - 298593, Northings : 6250117 - 6255298 with a Buffer of 200 meters. Additional Info : Report. Number of Aboriginal sites and Aboriginal objects found is 117

Appendix 2 Test excavation recording and artefact analysis

34800 Aldington Road Test Excavations
Test Pit Section drawings
AV
19/08/2021 & 20/08/2021

Scale 1:10

0 10 20

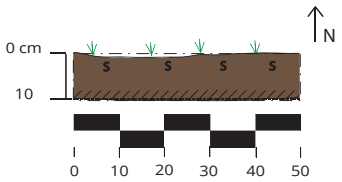
Key

- Grass
- Rootlets
- Charcoal
- Stones
- Clay

Context

- 7.5 YR 2.5/2 very dark brown
- 7.5 YR 2.5/3 very dark brown
- 7.5 YR 3/3 dark brown
- 7.5 YR 3/4 dark brown
- 7.5 YR 4/3 brown
- 5 YR 3/4 dark reddish brown

Transect 1 Test Pit 1



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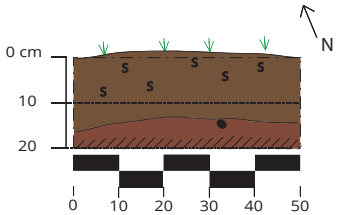

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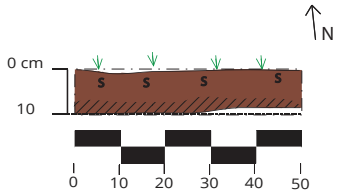
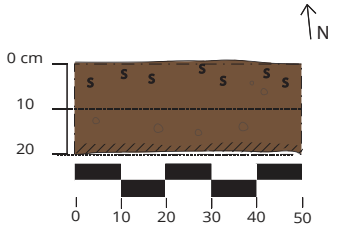


Transect 1 Test Pit 4



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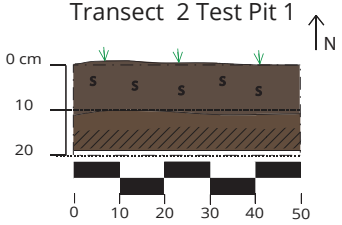

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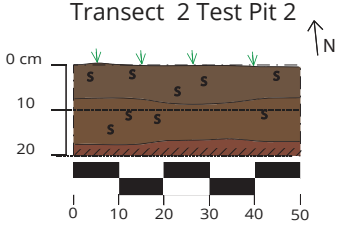

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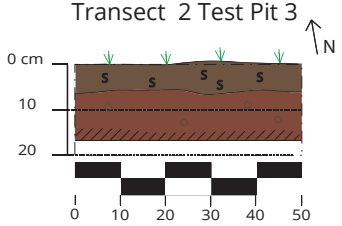

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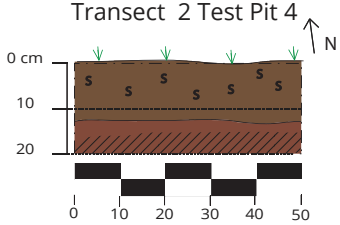
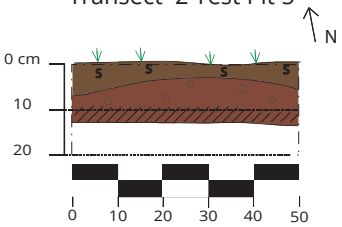


Transect 2 Test Pit 5



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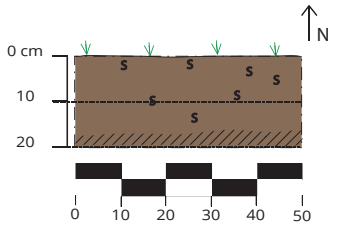

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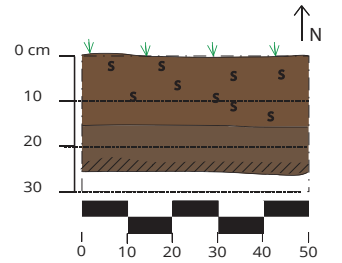

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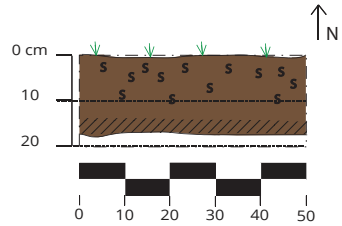

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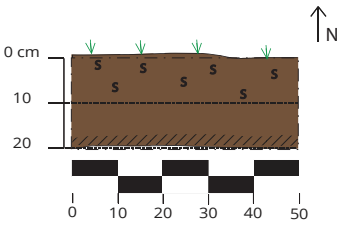

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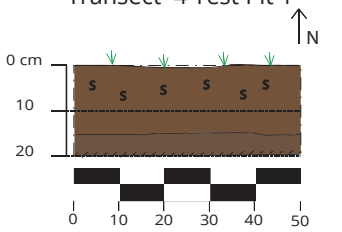

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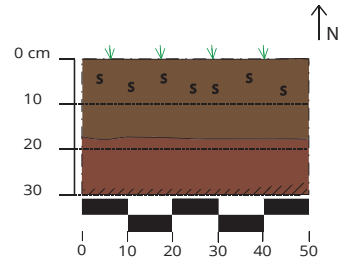

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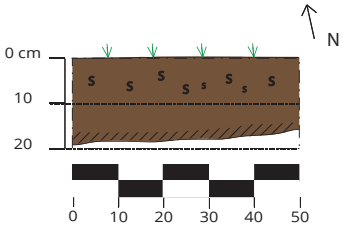

Transect	Test Pit	Context Number	Site	Date	Recorder	StartDepth_mm	EndDepth_mm	Colour (Munsell Code)	Compaction	Texture	Horizon clarity	PH	Disturbance	Inclusions	Notes
T1	TP1	1	34800	18/08/2021	AV	0	100	7.5YR 3/3 dark brown	moderately to highly compacted	silty clay	N/A	6	grass roots	N/A	excavated in 50mm spits. ending on clay at 100mm. soils are likely to have been ploughed and intermixed
	TP2	1	34800	18/08/2021	AV	0	170	7.5YR 3/4 dark brown	moderately to highly compacted	silty clay	N/A	6	grass roots	N/A	soils are likely to have been ploughed and intermixed
	TP2	2	34800	18/08/2021	AV	170	200	5YR 3/4 dark reddish brown	highly compacted	clay	N/A	6.5	N/A	charcoal inclusions.	ending on clay at 200mm. soils are likely to have been ploughed and intermixed
	TP3	1	34800	18/08/2021	AV	0	100	5YR 3/4 dark reddish brown	moderately to highly compacted	silty clay to clay	N/A	6	few grass roots	N/A	ending on clay at 100mm. soils are likely to have been ploughed and intermixed
	TP4	1	34800	18/08/2021	AV	0	200	7.5YR 3/4 dark brown	moderately to highly compacted	silty clay	N/A	6	grass roots	few stone inclusions 5% 5-10mm. orange clay mottling in wall.	ending on clay at 200mm. soils are likely to have been ploughed and intermixed
T2	TP1	1	34800	18/08/2021	AV	0	110	7.5YR 2.5/2 very dark brown	moderately compacted	silty loam	N/A	6	grass roots	N/A	soils are likely to have been ploughed and intermixed
	TP1	2	34800	18/08/2021	AV	110	190	7.5YR 2.5/3 very dark brown	moderately to highly compacted	loamy clay	N/A	6	N/A	orange clay in base of tp.	ending on clay at 190mm. soils are likely to have been ploughed and intermixed
	TP2	1	34800	18/08/2021	AV	0	50	7.5YR 3/3 dark brown	moderately compacted	silt	N/A	6	grass roots	N/A	soils are likely to have been ploughed and intermixed
	TP2	2	34800	18/08/2021	AV	50	180	7.5YR 3/4 dark brown	moderately compacted	silty clay	N/A	6	grass roots	N/A	soils are likely to have been ploughed and intermixed
	TP2	3	34800	18/08/2021	AV	180	200	5YR 3/4 dark reddish brown	highly compacted	clay	N/A	6.5	N/A	N/A	ending on clay at 140mm. soils are likely to have been ploughed and intermixed
	TP3	1	34800	18/08/2021	AV	0	70	7.5YR 3/3 dark brown	moderately compacted	silty clay	N/A	6	grass roots	N/A	soils are likely to have been ploughed and intermixed
	TP3	2	34800	18/08/2021	AV	70	170	5YR 3/4 dark reddish brown	highly compacted	clay	N/A	6	N/A	N/A	ending on clay at 170mm. soils are likely to have been ploughed and intermixed
	TP4	1	34800	18/08/2021	AV	0	130	7.5YR 3/4 dark brown	moderately compacted	silty clay	N/A	6	N/A	some clay intermixing.	soils are likely to have been ploughed and intermixed
	TP4	2	34800	18/08/2021	AV	130	200	5YR 3/4 dark reddish brown	highly compacted	silty clay	N/A	6	N/A	increase in clay content.	ending on clay at 200mm. soils are likely to have been ploughed and intermixed
	TP5	1	34800	18/08/2021	AV	0	70	7.5YR 3/4 dark brown	moderately compacted	silty clay	N/A	6	grass roots	N/A	soils are likely to have been ploughed and intermixed
	TP5	2	34800	18/08/2021	AV	70	140	5YR 3/4 dark reddish brown	highly compacted	clay	N/A	6	N/A	some yellow mottling in the walls, few stones 5% 2-5mm.	ending on clay at 140mm. soils are likely to have been ploughed and intermixed
T3	TP1	1	34800	18/08/2021	AV	0	200	7.5YR 4/3 brown	moderately compacted	silty loam	N/A	6	grass roots	orange clay mottling in walls and base of test pit.	ending on clay at 200mm. soils are likely to have been ploughed and intermixed
	TP2	1	34800	18/08/2021	AV	0	150	7.5YR 3/4 dark brown	moderately compacted	silt	N/A	6	grass roots	N/A	soils are likely to have been ploughed and intermixed
	TP2	2	34800	18/08/2021	AV	150	250	7.5YR 3/3 dark brown,	moderately compacted	silty loamy clay	N/A	6	N/A	orange clay mottling in walls and base of tp	ending on clay at 250mm. soils are likely to have been ploughed and intermixed
	TP3	1	34800	18/08/2021	AV	0	170	7.5YR 3/4 dark brown	moderately to highly compacted	silty clay to clay	N/A	6	grass roots	orange clay mottling in walls. increasing in clay compaction with depth.	ending on clay at 170mm. soils are likely to have been ploughed and intermixed
	TP4	1	34800	18/08/2021	AV	0	200	7.5YR 3/4 dark brown	moderately to highly compacted	silty clay to clay	N/A	6	grass roots	some orange clay mottling in the walls. increasing in compaction and clay content with depth.	ending on clay at 200mm. soils are likely to have been ploughed and intermixed
T4	TP1	1	34800	19/08/2021	AV	0	150	7.5YR 3/4 dark brown	moderately compacted	silty loam	N/A	6	grass roots	N/A	soils are likely to have been ploughed and intermixed
	TP1	2	34800	19/08/2021	AV	150	200	7.5YR 3/3 dark brown	moderately compacted	silty clay to clay	N/A	6	N/A	some orange clay mottling in walls and base.	ending on clay at 200mm. soils are likely to have been ploughed and intermixed
	TP2	1	34800	19/08/2021	AV	0	180	7.5YR 3/4 dark brown	moderately compacted	silty loam	N/A	6	grass roots, larger root in nw corner.	N/A	soils are likely to have been ploughed and intermixed
	TP2	2	34800	19/08/2021	AV	180	300	5YR 3/4 dark reddish brown	moderately compacted	silty loam	N/A	6.5	N/A	some charcoal.	ending on clay at 300mm. soils are likely to have been ploughed and intermixed
	TP3	1	34800	19/08/2021	AV	0	190	7.5YR 3/4 dark brown	moderately to highly compacted	silty clay to clay	N/A	6	grass roots	some orange clay mottling in walls	ending on clay at 200mm. soils are likely to have been ploughed and intermixed

Area	Transect	TP	Spit (numeral)	Depth (mm)	Raw Material	Primary Form	Cortex %	% of edge with retouch/ usewear (flakes, blades and angular fragments only)	Retouch/usewear type	Retouch/usewear location	Flake Platform (complete and proximal flakes and blades only)	Flake Termination (complete, distal and longitudinal split flakes and blades only)	Number of complete scars (cores only)	Longest scar (axial mm) (cores only)	Number of platforms/core rotations (cores only)	Formal Tool/ Core Type (if any)	Secondary Modification (if any)	Length - axial for flakes and blades (mm)	Width - axial for flakes and blades (mm)	Thickness (mm)	Maximum Dimension (mm)	Platform width (mm)	Platform depth (mm)	Notes
Aldington Road PAD 1	2	3	1	0-100	Chert	Angular Fragment	None	None													12.23			
Aldington Road PAD 1	2	5	2	100-200	Silcrete	Angular Fragment	None	None													27.24			