Chesley Park Brick Making Plant (Site 2) 416 Berrima Road, New Berrima NSW: Archaeological Report

FINAL REPORT

Prepared for Brickworks Ltd

21 April 2020

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Glossary

ACHA	Aboriginal Cultural Heritage Assessment
ACHMP	Aboriginal Cultural Heritage Management Plan
AHIMS	Aboriginal Heritage Information Management System
Consultation requirements	*Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a)
DA	Development application
DECCW	Department of Environment, Climate Change and Water (now EES)
DP	Deposited Plan
EES	Environment, Energy and Science Group (formerly Office of Environment and Heritage)
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
GDA	Geocentric Datum of Australia
GPS	Global Positioning System
GSV	Ground Surface Visibility
ICOMOS	International Council on Monuments and Sites
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
MGA	Map Grid of Australia
NNTT	National Native Title Tribunal
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
OEH	NSW Office of Environment and Heritage (now EES)
PAD	potential Archaeological deposit
SEARs	Secretary's Environmental Assessment Request
SSD	State Significant Development
Study area	Defined as Lot 1 DP 785111
RAP	registered Aboriginal party
The code	*Code of practice for archaeological investigation of Aboriginal objects in NSW* (DECCW 2010b)

Summary

Biosis Pty Ltd was commissioned by Brickworks Ltd to undertake an Aboriginal cultural heritage assessment (ACHA) for the proposed development at Chesley Park, 416 Berrima Road, Site 2) will be assessed under Part 4 of the *Environmental Planning and Assessment Act* (EP&A Act) as a Stage Significant Development (SSD). An ACHA for the Stage 1 development of a masonry plant and associated infrastructure has been previously undertaken by Biosis to support a development application (DA) to Wingecarribee Shire Council. The study area is located in farmland approximately 2.1 kilometres south east of Berrima and approximately 7.5 kilometres south west of the Bowral central business district (CBD).

There are 90 Aboriginal cultural heritage sites registered with the Aboriginal Heritage Information Management System (AHIMS) register, both within the study area as well as in the vicinity.

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 Department of Environment Climate Change and Water document (DECCW) document, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The consultation process identified 11 groups who registered their interest in the project.

The survey was conducted on 12 November 2019. The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed low. This was attributed to vegetation cover restricting ground surface visibility (GSV) combined with a low amount of exposures. No previously unrecorded Aboriginal cultural heritage sites were identified during the field investigation; however, two previously recorded Aboriginal sites were relocated. The survey was conducted in accordance with *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b) (the Code).

Test excavations were conducted between 11 and 29 November 2019. A total of 137 test pits were excavated within areas of moderate and high potential and 67 artefacts identified from the subsurface deposits. The test investigation works identified 11 additional sites within the study area.

There is potential for development activities to impact Aboriginal sites and the identified sites or areas of (archaeological) sensitivity.

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: Conservation of part of AHIMS 52-4-0196 (Stoney Creek 1)

Stoney Creek 1 (AHIMS 52-4-0196) was relocated during the survey and test excavations for Site 2 identified a moderate density, intact subsurface archaeological deposit within a slightly elevated terrace landform associated with the grinding grooves. The grinding grooves and subsurface artefact scatter are outside of the proposed development area and will not be impacted. However, the grinding grooves should be protected with a buffer and fencing (Figure 14).

Recommendation 2: Aboriginal cultural heritage management plan (ACHMP)

The current Aboriginal Cultural Heritage Management Plan (ACHMP) for Stage 1 should be updated in consultation with RAPs and NSW Environment, Energy and Science Group (EES). The ACHMP will facilitate the implementation of the management and mitigation strategies for all 14 sites located within the study area by clearly outlining Aboriginal site management requirements including the management of unexpected finds.

Recommendation 3: Continued consultation with the registered Aboriginal parties

The proponent should continue to inform the registered Aboriginal parties (RAPs) about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project. A copy of the final report will be sent to the RAPs, EES and the AHIMS register.

1 Introduction

1.1 Project background

Biosis Pty Ltd has been commissioned by Brickworks Ltd to undertake an ACHA for the proposed development at Chesley Park, 416 Berrima Road, New Berrima NSW (Figure 1). Stage 2 of this project consists of a new brick making plant that will be assessed under Part 4 of The EP&A Act as a SSD. An ACHA for the Stage 1 development of a masonry plant and associated infrastructure on a seven to eight hectare area (adjacent to the Site 2 study area) to support a DA to Wingecarribee Shire Council has already been conducted by Biosis.

The purpose of the current report is to identify and assess the impact of the proposal on any Aboriginal cultural heritage sites, items and values within the study area, to consult with Aboriginal community stakeholders about any identified Aboriginal heritage within the study area, and to advise on any legal requirements for salvage and mitigation of harm to sites. The project is classified as a SSD under Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional Development SEPP). This archaeological report has been prepared to support an Environmental Impact Statement (EIS) and a Secretary's Environmental Assessment Request (SEARs).

This investigation has been carried out under Part 6 of the *National Parks and Wildlife Act 1974* (NPW Act). It has been undertaken in accordance with the Code. 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 *Environmental Planning and Assessment Act 1979* (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 1977.*

1.2 Study area

The study area is located approximately 2.1 kilometres south east of Berrima and approximately 7.5 kilometres south west of the Bowral (Figure 1). It encompasses Lot 1 DP 785111, which consists of approximately 57 hectares of private land.

The study area is within the:

- Wingecarribee LGA
- Parish of Bong Bong
- County of Camden.

The study area is bounded by Berrima Road to the west, access roads to the north and south, and farmland to the east (Figure 2). It is located within the area covered by the Illawarra Local Aboriginal Land Council (LALC).

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:

- NPW Act.
- NSW *National Parks and Wildlife Amendment Act 2010.*
- Wingecarribee Local Environmental Plan 2010 (LEP).

1.4 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 Illawarra Local Aboriginal Land Council (ILALC).
- 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 survey 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.

1.5 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 1.

Table 1 Investigators and contributors

Name and qualifications	Experience summary	Project role
Taryn Gooley BSc (Hons)	Taryn has successfully completed numerous projects throughout the Newcastle, Port Stephens, Lake Macquarie, Hunter Valley, and North Western NSW regions. These	• Quality assurance

Name and qualifications	Experience summary	Project role
	projects have been for a diverse client base including Local Government, Roads and Maritime Services, the Australian Rail Track Corporation, Sydney Water, National Parks and Wildlife Service, Department of Primary Industry and Water, resource companies, architectural firms, engineering firms, and private developers. Taryn has extensive experience in undertaking remote archaeological surveys and large scale archaeological testing and salvage excavation programs. Taryn has participated in and managed a number of long term archaeological programs under Part 4 and Part 5 of the EP&A Act. Taryn holds a Bachelor Science (Honours) and is a member of the Australian Archaeology Association and the Australian Institute for Maritime Archaeology.	
Samantha Keats BA (Hons)	Samantha has over four years' 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 conducting desktop assessments, archaeological survey and Aboriginal and historical excavation as well as consulting with Traditional Owners. She has participated in a number of European historical excavations and monitoring programs in NSW and has authored several Statement of Heritage Impact reports and Heritage Assessments. Samantha has also authored multiple Aboriginal cultural heritage assessment report and participated in multiple Aboriginal archaeological excavations and survey.	• Project manager • Report author • Aboriginal groups consultation
Mathew Smith BA/BSc (Hons)	Mathew is an archaeologist with over three years of experience in the consulting industry. Mathew has worked on a number of Aboriginal cultural heritage projects across NSW as an archaeologist and project manager including water infrastructure and linear projects, residential development projects, renewable energy projects. Mathew has well developed skills in Aboriginal archaeology, serving as a key team member and project manager on a number of projects in Sydney, the Illawarra, the Hunter Region, Far Western and Central NSW. His areas of expertise include, archaeological excavation and survey, artefact analysis, Aboriginal community consultation and technical report writing. Mathew is also accomplished in obtaining approvals under the *NSW National Parks and Wildlife Act 1974*.	• Lithic analysis
Matthew Tetlaw BA (Hons) Archaeology and History	Matthew completed his Bachelor of Arts with honours in 2018 and joined Biosis in their Wollongong office in 2019. During his undergraduate years he participated in historical and Indigenous archaeological assessments in his home state of Western Australia and abroad. Primarily, these have included	• Background research

Name and qualifications	Experience summary	Project role
	historical surveys of convict sites, an international excavation in Bulgaria and a desktop rock-art assessment.	

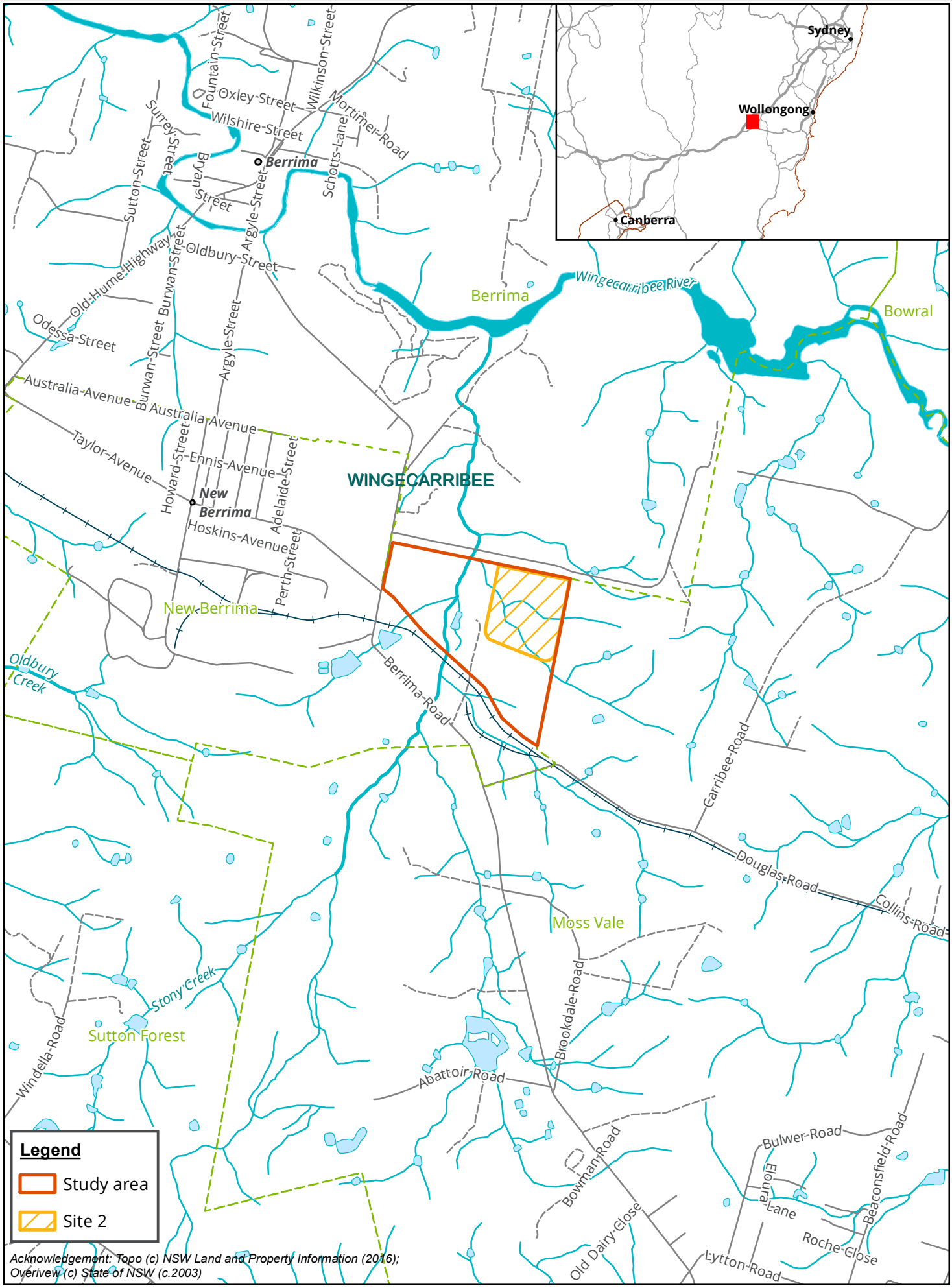

Figure 1 Location of the study area in a regional context

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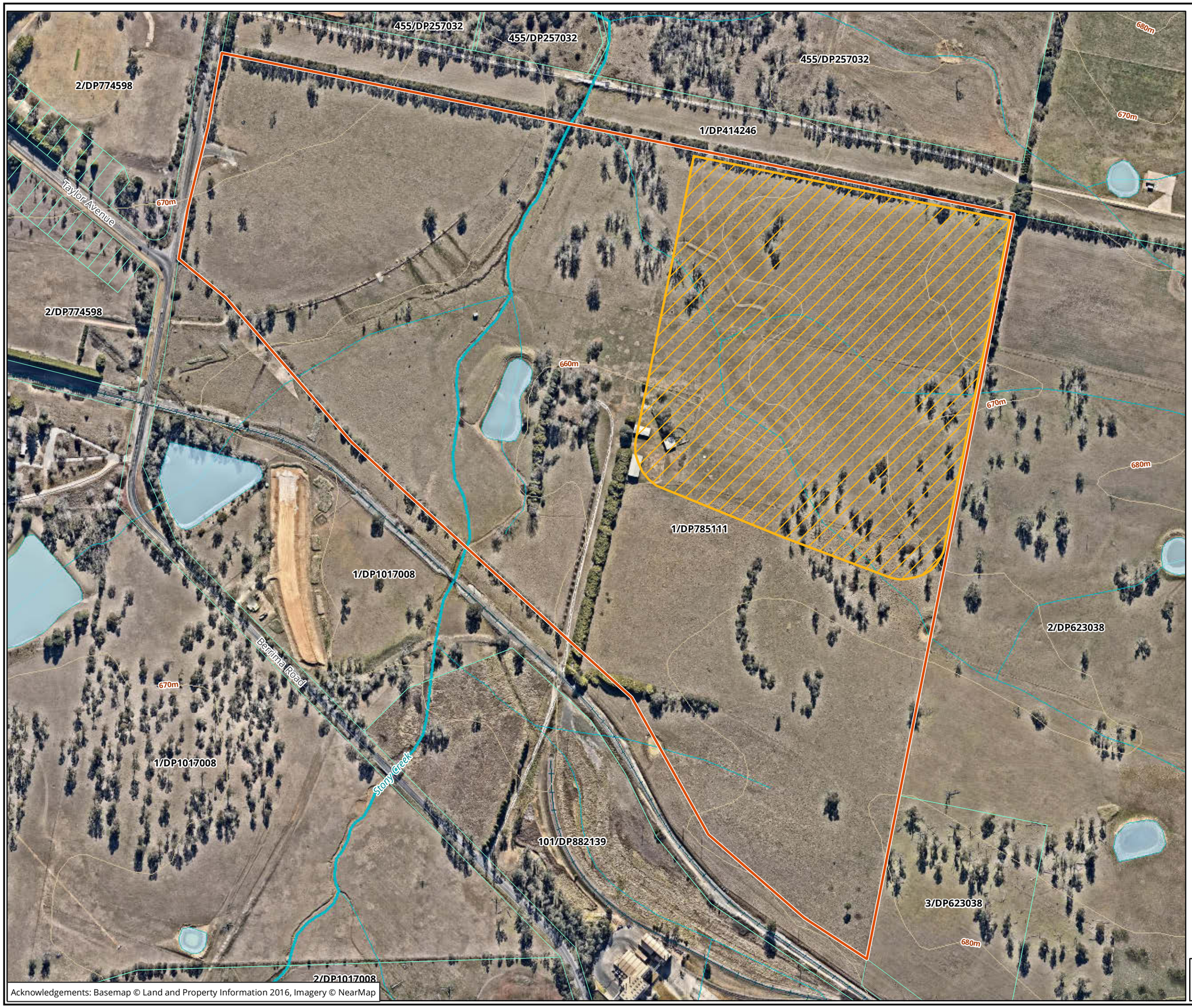

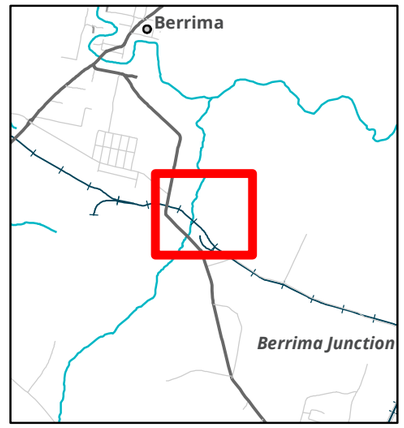

Legend

- Study area
- Site 2
- Lot

Figure 2 Study area detail

0 50 100 150 200

Metres
Scale: 1:4,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

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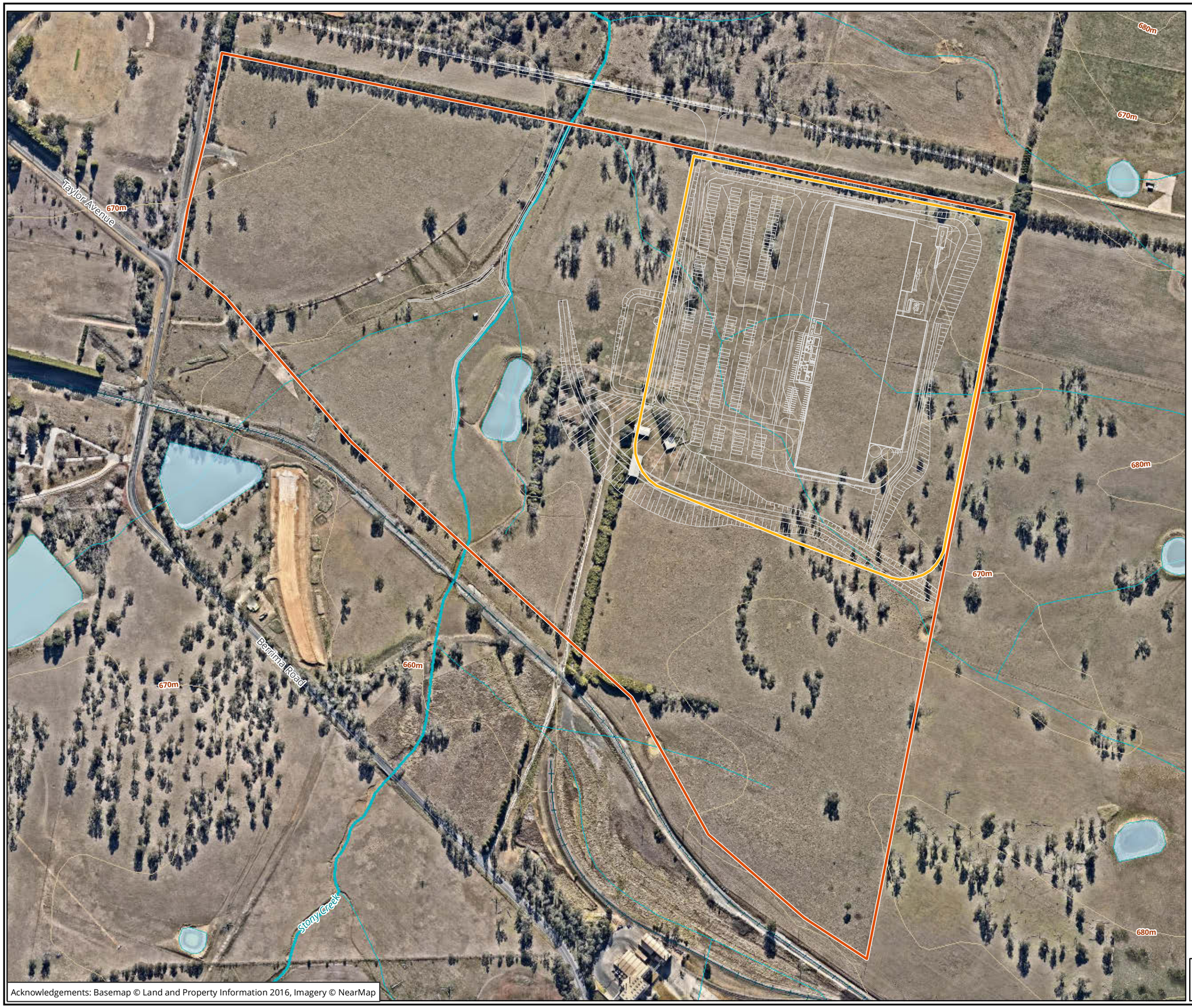
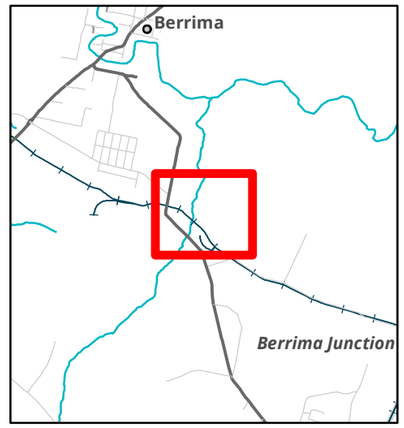
2 Proposed development

The proposed development consist of a brick making plant and associated infrastructure on a 14.87 hectare area within the western portion of Lot 1 DP 78511 (Site 2). The site will operate as a dry press brick plant with a reduction kiln and have a capacity of 50 million bricks per annum. The proposed development will include:

- 25,600m^2 factory building with amenities and lunchroom.
- Office and laboratory.
- Raw materials shed.
- Yard storage, which will provide space for 43,200 pallets stacked six high.
- Export yard and container area.
- Carpark for 36 staff plus 2 visitors plus disabled parking.
- Service requirements such as electricity, gas, water and sewer.





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- Study area
- Site 2
- Proposed development

Figure 3 Proposed development

0 50 100 150 200

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Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap

3 Desktop assessment

The desktop assessment involves researching and reviewing existing archaeological studies and reports relevant to the study area and the Moss Vale Tablelands. 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 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 underlying geology that dictates the existing landscape is the Wianamatta Group, which is comprised of the Bringelly Shales consisting of mid grey and dark grey mudstones with interbedded lithic sandstones as well as finer grained siltstones and claystone (Figure 4). The subdued relief of the Moss Vale Tablelands is the result of the long periods during which sediments laid down in the late Palaeozoic and early Mesozoic were slowly weathered, eroded and transported away. This landscape is geologically old. The local relief of the area is less than 40 metres and the slopes range from between 10 and 20% with localised steeper slopes of between 20 and 35%. The crests are broad and convex, and the slopes are moderately inclined with concave drainage lines and minor terracing occurring on steeper slopes (*eSPADE* 2019).

Stream order is recognised as a factor which helps the development of predictive modelling in Aboriginal archaeology in the Southern Highlands. The stream order system used for this assessment was originally developed by Strahler (1964). It functions by adding two streams of equal order at their confluence to form a higher order stream, as shown in Plate 1. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

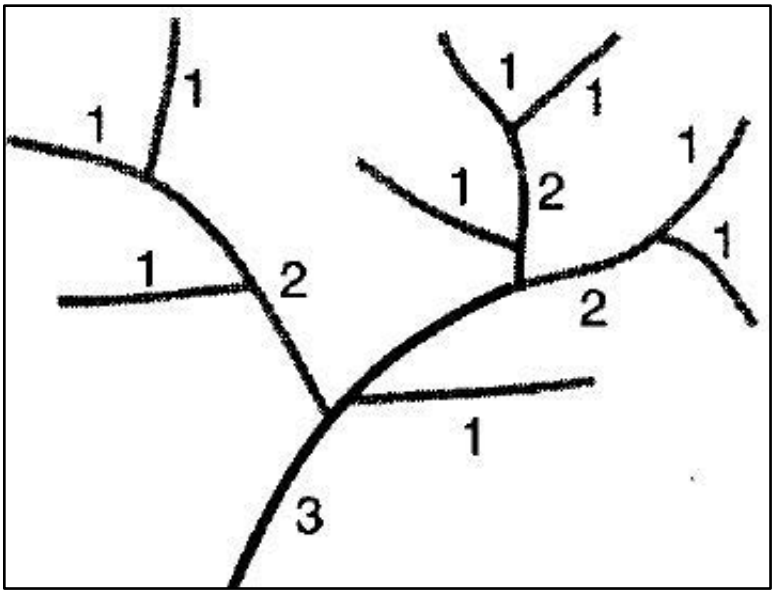


Plate 1 Diagram showing Strahler stream order (Ritter et al. 1995)

There is one drainage catchment within the Wingecarribee Shire. The Wingecarribee River is located approximately one kilometre north of the study area and flows from west to east through the Southern Highlands past the Illawarra ranges into other tributaries that flow into Illawarra Basin. A 5th order tributary of the Wingecarribee River, Stony Creek, flows through the study area northwards towards the river. There are also several other ephemeral drainage channels dissecting the crests and rises throughout the study area (Figure 5).

3.1.2 Soil landscapes

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. 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.

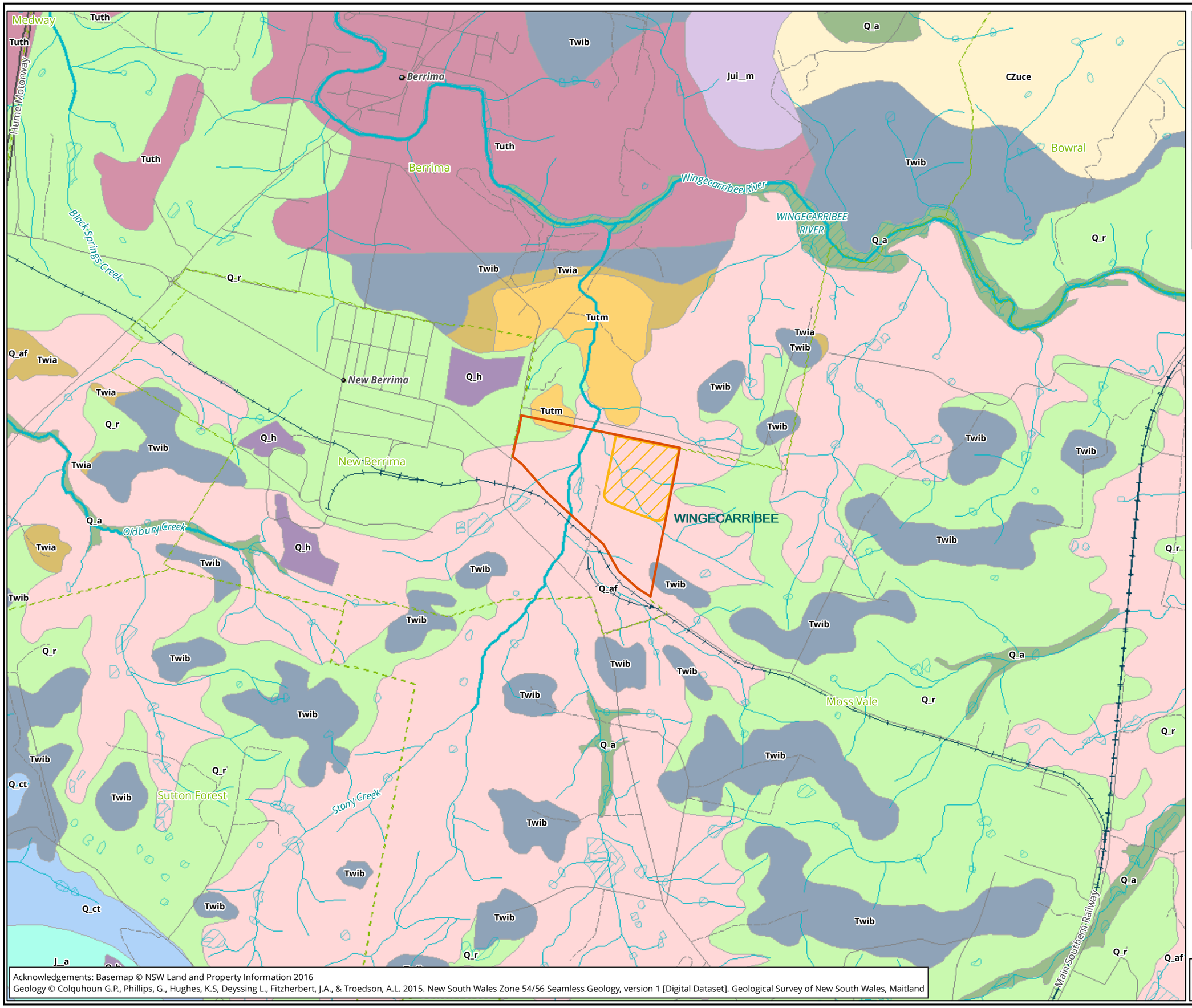
There are two soil landscapes present within the study area (Figure 6). The Nattai Plateau soil landscape covers a small part of the eastern portion of Site 2 and is characterised by steeply dissected plateau remnants on lower Triassic lithic sandstone, shale and tuff, abundant rock outcrop and cliffs, and steep debris slopes. The soils consists of shallow sands and occasionally yellow texture-contrast soils occur (Mitchell 2002, p.106). The Moss Vale Highlands soil landscape occurs over the remainder of the eastern portion of the Site 2 and consists of rolling hills and rounded peaks with deep channel incision on horizontal Triassic alternating between quartz sandstone and shale. There are widespread yellow and grey texture-contrast soils, deep yellow earth on friable sandstone often with concretionary ironstone and accumulations of clan quartz sand in valleys (Mitchell 2002, p.117).

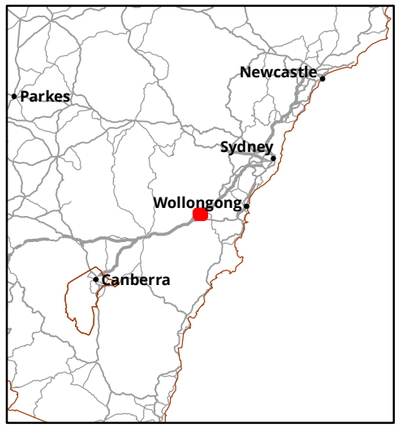
NSW Soil and Land Information Systems (2001) mapped the soil profile along Berrima Road, approximately 275 metres north of the study area and is described in Table 2.

Table 2 Soil description (NSW Soil and Land Information Systems 2001)

Soil layer	Description
Layer 1 – A1 Horizon	15 centimetres of very dark grey (7.5YR 3/1) fine medium sandy clay loam with weak pedality, many roots (<1mm), coarse fragments are very few (<2%), ironstone, gravel (6-20 mm), segregations are not evident; smooth clear (20-50 mm) boundary to Layer 2.

Soil layer	Description
Layer 2 – B2 Horizon	35 centimetres of strong brown (7.5YR 4/6) fine medium sandy clay loam with massive structure (earthy), common roots, coarse fragments are few (2-10%), ironstone, gravel (6-20 mm), quartz, gravel (6-20 mm), segregations are not evident; smooth clear (20-50 mm) boundary to layer 3.
Layer 3 – C Horizon	20 centimetres of strong brown (7.5YR 5/6) light sandy clay with massive structure (earthy), no roots, coarse fragments are abundant (50-90%), ironstone, coarse gravel (20-60 mm), quartz, segregations are not evident; smooth clear (20-50 mm) boundary to bedrock.





Legend

- Study area
- Site 2

Geological Units

- CZuce - Robertson Basalt
- J__a - Gingenbullen Dolerite
- Jui__m - Jurassic, unnamed igneous
- Q_a - Alluvium
- Q_af - Alluvial floodplain deposits
- Q_ct - Colluvial talus deposits
- Q_h - Anthropogenic deposits
- Q_r - Residual deposits
- Tuth - Hawkesbury Sandstone
- Tutm - Mittagong Formation
- Twia - Ashfield Shale
- Twib - Bringelly Shale

Figure 4 Geological formations in the vicinity of the study area

0 200 400 600 800 1,000

Metres
Scale: 1:20,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

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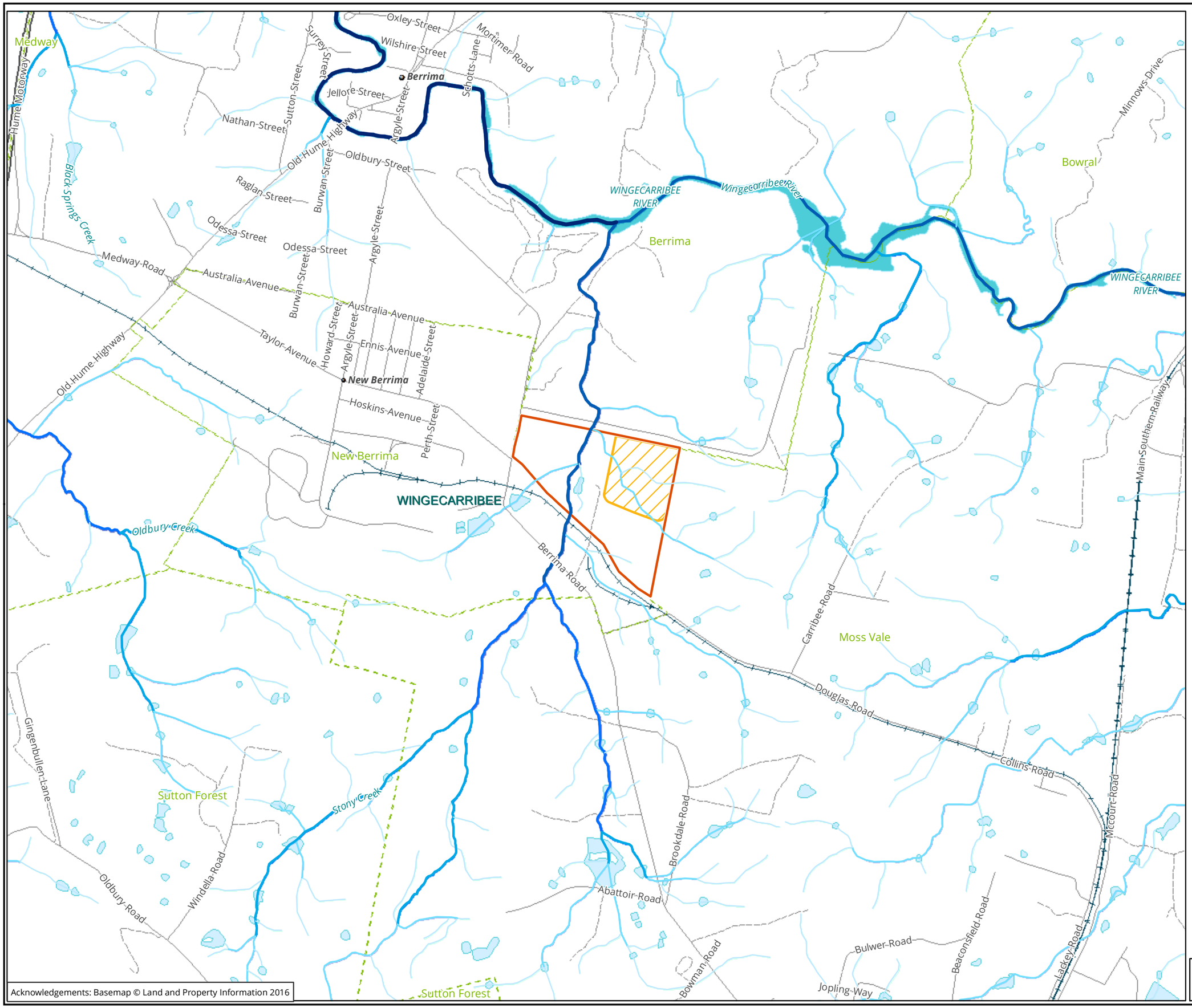

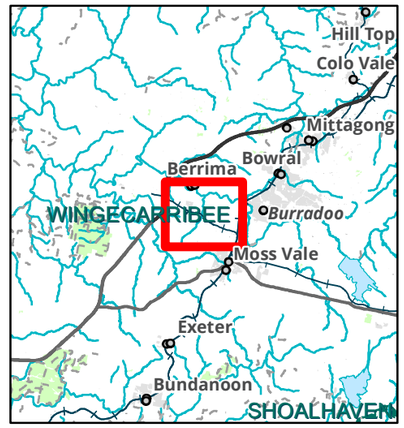

Legend

- Study area
- Site 2

Hydrological features

- Canal-Drain
- Natural watercourse

Strahler Order

- 1
- 2
- 3
- 4
- 5
- 6

Figure 5 Hydrology in the vicinity of the study area

0 200 400 600 800 1,000

Metres
Scale: 1:20,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

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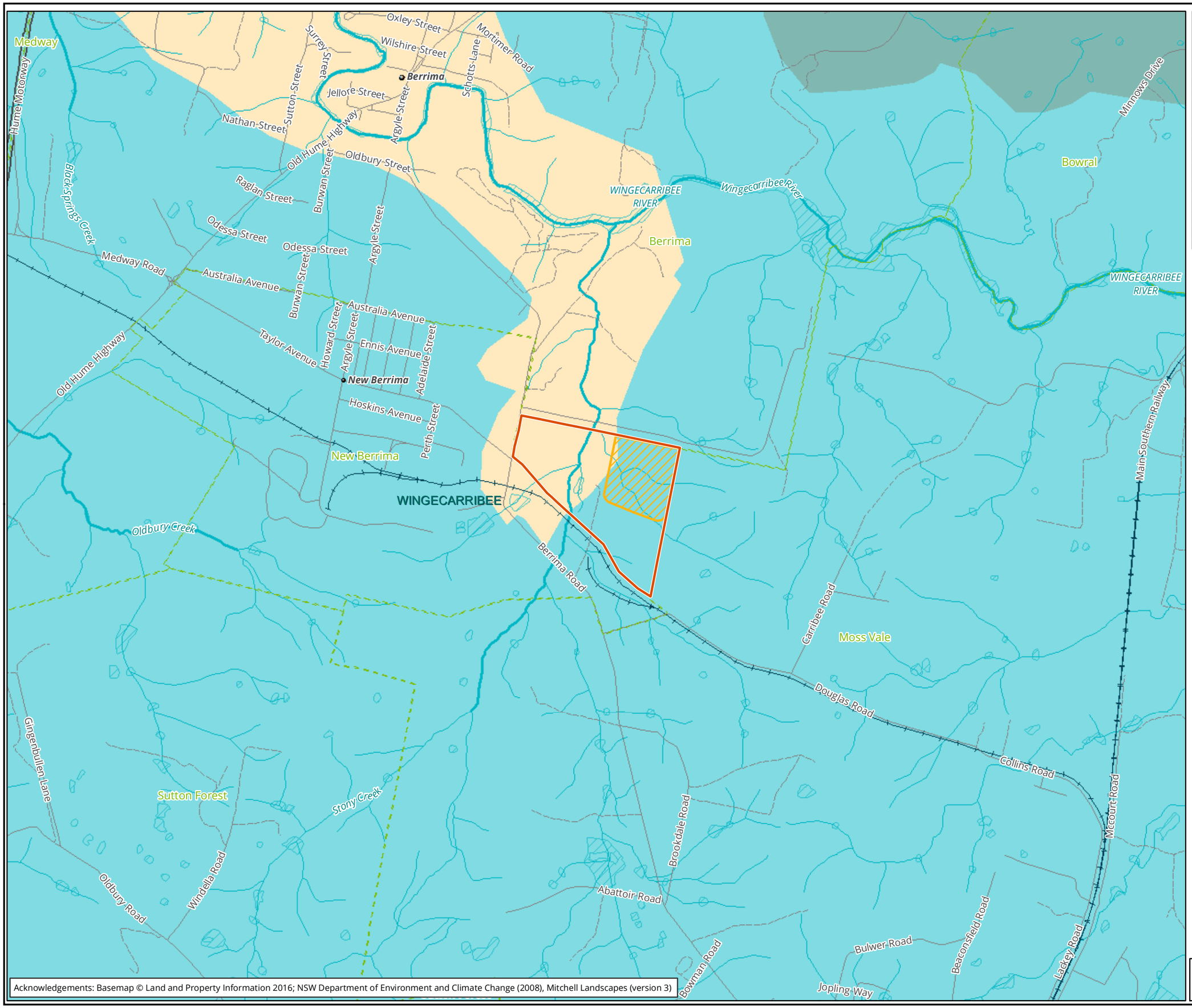

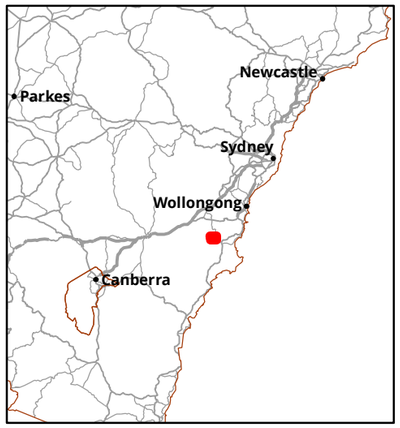

Legend

- Study area
- Site 2

Mitchell landscapes (1:250,000)

- Moss Vale Highlands
- Nattai Plateau
- Robertson Basalts

Acknowledgements: Basemap © Land and Property Information 2016; NSW Department of Environment and Climate Change (2008), Mitchell Landscapes (version 3)

Figure 6 Soil landscapes in the vicinity of the study area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

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3.1.3 Landscape resources

The Southern Highlands region provided a wide variety of resources that could have been used by Aboriginal inhabitants.

The swamp and numerous creeks in the area would have provided permanent water and food resources such as fish, snakes, eels, platypus, waterfowl and yabbies, with edible plants growing abundantly. The tall open forests would have provided areas to hunt kangaroo, possums, wallabies and birds, while closer to the escarpment, caves and over-hangs provided shelter and smaller trees, plants and bushes would have provided yet another source of food (Morton 2005). 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. Animals such 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).

The study area has been extensively cleared and now consists of predominantly grasses and remnant stands of tall open forest, propagated wind breaks and introduced species. Vegetation prior to European impacts in the area is thought to have comprised of wet sclerophyll forest and woodlands. Common species would have included tall eucalypts, including peppermints and mountain grey gums. Woodlands were dominated by gums and silvertop ash, and in poorer soil areas by peppermint stringybark, swamp gum, and cabbage gum. Understorey species would have included she oak, spiky hakea, and tea tree. Large areas of wet heath comprised of prickly broom heath, coral heath, Christmas bells and button grass (Mitchell 2002, p.117). Plant resources were used 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).

The Moss Vale region generally provided a number of lithic resources used by Aboriginal inhabitants. Lithic resources would have been accessible in the outcrops of shale and sandstone of the Wianamatta Group, while the sandstone formations also provided areas where tools might be ground and sharpened and art engraved. Alluvial deposits along the banks of the Wingecarribee and Nepean Rivers would also have provided sources of silcrete and quartzite cobbles which would have been used extensively by Aboriginal people. The local environment of the study area provided access to water, flora and fauna resources, and useful stone material. These factors would have made the area a potentially suitable place of occupation.

3.1.4 Land use history

The earliest exploration of the Southern Highlands occurred in 1798 when several explorers visited the Wingecarribee River. They were followed by Hamilton Hume and Charles Throsby and in 1817 who explored the area west of Sutton Forest; and then in 1818 they explored the area between Moss Vale and Jervis Bay with James Meehan. In 1819, Thorsby was granted 1000 acres by Governor Macquarie at Bong Bong on the outskirts of Moss Vale and named the property Throsby Park. Governor Macquarie also put Throsby in charge of building the Old Argyle Road from Sydney to Goulburn (NSW Roads and Maritime Services 2013, p.41).

The township of Berrima was founded in 1829 on land surveyed by Surveyor-General Sir Thomas Mitchell, after he noted its abundance of good water and building stone while carrying his road through to the district of Goulburn. He advised governor Bourke that this was an ideal town site, and surveyor Robert Hoddle submitted a plan for the village which was approved in 1831 (Plate 2).

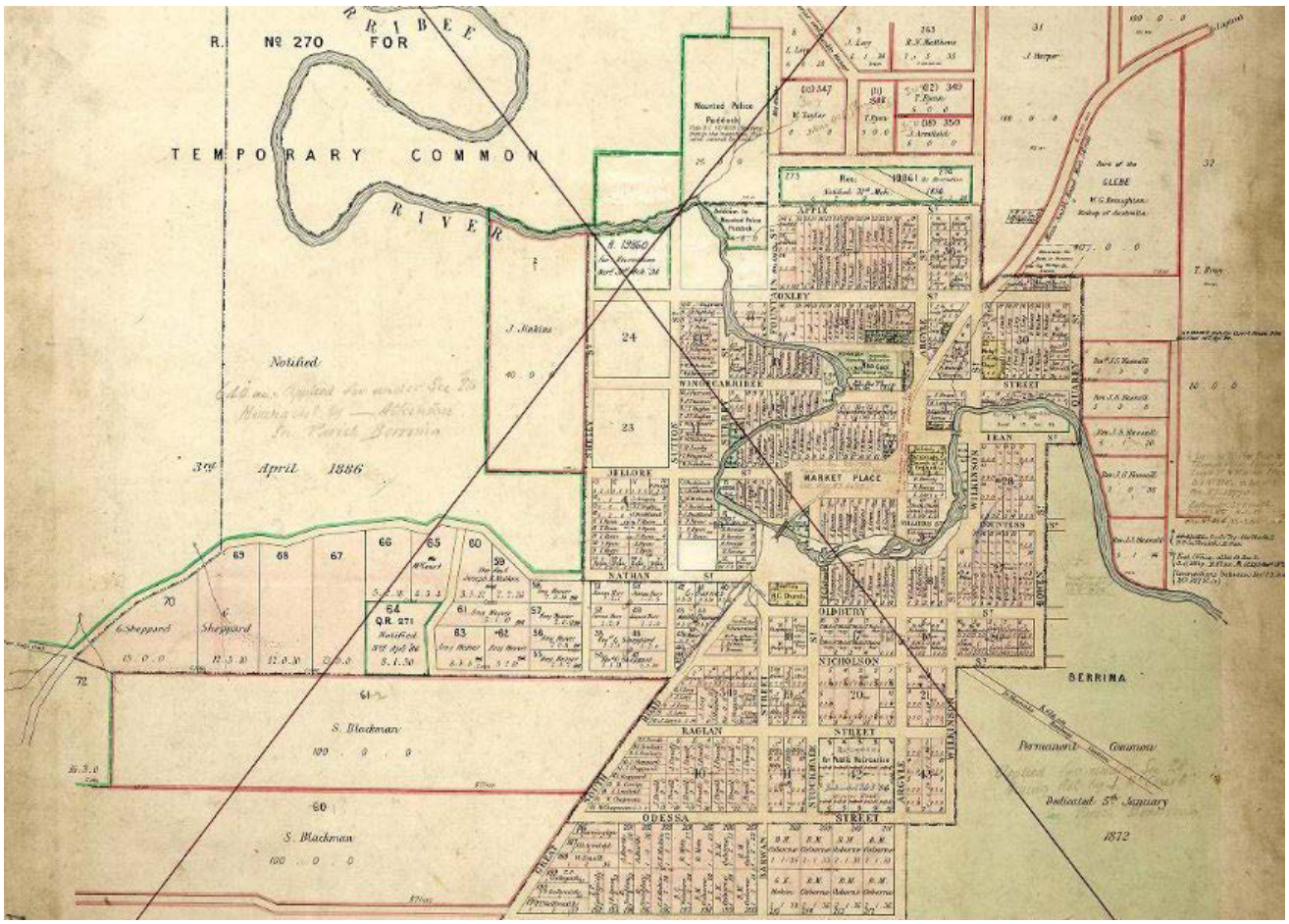


Plate 2 1881 town map of Berrima (Source: NSW Land Registry Services)

Due to its location near the Wingecarribee River, Berrima had land suitable for grazing and agriculture. Berrima was almost the geographical centre of the County of Camden as drawn by Mitchell's map of 1829, and was intended to be not only the capital, but the centre for manufacturing and administration (NSW Roads and Maritime Services 2013, p.42).

Following the opening of the Great South Road, Berrima became an important stop for travellers from Sydney and a number of inns were established, the first being in 1827 (Artefact 2018, p.7). By 1835, there were 13 inns built to accommodate the coaches and travellers passing through Berrima (NSW Roads and Maritime Services 2013, p.42). A large gaol was built at Berrima in 1839 and a courthouse in 1841 with the major source of labour coming from convicts. The 1841 census showed 36 families residing in Berrima, made up of 249 people, of which 39 were incarcerated and 87 were ex-convicts (Artefact 2018, p.7). The railway through the Southern Highlands was built in 1867; however, it was located east of Berrima near the towns of Bowral and Moss Vale, both of which surpassed Berrima in population and work opportunities). By 1909, only the Surveyor General Hotel survived to cater for travellers (NSW Roads and Maritime Services 2013, p.42).

Plate 3 c.1900 photograph of Berrima looking towards the Surveyor General Inn and gaol (Source: Berrima District Historical and Family History Society Inc.)

The study area was originally part of a large land grant of 2850 acres to William Hutchinson, possibly in the 1820-1830s. Hutchinson was granted other land that adjoined the study area, which totalled 2850 acres. He started life in Australia as a convict and went on to hold positions such as the Superintendent of Convicts and director of the Bank of NSW. The 1894 parish map shows the study area as part of Hutchinson's 2850 acres with the Berrima Coal Company tramway line situated along the southern boundary of the study area Plate 4). The Berrima Coal Company tramline was a short branch from the Main South line to serve the Berrima Colliery.

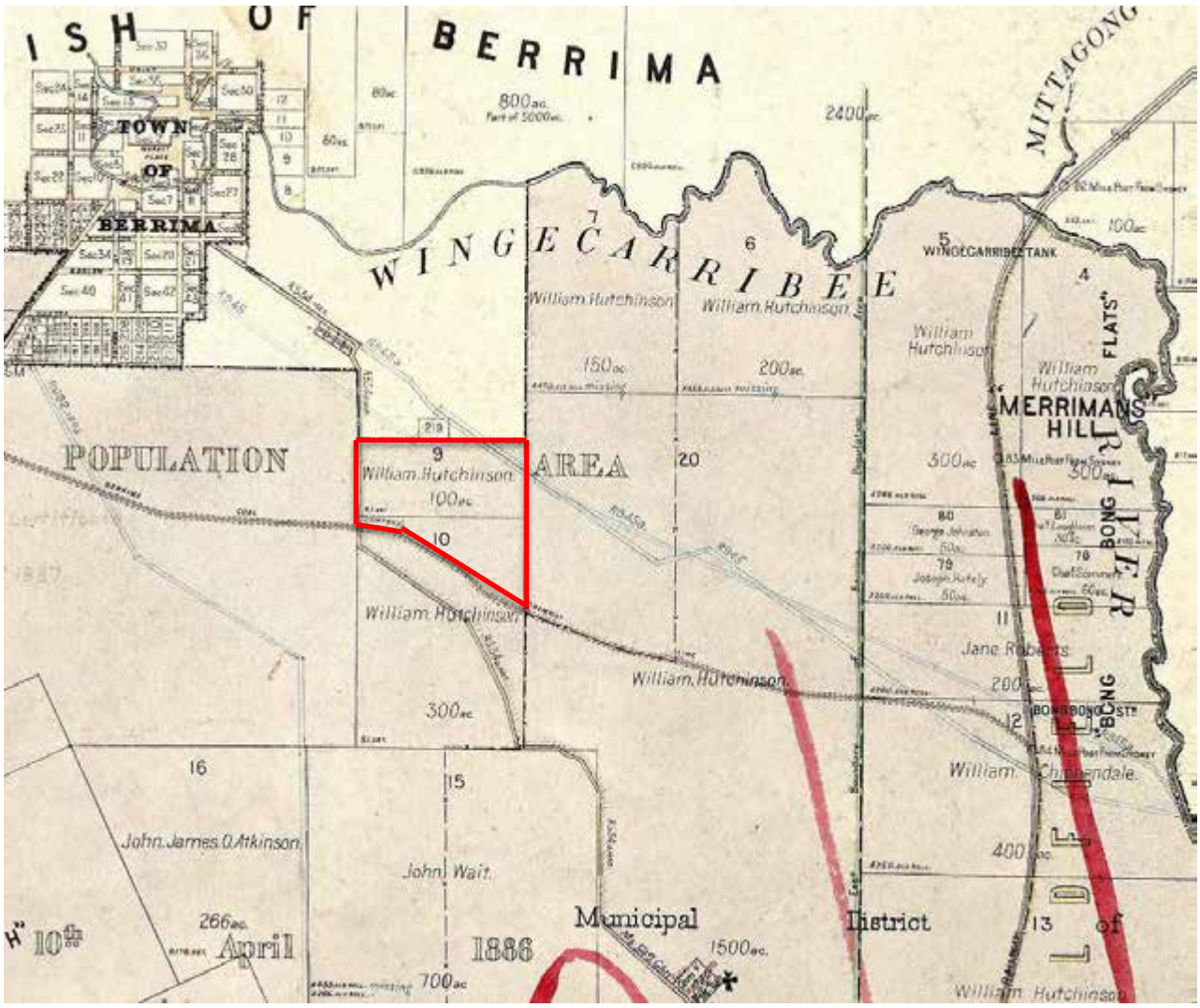


Plate 4 **1894 parish map showing the land grants to William Hutchinson. The study area is marked in red (Source: NSW Land Registry Services)**

3.2 Previous archaeological work

A large number of cultural heritage surface (surveys) and sub-surface (excavations) investigations have been conducted throughout the region of 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 Southern Highlands has been the subject of a moderate level of archaeological survey and assessment. Common sites include isolated finds, open artefact scatters or camp sites, rock shelters containing surface artefacts and/or occupation deposit and/or rock art, and grinding groove sites. The distribution of each of these site types is directly determined by the underlying geology and surface topography. For example, rock shelters are found only in places where suitable sandstone is exposed. Other site types such as modified trees, quarries, burials, stone arrangements and other ceremonial places are rare.

3.2.1 Regional overview

A number of Aboriginal cultural heritage investigations have been conducted for the Southern Highlands region. Models for predicting the location and type of Aboriginal sites with a general applicability to the 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.

Rich (1988) surveyed a stretch of the Wingecarribee River between Berrima and the Wingecarribee Swamp, approximately 15 kilometres south-east of the study area, which resulted in the identification of open artefact scatters, isolated finds, potential archaeological deposits (PADs) and scarred trees. Low-density artefact scatters were located predominantly within 50 metres of water. Based on the results of this study, Rich argued that site distribution in the cold upland areas may have been governed by cultural preferences. She concluded that most sites will be located along minor water courses on elevated dry flat areas and more selectively along rivers where the valley is wide, or where resource areas such as swamps occur. Isolated finds, however, will be found at a wider variety of locations.

Dibden (2000) conducted a survey of 5.5 hectare property in Mittagong (11 kilometres north of the study area) adjacent to the upper reaches of Nattai Creek, which located an artefact scatter distributed on either side of an ephemeral creek channel. Subsequent subsurface test pitting revealed that the site had been extensively disturbed by previous European industrial activity. The site was determined to be a sparse scatter of low-density lithic material comprising primarily silcrete, chert and quartz and covering an area of approximately 1.8 hectares. The assemblage contained mainly debitage resulting from stone artefact manufacture, and a micro-blade core was recovered indicated that micro-blade technology was employed on the site.

Kelton & Mills (2003) undertook a survey of the proposed expansion area of Penrose Quarry, approximately 22 kilometres south-west of the study area. A rock shelter with ochre and charcoal markings was recorded. The art was determined low scientific significance; however the shelter floor was considered to have high significance due to the depth of floor deposit. Consequently, the shelter floor was excavated within three trenches to the basal weathered sandstone. Artefacts, including backed blades and a dense charcoal deposit were found throughout the soils. A large hearth was also identified that contained stone artefacts, bone and shell. A geomorphologist confirmed the theory that there were two distinct periods of occupation within the shelter, ranging from 2,977 to 12, 829 BP.

Navin Officer Heritage Consultants Pty Ltd (2003) recorded six open artefact scatter sites during a survey conducted at *Renwick*, approximately 11 kilometres north of the study area, in response to a proposed residential subdivision. All sites were located within 200 to 300 metres of an ephemeral water courses on both spur crests and valley floors. Stone artefacts were made primarily on silcrete, with smaller frequencies of quartz, tuff and chert. All artefacts were flakes, cores and flaked pieces indicating general flaking activities; no formal tool types were recorded other than one backed blade. Visibility variables were extremely low during the survey and hence the opportunity to locate artefactual material was considerably hampered.

Dibden (2000), following the identification of two artefact scatter sites during a survey, conducted a surface collection and test excavations at Lot 1, Sackville Road, Hill Top NSW, approximately 22 kilometres north of the study area. Thirty 50 by 50 centimetre test pits were excavated across a broad ridge 500 metres east of Running Water Creek and adjacent to a 1st order open drainage depression. A total of 241 artefacts were recovered; however, most were collected from the ground surface. Only 15 artefacts were found within 8 of the test pits. Quartz was the most common raw material followed by silcrete and silicified tuff, while artefact types consisted of cores, bipolar cores, backed artefacts and retouched artefacts. It was concluded that the irregular distribution of artefacts suggested the site was probably occupied for short stays only.

Dibden (2006) conducted a survey at the Chelsea Gardens site, approximately 5 kilometres south-east of the study area and the Wensleydale site is approximately 18 kilometres north east of the study area. A pedestrian survey of the study area resulted in the identification of six sites; four at the Wensleydale site, and two at the Chelsea Gardens site. Possible scar trees were also recorded at both sites. At Wensleydale, artefacts comprised of silcrete, quartzite, and chert flakes, and a chert core. Artefacts at Chelsea Gardens comprised of

chert, silcrete, quartz, quartzite, and volcanic flakes; and a silcrete blade. Although the sites at Wensleydale and Chelsea Gardens have been impacted from pastoralism, it was predicted that there exists the potential for intact archaeological remains to occur in the subsurface below the horticultural layer.

AMBS (2007) conducted test excavations across 115 hectare development area at the Renwick Sustainable Village, approximately 15 kilometers north-east of the study area. Two test areas consisting of 1 metres by 1 metre test pits were located on three different landforms (crest, terrace slopes and creek flats) that were associated with 2nd and 3rd order streams. A total of 1786 artefacts were recovered from 138 test pits, with the majority coming from a depth of 19-45 centimetres. The highest density of artefacts were recovered from alluvial deposits adjacent to drainage lines or on terrace slopes with deep sandy deposits. Spur crests and slopes with shallow soil deposits had the least occurrence of artefacts. The dominant raw material was quartz followed by quartzite and silcrete. The small number of bipolar cores, the use of quartz and presence of back artefacts suggested a date range of 5000 to 1600 years ago.

3.2.2 Local overview

A number of Aboriginal cultural heritage investigations have been conducted within the region (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.

Koettig (1987) conducted an archaeological assessment for the Berrima Sewerage Scheme, approximately three kilometres north of the study area. Two open artefacts sites were identified during the survey: one was located within a bulldozer scour exposure on the alluvial floodplain of the Wingecarribee River, and the other site was on a spur crest 100 metres from a tributary of the Wingecarribee River. Artefacts consisted of chert, silcrete and quartz. Test excavations were conducted on a low, wide spur that had been largely cleared. Thirteen backhoe pits were excavated along with two shovel test pit transects of 19 test pits. A total of 67 artefacts were recovered from the test pits, with most being located at a depth of 10 to 20 centimetres, and consisted of quartz, silcrete, mudstone and chert. Koettig argued that due to the limited number of excavations within the region during the 1980s, the test excavations could not determine whether the recovered archaeological material was typical of sites more than 100 metres from water. She concluded that spurs and undulating ground close to minor streams were of moderate archaeological sensitivity.

Kelton (2002) surveyed the area above a series of proposed extraction panels for underground mining at the Berrima Colliery, approximately 4 kilometres north-west of the study area. The survey targeted of a number of landforms including ridge crests, low and upper-mid hill slopes, ephemeral and spring-fed creeks, alluvial and colluvial terraces, and exposed sandstone formations. Three Aboriginal sites were recorded that comprised two rock shelters with art and deposit and one open artefact scatter.

Total Earth Care (2006) undertook a pedestrian survey of the site, located approximately five kilometres south-east of the study area, resulting in the identification of eighteen artefacts; one artefact scatter of thirteen artefacts over an area of 50 metres by 70 metres area (Site MVSW1), and five associated isolated finds 250 metres away. It was predicted that a substantial subsurface assemblage is likely to be present at the MVSW1 site and as such it was recommended that the site be conserved or that further investigation is undertaken prior to any disturbance or development of the site.

Mary Dallas Consulting Archaeologists (2011) undertook an Aboriginal heritage due diligence assessment to support a DA to subdivide two allotments and for the construction of a road to provide access to the two allotments at Chesley Park. This included a section of Stage 1 of the current study area. A desktop assessment was conduction and a brief site visit to relocate previously recorded sites. The assessment found that the previously recorded Aboriginal sites within the study area would not be adversely affected by the proposed

road and subdivision; however, a PAD previously identified and amended by previous studies would be directly affected and that further investigations were recommended.

Total Earth Care (2007) completed an Aboriginal cultural heritage study of the Moss Vale 'Enterprise Zone', which included survey along sections of Stony Creek. Seven open artefact scatters and 11 isolated finds were identified that comprised of 64 artefacts and seven grinding groove panels. Five of the open artefact scatters were located along Stony Creek indicating that this was a 'significant landscape that was a focus for camping, resource use and travel for Aboriginal people'. One site comprising of four artefacts and seven panels of grinding grooves (AHIMS ID 52-4-0175) are located within the current study area. All of the sites were located on level raised areas above the flood zone of the creek line and all of them were considered to have high levels of associated subsurface deposits.

EMM (2017) conducted an ACHA on behalf of Hume Coal Pty Ltd for an underground coal mine and associated mine infrastructure in the Southern Coalfields of NSW, approximately five kilometres west of the study area. The survey also included the Berrima Rail project area, which is 40 metres south of the study area. A desktop assessment was conducted of the environmental, archaeological and ethnohistoric contexts and, through consultation with the Aboriginal community, a predictive model of Aboriginal site location was able to be determined:

- Artefact scatters and isolated finds are most likely to occur as background scatter on all landforms; however, concentration of artefacts are most likely to occur on elevated landforms or raised areas of lower lying landforms adjacent to ephemeral and perennial streams, within 200 metres.
- Elevated landforms near the confluence of streams are particularly sensitive to open artefact scatters.
- Rock shelters are likely to occur along rocky scarps and cliff lines.
- Grinding grooves and engraving sites are most likely to be present on outcropping sandstone in stream beds or adjacent to streams.
- Modified trees will occur in areas that have not been cleared and are of sufficient age to bear marks of traditional Aboriginal scarring or carving.

Due to the large area of the project, the predictive model was used to target specific areas during archaeological surveys and test excavation. The survey resulted in 166 newly recorded sites within the Hume Coal Project area, 11 newly recorded sites within the Berrima Rail Project area and two previously recorded sites were relocated and re-recorded. Sites types included rock shelters (some with art, artefacts and PADs), grinding grooves, open stone artefact sites, areas of PAD, and potential culturally modified trees.

Based on this survey an archaeological test excavation was conducted, which consisted of 160 test pits being excavated. 281 artefacts were recovered and consisted of cores, flakes, and flake fragments, and 11 retouched artefacts were identified. Raw material comprised of quartz, silcrete, quartzite, chert, volcanic, and petrified wood. The excavations determined that the overall average artefact density was seven artefacts per square metre with the upper soil profile bearing the majority of artefacts. The results of both the survey and test excavations confirmed that the presence of stone artefacts is linked directly to distance to streams and that the presence and frequency of surface artefacts sites is not a reliable indicator of subsurface frequencies.

Artefact (2018) was engaged by Brickworks Ltd to prepare an Aboriginal heritage assessment of the study area for the proposed development of a masonry plant and associated infrastructure on an 8 hectare portion in the north-west corner of the study area (Stage 1). The assessment found that a portion of AHIMS ID 52-4-0175/52-4-0197, including a surface artefact scatter and an associated area of archaeological sensitivity, would be impacted by the proposed Stage 1 works. Another portion of the same site, which includes a suite of grinding groves and associated area of archaeological sensitivity, is located 20 metres outside the proposed Stage 1 impact area. The survey also found three additional Aboriginal sites (AHIMS ID 52-4-0196,

CPark A1 and CPark A2) and areas of archaeological sensitivity located outside the Stage 1 area within the Stage 2 area for future development. Artefact recommended archaeological test excavations to determine the nature and extent of any potential subsurface deposits. They also recommended an exclusion zone around the grinding grooves to mitigate any direct or indirect impacts, along with a heritage management plan.

Biosis Pty Ltd (2019) was commissioned by Brickworks Ltd to undertake an ACHA for Stage 1 of the proposed development at Chesley Park, 416 Berrima Road, New Berrima NSW. Test excavation undertaken the entire Stage 1 study area recovered 427 artefacts from 156 test pits. The site contains a large number of artefacts including a range of tool types such as complete flakes, cores, and flake fragments made using different raw material types and largely intact stratified deposits. A total of 13 tools were recorded from the excavation program, which included backed artefacts, Bondi points, an anvil, asymmetrical blade, dihedral burin, eloura, geometric microlith, round edge scraper, scraper, steep edge scraper and a thumbnail scraper. The high frequency of tools recorded in the assemblage indicates that the area was likely to have been used as either a tool processing area or as an occupation area (or camp site) where tools were discarded. This site demonstrates ongoing long-term occupation of the study area by Aboriginal people. This site type has been identified occassionally within the local region and has therefore been assessed as having high archaeological significance.

3.2.3 AHIMS site analysis

A search of the OEH AHIMS database (Client Service ID: 462896) identified 90 Aboriginal archaeological sites within a five kilometre search area, centred on the proposed Site 2 study area. Two of these registered sites are located within the study area (Figure 7):

- 52-4-0691 (CPark A02) consists of a broken grinding stone identified on the crest of a small hillock in the north section, approximately 80 meters south of the fence line. A small group of juvenile native trees form a tree lane directly west (about 6 metres) of the grinding stone. The artefact had been broken some time ago, with the break occurring along its width. The grinding stone measures 90 millimetres long 100 millimetres wide and 50 millimetres high.
- 52-4-0692 (CPark A03) is a single flake identified in the north-west corner of the old homestead block, inside the fence. The area whilst being part of the house block is relatively undisturbed. This proximal flake (2 millimetres long by 1.4 millimetres wide) consists of pale yellow silcrete with a missing left margin and distal point. There is also evidence that it has been heated.
- 52-4-0196 (Stoney Creek 1) consists of three axe grinding grooves on a sandstone floater measuring approximately 2.3 by 1.5 meters located within the creek course. A number of circular depressions, or Gnamma holes, were also observed ranging in size of 50-140 millimetres in diameter. Three of these holes appear to have been subjected to grinding to increase the diameter. The site card no longer remains for this site; however, it was easily relocated during the archaeological survey.

AHIMS search results are provided in Appendix 1. Table 3 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.

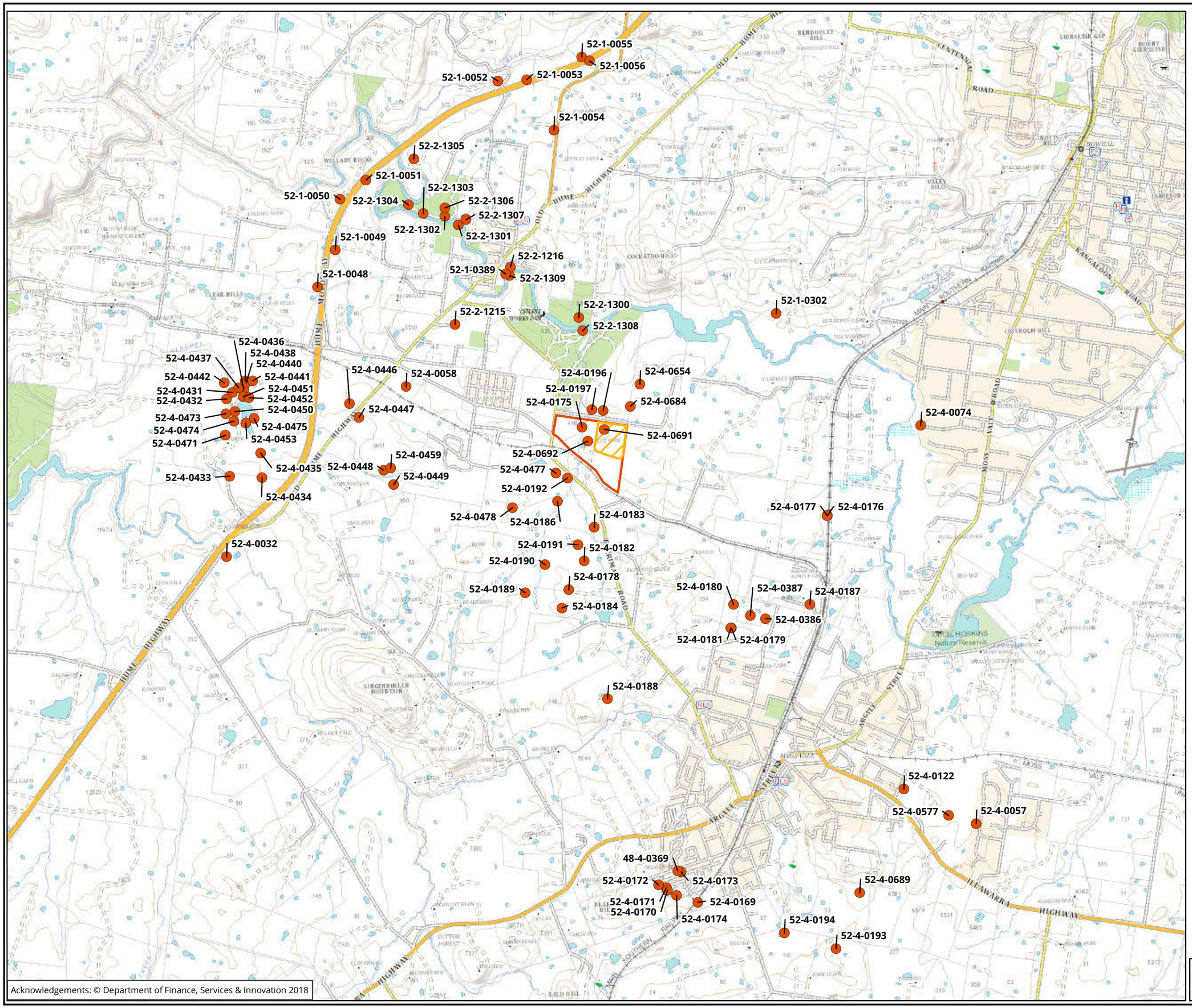
It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete 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 95 results presented here, compared to the 90 sites identified in AHIMS.

Table 3 AHIMS site type frequency

Site type	Number of occurrences	Frequency (%)
Artefact	72	75.79
Grinding groove	7	7.37
PAD	12	18.46
Modified tree	4	4.21
Total	**95**	**100.00**

A simple analysis of the Aboriginal cultural heritage sites registered within the 5 kilometre search of the study area indicates that the most common site type is artefact scatters at 75.79% (n=72). This is followed by PADs with 18.46% (n=12), grinding grooves with 7.37% (n=7), and modified trees (carved or scarred) with 4.21% (n=4).



Acknowledgements: © Department of Finance, Services & Innovation 2018

Figure 7 Aboriginal sites located in the study area and within the vicinity

NOT TO BE MADE PUBLIC

Biosis Pty Ltd

Ballarat, Brisbane, Canberra, Melbourne, Sydney,Wangaratta & Wollongong

Matter: 30434
Date: 11 November 2019,
Checked by: amurray, Generated by: amurray
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30434_AR_F7_AHIMS.mxd

4 Predictive model

Based upon the review of previous studies and environmental factors, a model was formulated to 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. This predictive model was formulated as part of the Stage 1 assessment (Biosis Pty Ltd 2019).

The predictive model contained within this section is based upon:

- Site distribution in relation to local soil landscapes, local geology, local hydrology and local topography 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.

Based on this information, a predictive model was developed, indicating the site types most likely to be encountered during the survey and subsequent sub-surface investigations across the present study area.

4.1 Analysis of Aboriginal occupation

The results of the regional AHIMS search for the Stage 1 ACHA are similar to those from the local area around the study area, with a similar variety of site types been noted within both the wider and local region. The most commonly recorded site types in the wider region are artefact scatters, which represent a total of 74.7% of all sites noted (Table 4). The next most common site types are PAD's (6.0%) and grinding grooves (7.7%).

Once again, in order to use this data, it is necessary to acknowledge possible biases. 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.

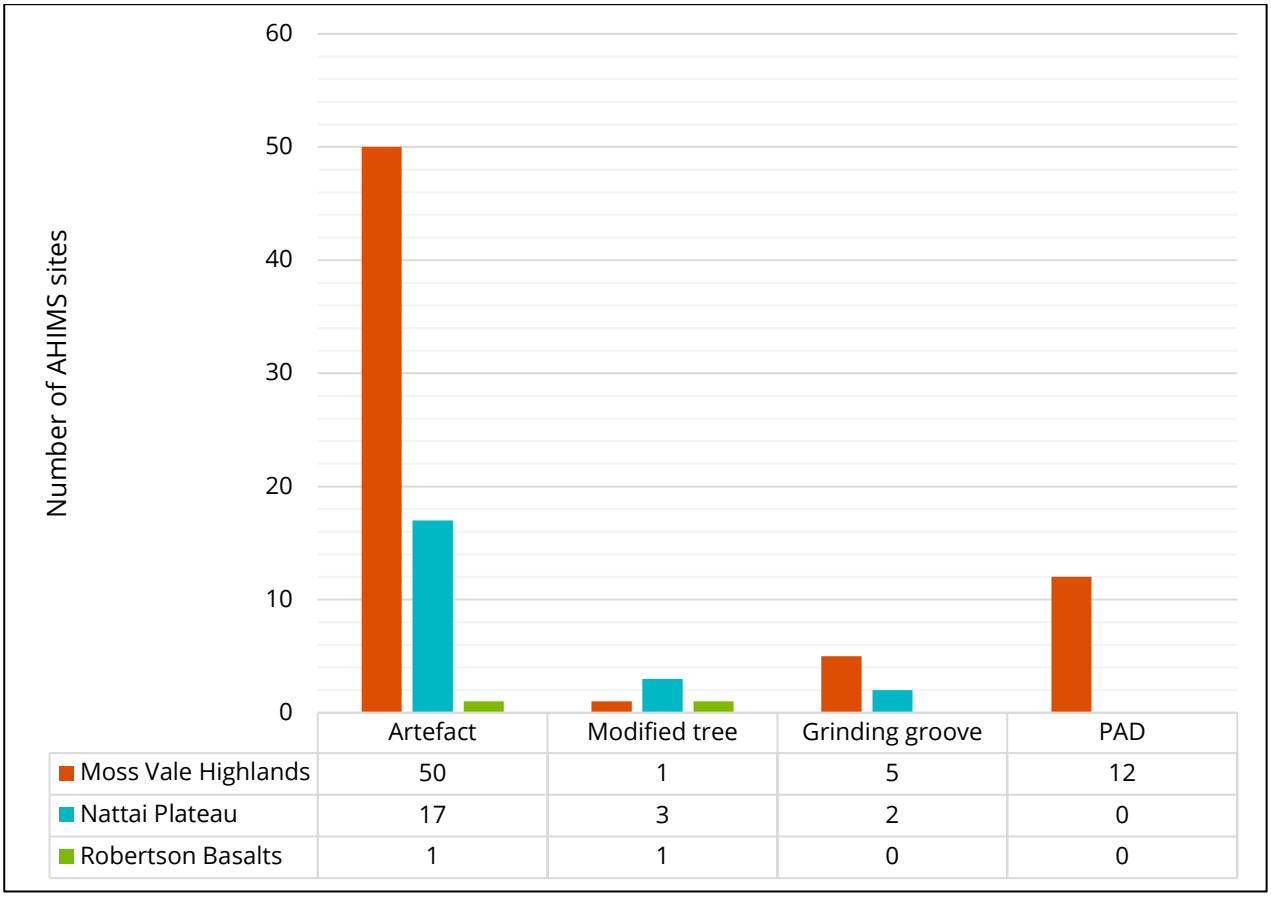
Table 4 Summary of the AHIMS site types recorded within the wider region (Biosis Pty Ltd 2019)

Site type	Number of occurrences	Frequency (%)
Artefact scatter	67	74.7
Modified tree (carved or scarred)	4	4.4
Grinding groove	7	7.7
PAD	12	13.2
Total	**90**	**100**

4.1.1 Local soils

An analysis of Aboriginal sites in relation to soil landscapes has been completed to identify correlations, which may be caused by the environment in each landscape. Soil landscapes are characterised by distinct vegetation and landforms, both of which can influence the distribution of Aboriginal heritage sites. The Nattai Plateau soil landscape is one of the most dominate landscapes within the local area. This soil landscape occurs extensively within the Southern Highlands and is associated with rolling hills and rounded peaks with deep channel incisions (Mitchell 2002, p.106).

The greatest variety of site types and the highest number of sites occur in the Moss Vale Highlands soil landscape (Graph 1). A total of 68 sites are recorded in this soil landscape, accounting for 73.9% of the total recorded sites identified. This landscape contains four site types including artefacts, PAD's, grinding grooves, and modified trees. The Nattai Plateau landscape contains the second highest number of sites (n=22), which accounts for 23.9% of sites and includes 17 artefact/artefact scatters, three modified trees, and two grinding grooves. The study area is located wholly within this soil landscape.



	Artefact	Modified tree	Grinding groove	PAD
Moss Vale Highlands	50	1	5	12
Nattai Plateau	17	3	2	0
Robertson Basalts	1	1	0	0

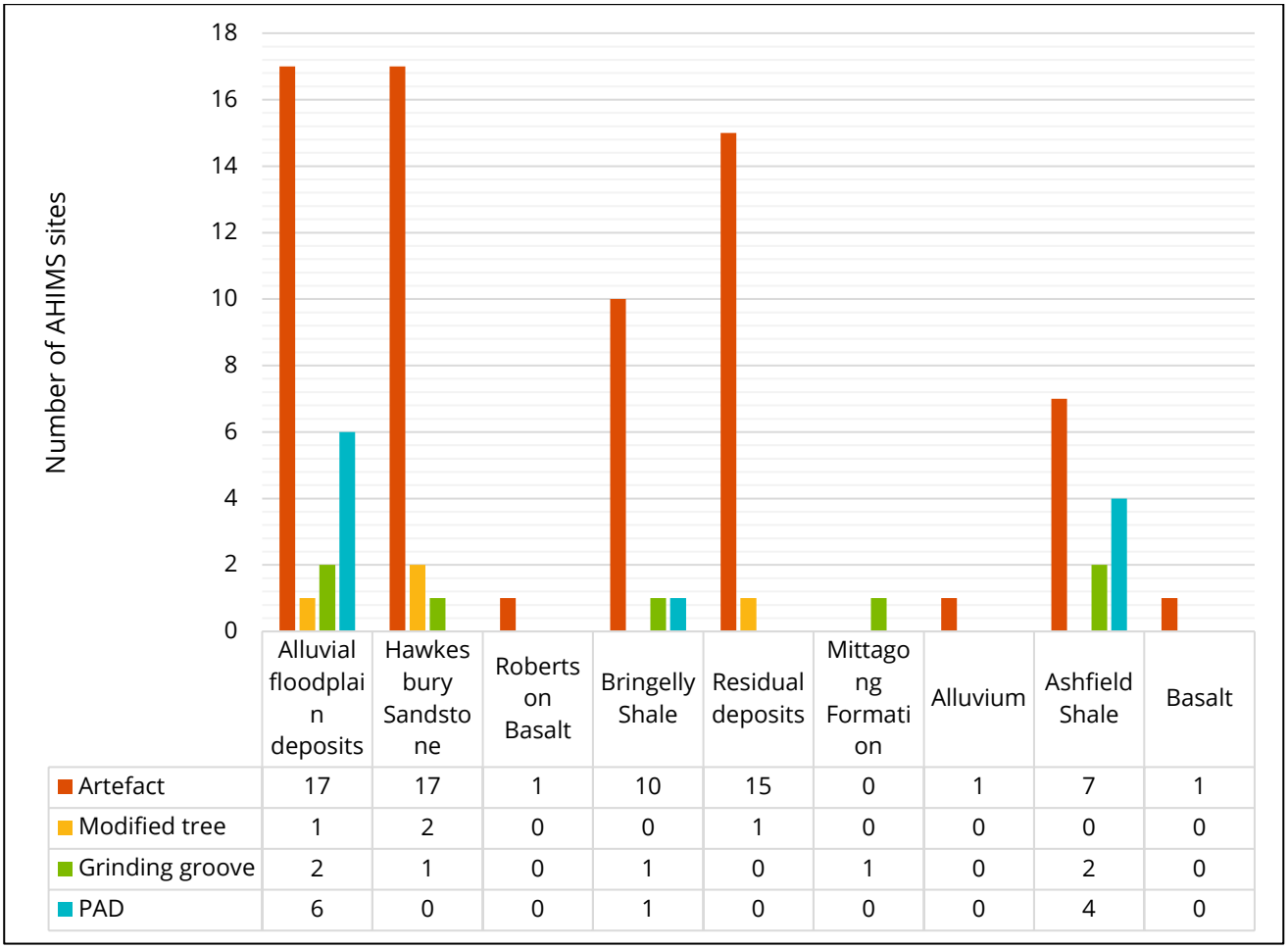
Graph 1 Site types and frequency of recorded AHIMS sites located within soil landscapes in the local region

4.1.2 Local geology

The underlying geology that dictates the existing landscape is the Wianamatta Group. Within this group, the alluvial floodplain deposits (Q_af) is the most frequently occurring formation within the local area and includes all of the Site 2 study area (Figure 4). This formation is primarily composed of gravel, sand, silt and/or clay, which had been deposited by physical processes in river channels or on floodplains. A total of 24.6% of all artefact scatters recorded in the local area have been noted within this formation. Likewise, the third most

frequently occurring formation, Hawkesbury Sandstone (Tuth), also contains 24.6% of all artefact scatters. The alluvial floodplain deposits also contain the most PADs (54.5%) and grinding groove (28.6%) sites. Subsequently, the formation is the most archaeological rich in comparison to others recorded the highest variety of cultural material compared to others (Graph 2).

Residual deposits (Q_r) is the second most frequently occurring formation within the local area and includes the Stage 1 study area. A total of 21.7% of all artefact scatters recorded in the local area have been noted within this formation. The only other site type recorded within this formation is a modified tree (25%). The Bringelly Shale formation (Rwb) also recorded a relatively high number of artefacts within the region. This unit consists of mid grey and dark grey mudstones with interbedded lithic sandstones as well as finer grained siltstones and claystone. A total of 14.5% of all artefact scatters recorded have been noted within this formation.



	Alluvial floodplain deposits	Hawkesbury Sandstone	Robertson Basalt	Bringelly Shale	Residual deposits	Mittagong Formation	Alluvium	Ashfield Shale	Basalt
Artefact	17	17	1	10	15	0	1	7	1
Modified tree	1	2	0	0	1	0	0	0	0
Grinding groove	2	1	0	1	0	1	0	2	0
PAD	6	0	0	1	0	0	0	4	0

Graph 2 Site types and frequency of recorded AHIMS sites located within the geological units in the local region

4.1.3 Local hydrology

Distance to water

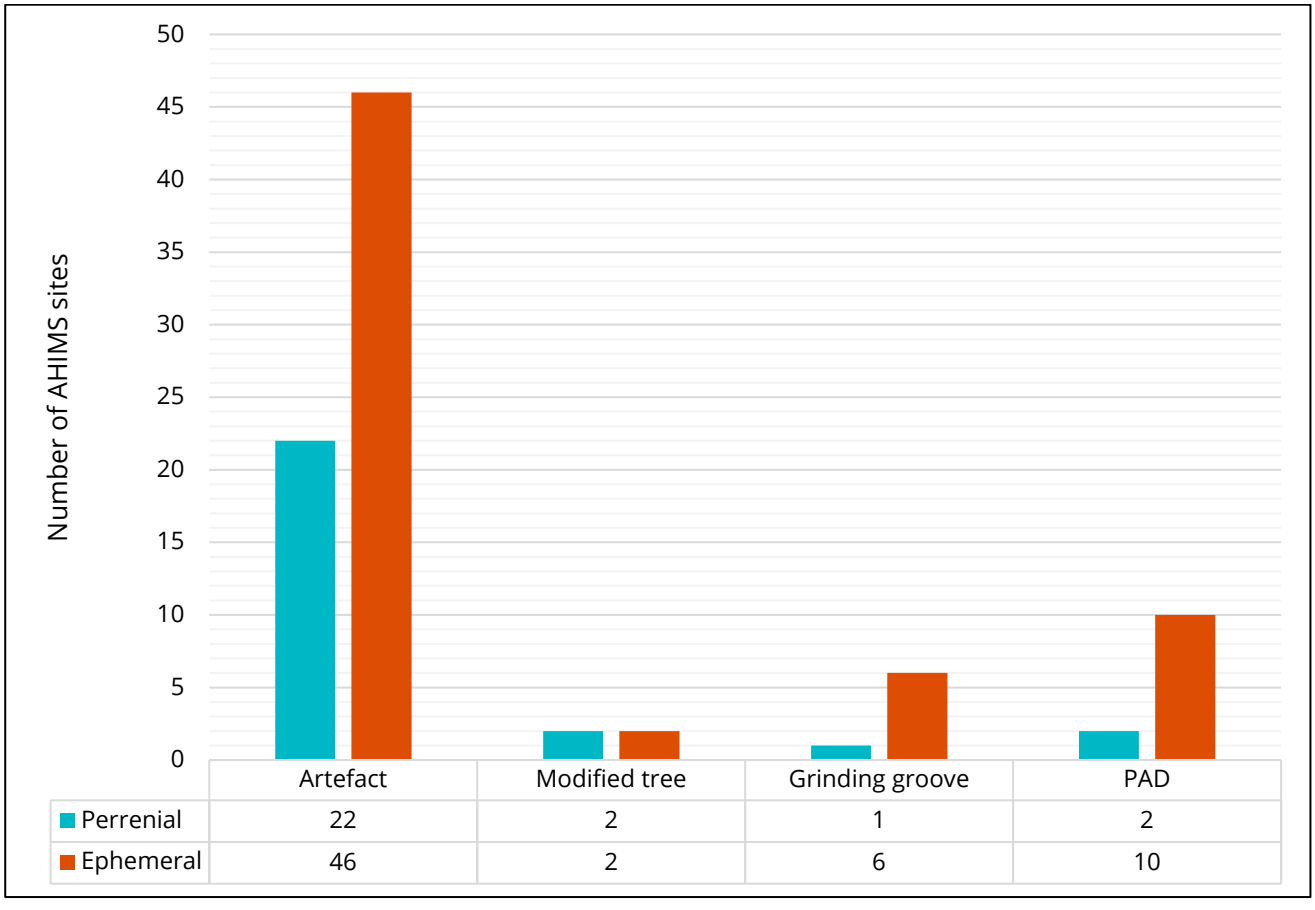
Distance to water is a common and important factor in the distribution of Aboriginal sites. Water is imperative to survival and areas with access to abundant water was often the preferred location for occupation. Within the local area the average distance that sites are recorded from permanent water sources is approximately

136.7 metres and 75.9 metres to ephemeral water source. A further analysis of this information illustrates the distribution of site types within the landscape and their general relationship to water sources.

The data illustrates that artefact scatters are on average closer to ephemeral water sources than permanent ones, as are PADs and modified trees. Grinding grooves are on average closer to permanent water sources than ephemeral ones. This data also shows that modified trees have the longest average distance to both permanent and ephemeral water sources. As only four modified trees and seven grinding grooves have been identified in the AHIMS results, the numbers contain some bias as the data could be affected by the possible underrepresentation of certain site types in the local area.

Table 5 Summary of the site types and their associated distances to water (metres)

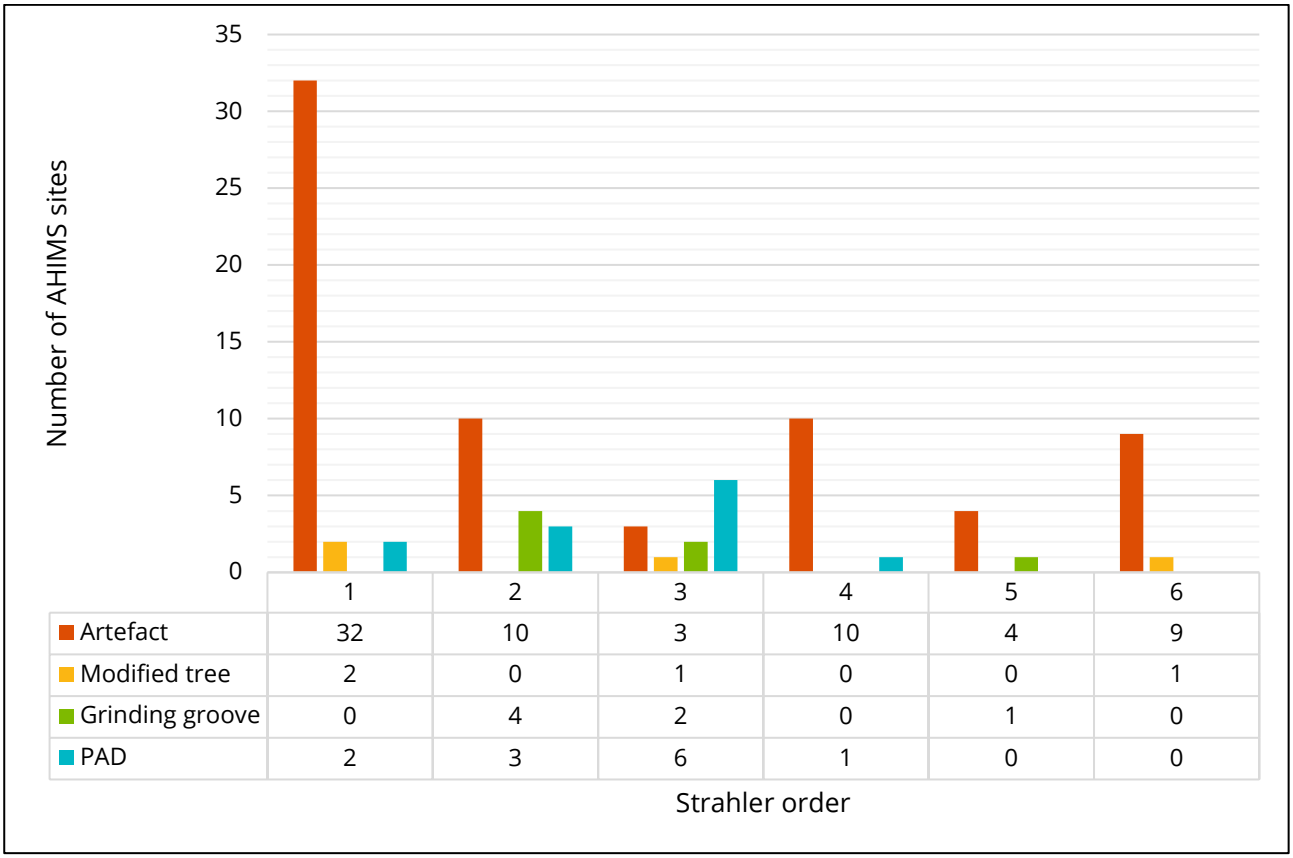
Site type	Permanent water source			Ephemeral water source		
	Max	Min	Average	Max	Min	Average
Artefact/s	542.9	4.5	164.3	190.1	9.9	74.5
Modified tree	227.2	105.7	166.5	166.3	105.1	135.7
Grinding grooves	34.7	0.1	15.9	-	-	20.3
PAD	204.5	19.8	76.1	77.5	40.3	58.9
Total	-	-	136.7	-	-	75.9



Graph 3 Site types and frequency of recorded AHIMS sites and distance to water

Stream order

In the local area, it becomes evident that 40.7% of all sites are located near a first order stream. These sites include artefacts, PADs, and modified trees, with artefacts representing nearly half of all sites near first order streams. The second highest number of sites, a total of 20.9%, are located near second order streams. This group of sites consisted of artefacts, PADs, and grinding grooves. A total of 13.2% sites are located near third order, 12.1% near forth order streams, 11% near sixth order streams, and 5.5% near fifth order streams (Graph 4). From this analysis alone it could be suggested that a higher number of Aboriginal sites are situated around first and second order streams. It also suggests that PADs are more likely to be located near third order streams and that modified trees will be located near a higher order stream. Overall, it could suggest a preference for this environmental zone, which helps to predict the location and complexity of other unrecorded Aboriginal sites in the landscape.



	1	2	3	4	5	6
Artefact	32	10	3	10	4	9
Modified tree	2	0	1	0	0	1
Grinding groove	0	4	2	0	1	0
PAD	2	3	6	1	0	0

Graph 4 Site types and frequency of recorded AHIMS sites and Strahler order

4.2 Aboriginal site prediction statements

The definition of each site type is described in Table 6 firstly, followed by the predicted likelihood of this site type occurring within the study area (Table 7).

Table 6 Definitions of the predictive model

Potential rating	Description
Very High	The Aboriginal site types given this rating are those that have been recorded predominantly in both the local and regional area. Likewise, the landscape conditions within the focus area will also be aligned with those generally associated with this site type.
High	Those Aboriginal sites types give this rating have been recorded in both the regional and local landscape. However, there numbers are not as numerous. This being said the landscape conditions within the focus area will be aligned with those generally associated with this site type. Although it may be unlikely to locate this site type, due to their overall moderated numbers, this location would be where you would ultimately find them.
Moderate	Sites are known to occur in the regional and local landscape but not in high numbers. The landscape conditions are not precisely aligned however the site may infrequently occur in certain conditions.
Low	The site types given this rating have been recorded regionally, but not locally and not in substantial numbers. The site is generally considered unlikely to occur within the landform conditions present.

Table 7 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.	**Very high:** Stone artefact sites have been previously recorded in the region across a wide range of landforms including alluvial flats, and also within the study area. They have a high potential to be present in undisturbed areas within the study area.
PADs	Potential sub surface deposits of cultural material.	**High:** PADs have been previously recorded in the region across a wide range of landforms including alluvial flats. They have the potential to be present in undisturbed landforms.
Axe grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	**High:** The geology of the study area contains suitable horizontal sandstone rock outcrops for axe-grinding grooves and a number of grinding grooves have been recorded within the study area. Therefore, there is a high potential for axe grinding grooves to occur in the study area.
Modified trees	Trees with cultural modifications	**Moderate:** A small number of mature native trees have survived within the study area; therefore the potential for modified trees to

Site type	Site description	Potential
		occur is moderate.
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 the study area and due to the distance from permanent water sources, there is low potential for shell middens to be present within the study area.
Quarries	Raw stone material procurement sites.	**Low:** There is no record of any quarries being within or in the vicinity of 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.
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.
Aboriginal ceremony and Dreaming Sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	**Low:** There are currently no recorded mythological stories for the study area.
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.

5 Archaeological survey

A field survey of the study area was undertaken on 12 November 2019. The field survey sampling strategy, methodology and a discussion of results are provided below.

5.1 Archaeological survey objectives

The objectives of the survey were to:

- Provide Illawarra LALC 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.
- Attempt to re-identify Aboriginal archaeological sites AHIMS 52-4-0691 (CPark A02), AHIMS 52-4-0692 (CPark A03) and AHIMS 52-4-0196 (Stoney Creek 1) previously identified in 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.

5.2 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.

5.2.1 Survey methods

The archaeological 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.

5.3 Archaeological survey results

A meandering transect was walked across all accessible parts of the study area with the two 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 new Aboriginal sites or PADs were identified in the study area. The results from the field survey have been summarised in Table 8 below.

5.3.1 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 GSV. The study area had a low GSV due to the extensive grass coverage across the study area and relatively small areas of exposure.

5.3.2 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 2010b). GSV across the study area was typically low (20%) due to extensive grass coverage (Plate 5). Small areas of GSV were present along fence lines, and where erosion and disturbance had occurred.

Plate 5 East facing photo showing extensive grass coverage and low visibility

5.3.3 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 the prevailing conditions 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). Overall, the study area displayed areas of exposure of less than 20% due to extensive grass coverage. Areas of exposure were located at the base of mature trees (Plate 6), around fence lines, and around the edges of dams (Plate 7).

Plate 6 South facing photo showing exposure at the base of mature trees

Plate 7 East facing photo showing exposure around the edges of the dams

5.3.4 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.

There were a number of disturbances observed within the study area, which would have resulted in the removal of topsoil and its replacement with introduced materials of varying degrees. These areas include the extensive vegetation clearance, reoccurring ploughing, construction of multiple residential buildings (now

removed) and sheds, (Plate 8), construction of dams (Plate 9), wombat burrowing (Plate 10), construction of channel banks (Plate 11), and access roads.

Plate 8 South facing photo showing disturbances from the construction of sheds

Plate 9 North facing photo showing disturbances created from the construction of dams

Plate 10 West facing photo showing the disturbance caused by wombats

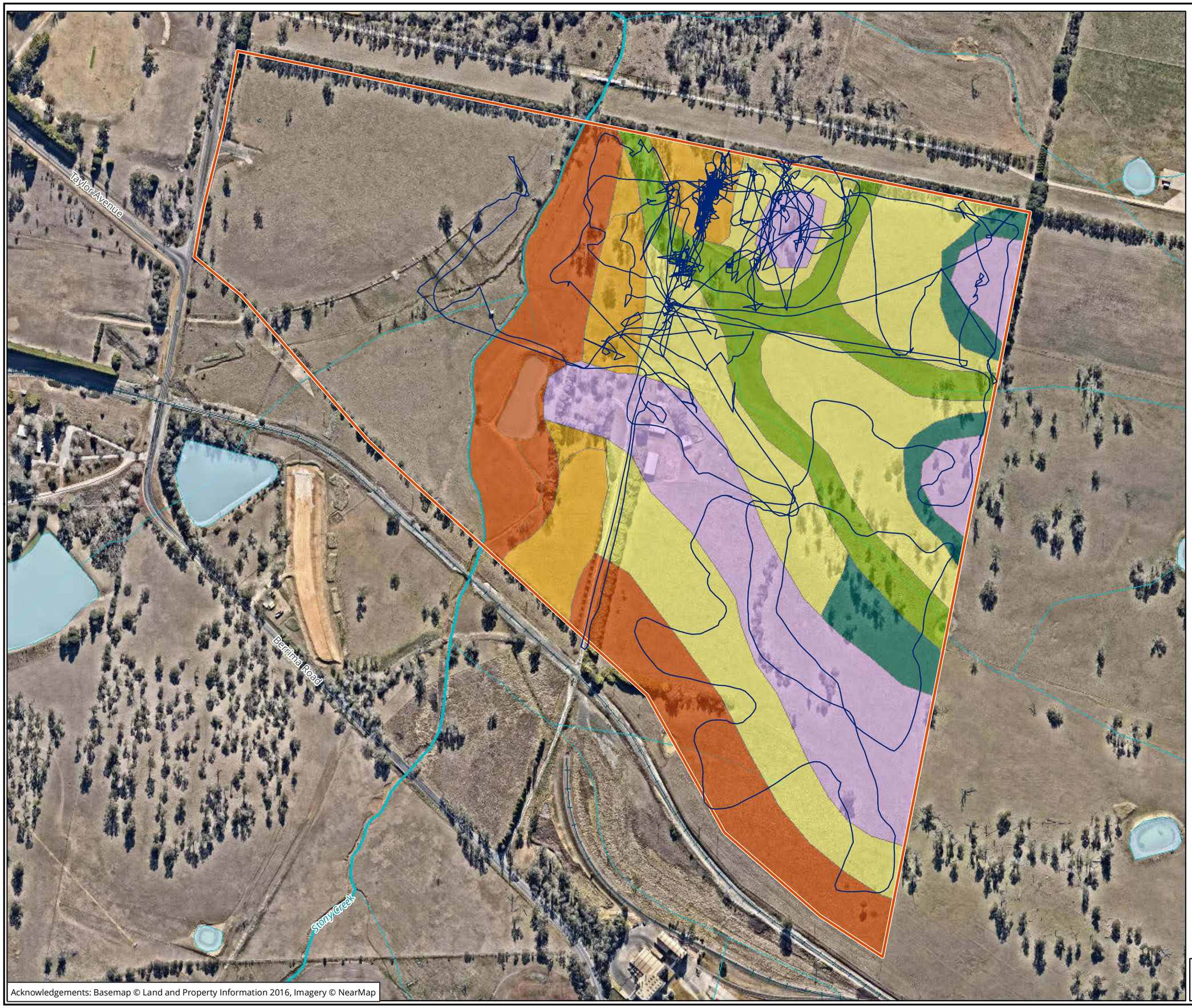
Plate 11 North facing photo showing disturbance created by the construction of channel bank to redirect water flow

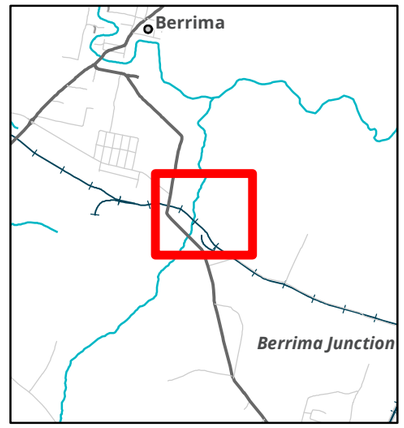
Table 8 Survey coverage

Survey unit	Landform	Survey unit area (m²)	Visibility (%)	Exposure (%)	Effective coverage area (m²)	Effective coverage (%)
1	Crest	81,033	20	10	14,352	17.71%
2	Lower slope	36,813	20	10	3,152	8.56%
3	Mid slope	168,038	20	10	26,053	15.50%
4	Open depression	43,283	20	10	10,578	24.44%
5	Terrace	32,146	20	10	7,774	24.18%

Table 9 Landform summary

Landform	Landform area (m²)	Area effectively surveyed (m²)	Landform effectively surveyed (%)	No. of Aboriginal sites	No. of artefacts or features
Crest	81,033	14,352	17.71%	1	1
Lower slope	36,813	3,152	8.56%	1	1
Mid slope	168,038	26,053	15.50%	–	–
Open depression	43,283	10,578	24.44%	–	–
Terrace	32,146	7,774	24.18%	–	–





Legend

- Study area
- Survey track

Landform

- Crest
- Lower slope
- Mid slope
- Open depression
- Terrace
- Upper slope

Figure 8 Survey effort

0 50 100 150 200

Metres
Scale: 1:4,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

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5.4 Discussion of archaeological survey results

The archaeological survey consisted of a meandering foot transect, which targeted all portions of the study area. The results of the field survey are provided in Figure 9. The previously recorded AHIMS 52-4-0691 (CPark A02) and AHIMS 52-4-0196 (Stoney Creek 1) were easily relocated during the archaeological survey; however, AHIMS 52-4-0692 (CPark A03) was unable to be relocated. The assessment for areas that have low, moderate or high archaeological potential within the study area is based on a number of factors, including environmental conditions, geomorphological processes, past land use activities, results of previous archaeological studies, surveys and test excavations, and results of the current survey.

The study area is within a rolling hills landform pattern with rounded peaks and deep channel incisions. The north-east corner of the study area (Site 2) contains a number of crests, open depressions and sloping landform units. A number of sandstone outcrops occur along the eastern bank of Stony Creek, which are located approximately 110 metres east of Stony Creek.

The Moss Vale Highlands soil landscape covers the majority of Site 2 and consists of rolling hills and rounded peaks with deep channel incision on horizontal Triassic alternating between quartz sandstone and shale. There are widespread yellow and grey texture-contrast soils on friable sandstone often with concretionary ironstone and accumulations of clan quartz sand in valleys (Mitchell 2002, p.117). The primary geomorphological agents are likely to be sheet wash and aggradation causing a process of erosion. Top soils within the study area were likely formed from material being washed down the slope where they accumulated at the base of slopes and within stream channels. Land clearance is likely to have exposed soils and exasperated effects of sheet wash, potentially eroding away archaeological deposits.

The 1949 aerial shows that much of Site 2 has been cleared of vegetation with a few remnant trees remaining (Plate 12), and the house and four associated sheds have been constructed. There also appears to be plough lines in the aerial image. By 1963, little has changed within the Site 2 study area, although the most southern shed appears to have been demolished (Plate 13). The 1974 aerial shows that two large dams have been constructed (Plate 14) and by 1991, two more shed have been built and a number of low channel banks have been installed (Plate 15).

Plate 12 1949 aerial

Plate 13 1963 aerial

Plate 14 1974 aerial

Plate 15 1991 aerial

The initial vegetation removal and repeated ploughing of the ground are the most widespread disturbances within the study area. The impact of ploughing activities on subsurface artefact deposits has been investigated multiple times. Odel and Cowan (1987) and Clark and Schofiled (1991) undertook experimental studies of artefact movement from ploughing where a known number of stone artefacts were buried in ploughed fields and their movement and condition were recorded after ploughing. They found that, although artefacts were displaced from their original location, the ploughing did not destroy the spatial distribution of the sites and the artefacts would generally remain within the landform where they were initially deposited. Also, the construction of the residential building and associated sheds, along with the construction of large dams, would have caused significant disturbance to this part of the study area. All of these human land use practices have had an influence on site integrity and caused spatial and stratigraphic movements of artefacts. Significant land modifications, such as deep excavations while constructing buildings and dams, have caused the destruction and removal of cultural material. However, the potential for subsurface artefacts to be present is high within areas that are less disturbed.

Three previous surveys have been conducted within the study area by Total Earth Care (2007), Navin Officer (2008) and Artefact (2018), which resulted in overlapping areas of archaeological sensitivity, as shown below.

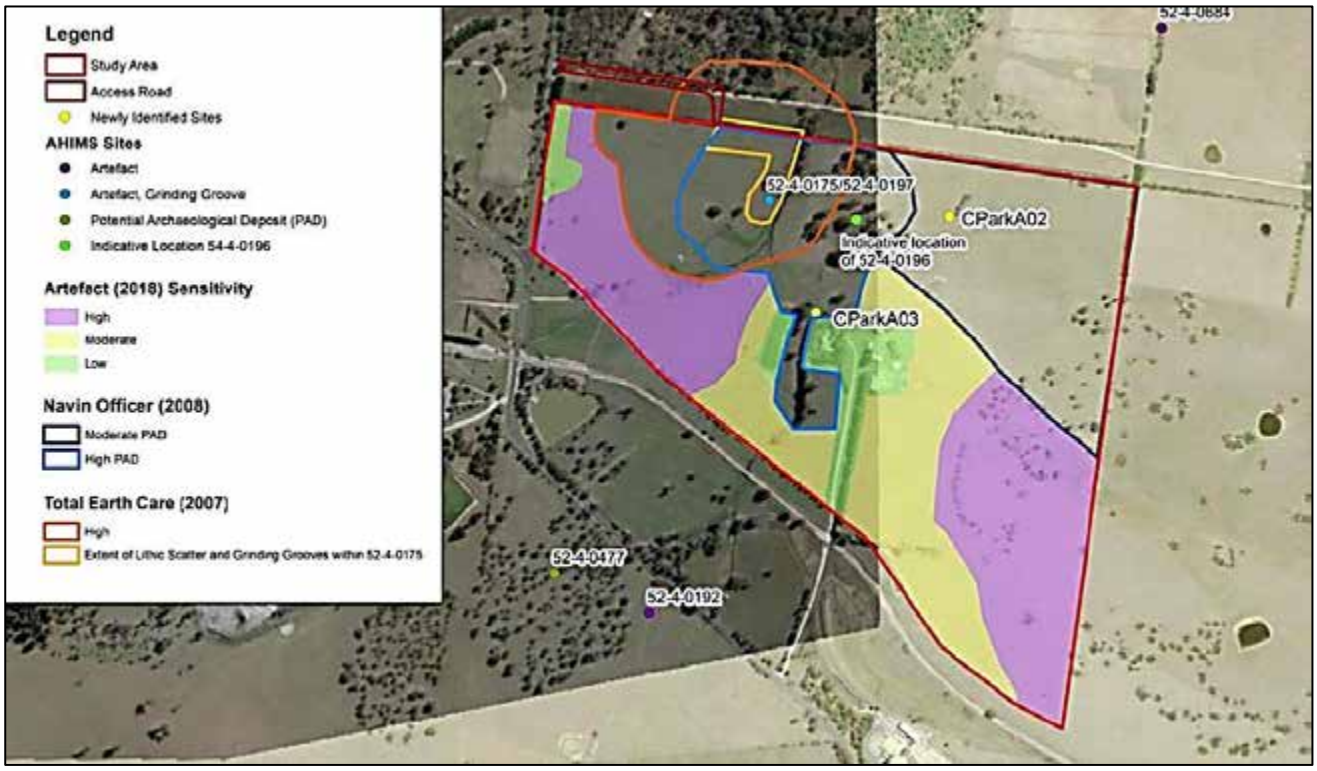
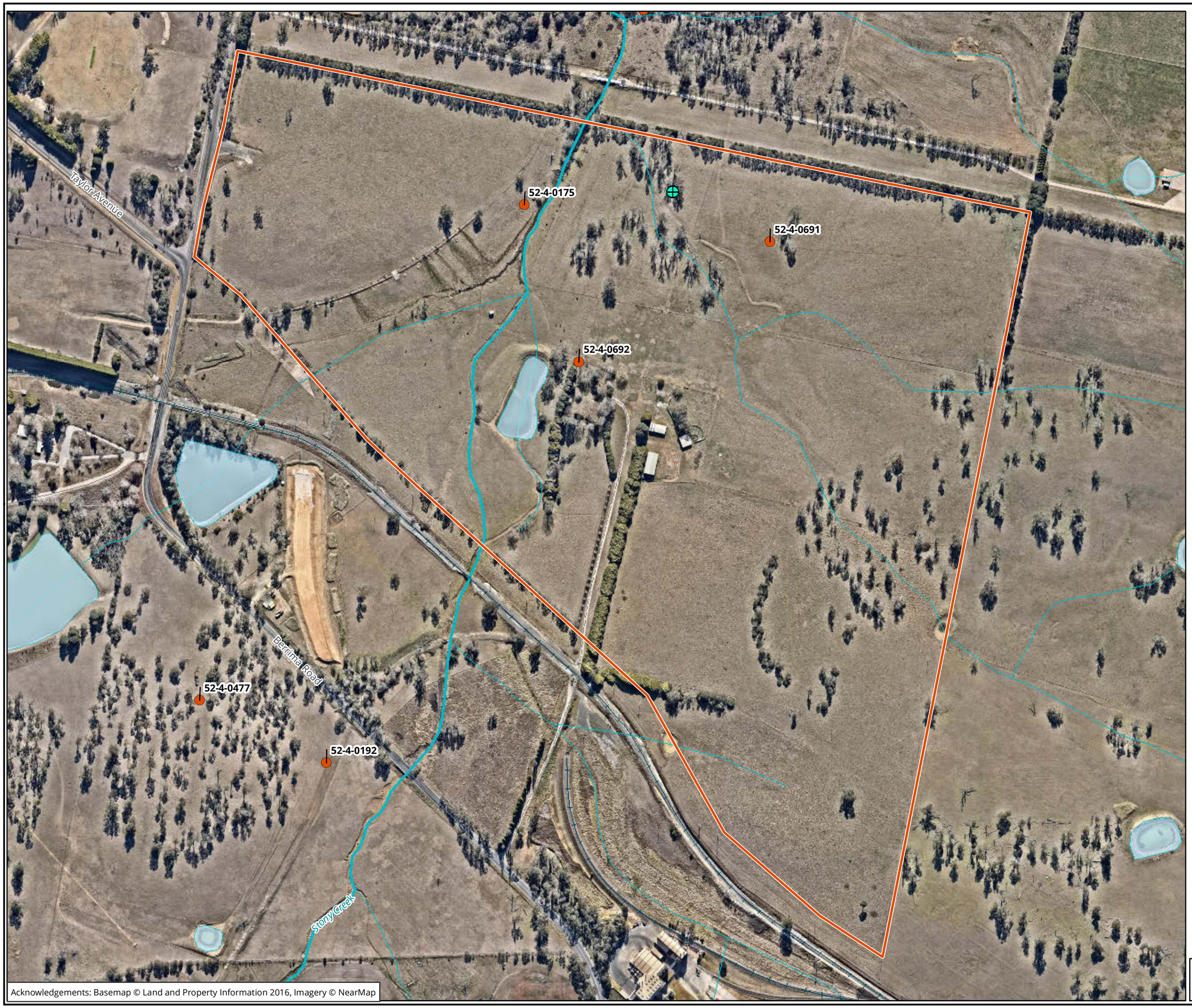
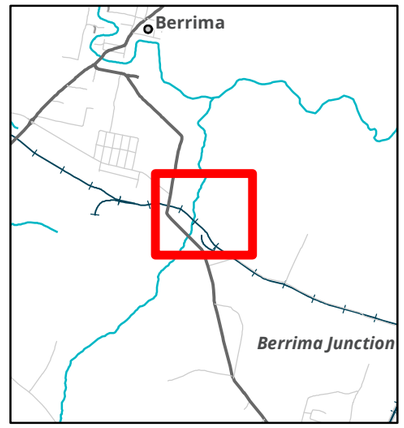


Plate 16 Areas of archaeological sensitivity as described by Artefact (2018)

During the current survey, CPark A02 was relocated on the crest of a small hillock in the north section. This artefact consists of a broken grinding stone measuring 90 millimetres long, 100 millimetres wide and 50 millimetres high. Stoney Creek 1 consists of three axe grinding grooves on a sandstone floater measuring located east of Stony Creek. No site card remains for this site and AHIMS shows the location as being north of the study area; however, this is likely a projection area and the site was easily relocated during the survey. The sandstone outcrop measures approximately 2.3 by 1.5 meters and a number of circular depressions, or Gnamma holes, were also observed ranging in size of 50-140 millimetres in diameter. Three of these holes appear to have been subjected to grinding to increase the diameter.

The results of the current archaeological survey confirm the findings of previous assessments. Total Earth Care' s (2007) survey along sections of Stony Creek recorded seven open artefact scatters and 11 isolated finds, which comprised of 64 artefacts and seven grinding groove panels. All of the sites were located on level raised areas above the flood zone of the creek line and all of them were considered to have high levels of associated subsurface deposits. The areas where these sites were located was considered a 'significant landscape that was a focus for camping, resource use and travel for Aboriginal people'. Likewise, a survey conducted by Rich (1988) found that sites will be located along minor water courses on elevated dry flat areas and more selectively along rivers where the valley is wide, or where resource areas such as swamps occur. Extensive test excavations conducted by AMBS (2007) demonstrated that the highest density of artefacts were recovered from alluvial deposits adjacent to drainage lines or on terrace slopes with deep sandy deposits.





Legend

- Study area
- AHIMS record
- Updated location of 52-4-0196

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap

Figure 9 Survey results

0 50 100 150 200

Metres
Scale: 1:4,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

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Biosis Pty Ltd

Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

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6 Test excavation

Following the results of the field survey a test excavation program was undertaken to characterise the extent, nature and archaeological (scientific) value of Aboriginal cultural heritage within identified Aboriginal sites and areas of moderate and high potential. The sampling strategy, methodology and results of the test excavation program are discussed below

6.1 Test excavation objectives

The principle objectives of the sub-surface test excavation program is to identify and understand the nature, extent and significance of any subsurface archaeological material located within areas of archaeological sensitivity within the study area. The aims of the testing program are to:

- Determine whether sub-surface archaeological deposits exist which may be impacted upon by the development. If so, to determine the extent and nature of such deposits.
- Identify whether 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, shell, hearths, knapping floors 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 identified during the subsurface testing program.

6.2 Research questions

Research questions provide a framework for undertaking sub-surface investigations and ensure that the information collected during the sub-surface testing program contributes to the knowledge of the sites and the broader archaeological record. Research questions include:

- *Do non-disturbed or minimally-disturbed soil profiles exist within areas of archaeological potential?*
- *Does the deposit contain archaeological material?*
- *Is the subsurface archaeology similar to other archaeological sites in local area?*
- *What is the nature of potential lithic assemblages?*
- *Is the lithic typology similar to the assemblages from other subsurface excavations in the region?*
- *Are any of the archaeological materials of scientific or cultural significance?*
- *What management is appropriate? Does the area warrant further investigation?*

6.3 Test excavation methodology

The test excavation will be conducted within the Site 2 study area identified as having high and moderate archaeological potential to contain Aboriginal cultural material. Excavation was conducted by hand in accordance with the code. Test excavation within the study area will conform to the following methodology:

- Test pits measuring 50 cm by 50 cm will be excavated within the area of high archaeological potential, spaced 20 metres apart, and areas of moderate potential, spaced 40 metres apart.
- Pits will be placed further apart where possible and closer where higher densities are encountered to allow extent testing.
- This approach will ensure an effective sampling of landforms while minimising the amount of excavation actually required.
- Test excavations units must be excavated using hand tools only including spades, handle shovels, and trowels.
- The first test excavation unit within the landform will be excavated and documented in 5 centimetre spits. Based on the evidence of the first excavation unit, 10 centimetre spits or sediment profile/stratigraphic excavation (whichever is smaller) will then be implemented.
- All material excavated from the test excavation units must be dry sieved using 5 millimetre aperture wire-mesh sieves.
- Test excavation units must be excavated to at least the base of the identified Aboriginal object-bearing units, and must continue to confirm the soils below are culturally sterile.
- All cultural material recovered from the test pits will be collected and brought to the Biosis office at 30 Wentworth Street, Port Kembla for lithic analysis.
- 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, texture and pH.
  - Amount and location of cultural material within the deposit.
  - Nature of disturbance where present.
  - Stratigraphy.
  - Archaeological features (if present).
  - Photographic records.
  - Context records.
- Test excavation units must be backfilled as soon as practicable due to safety issues.
- Following test excavation, an AHIMS Aboriginal Site Recording form must be completed and submitted to the AHIMS Registrar as soon as practicable, for each site that has been identified.
- Standard protocol for the discovery of any human remains is to be followed in the event that human remains are discovered.
- Test pits may be combined and excavated as necessary in 50 by 50 centimetre units for the purposes of further understanding site characteristics or in-situ features such as the extent of an area of high artefact density, or where intact Aboriginal archaeological features (knapping floors, hearths etc) may be suspected to be present. Note that under the Code, the maximum area that can be excavated in any one continuous area is three metres squared ($3m^2$).

- Test excavations can cease when enough information has been recovered to adequately characterise the objects present with regard to their nature and significance within the four PAD areas.

6.4 Test excavation results

A total of 137 test pits were excavated within areas of moderate and high potential (Figure 10, Figure 11 and Figure 12). Individual test pit and soil analysis results are provided in Appendix 3. Results by landforms are shown in Table 10 and a detailed discussion of results is provided below.

Table 10 Test excavation results by landform

Landform	Landform area (m^2)	Area tested (m^2)	Landform effectively tested (%)	No. of artefacts
Lower slope terrace	68,959	14.5	0.021	55
Mid slope	168,038	7.5	0.004	9
Upper slope	21,041	0.25	0.001	1
Crest	81,033	8	0.009	2
Open depression	43,283	3.75	0.008	1

6.4.1 Lower slope terrace

The lower slope terrace landform is located approximately 80 metres east of Stony Creek and runs parallel to the water course. A total of 32 test pits were excavated across the lower slope terrace landform at intervals of 20 metres in order to determine the extent and nature of the archaeological deposits. 55 artefacts were identified in 31 test pits (Figure 10). All artefacts were located within clayey silt or sandy clay contexts. The majority of the artefacts were encountered in the top two contexts, between 0 and 300 millimetres in depth, with artefact occurrence decreasing past this point.

Soil stratigraphy remained relatively consistent across the lower slope terrace landform with three main contexts encountered in each test pit. This typically consisted of a brown clayey silt present to approximately 180 millimetres, which overlaid a yellowish brown sandy clay that was present to between 300 and 350 millimetres. Below this context was a yellowish brown sandy clay present to between 400 and 600 millimetres. Some test pits contained a high percentage of ironstone (60-80%) inclusions, while others consisted of a clay base (Plate 17 and Plate 18). The soil profiles are relatively consistent with the Nattai Plateau soil landscape described by NSW (Mitchell) Landscapes (2002, p.106), which covers the lower slope terrace landform unit, and with the mapped soil profile identified along Berrima Road, 275 metres north of the study area (NSW Soil and Land Information Systems 2001).

One test pit contained asbestos (test pit 14.1) and was abandoned, while another test pit (test pit 12.1) contained a small amount of historical items such as glass and ceramic fragments.

Plate 17 Test pit 1.1, showing soil profiles within the lower slope terrace landform east of Stony Creek

Plate 18 Test pit 11.3, showing soil profiles within the lower slope terrace landform east of Stony Creek

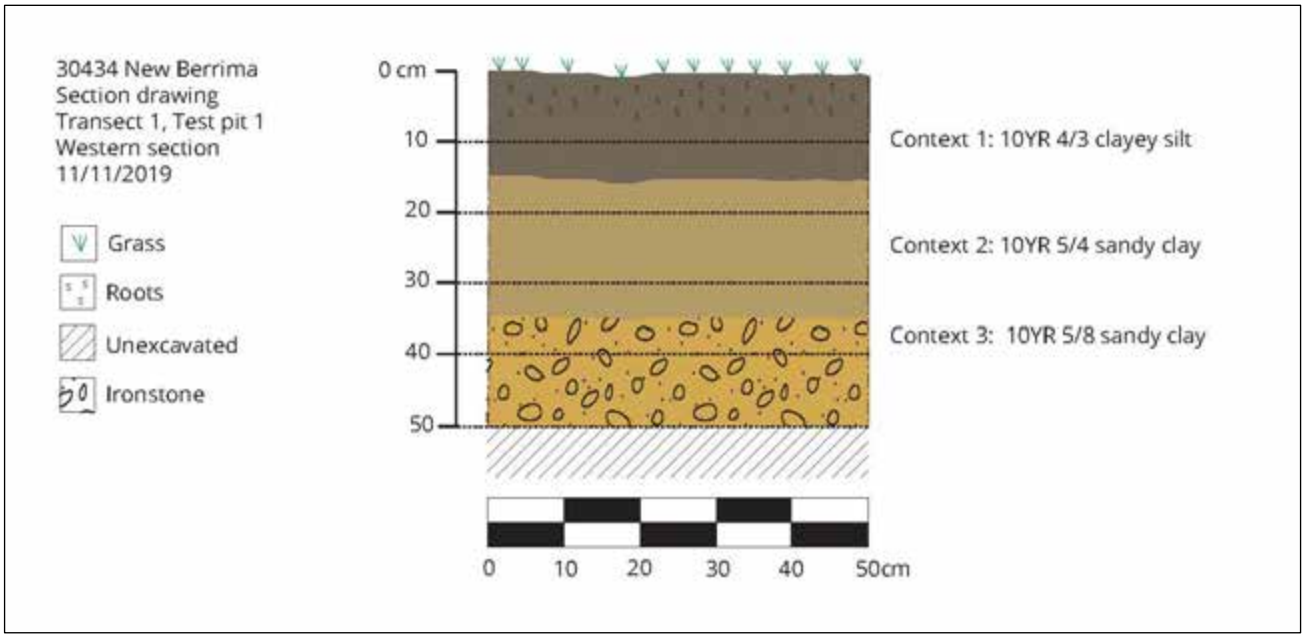


Plate 19 Transect 1, test pit 1 showing stratigraphic profiles of the lower slope terrace landform

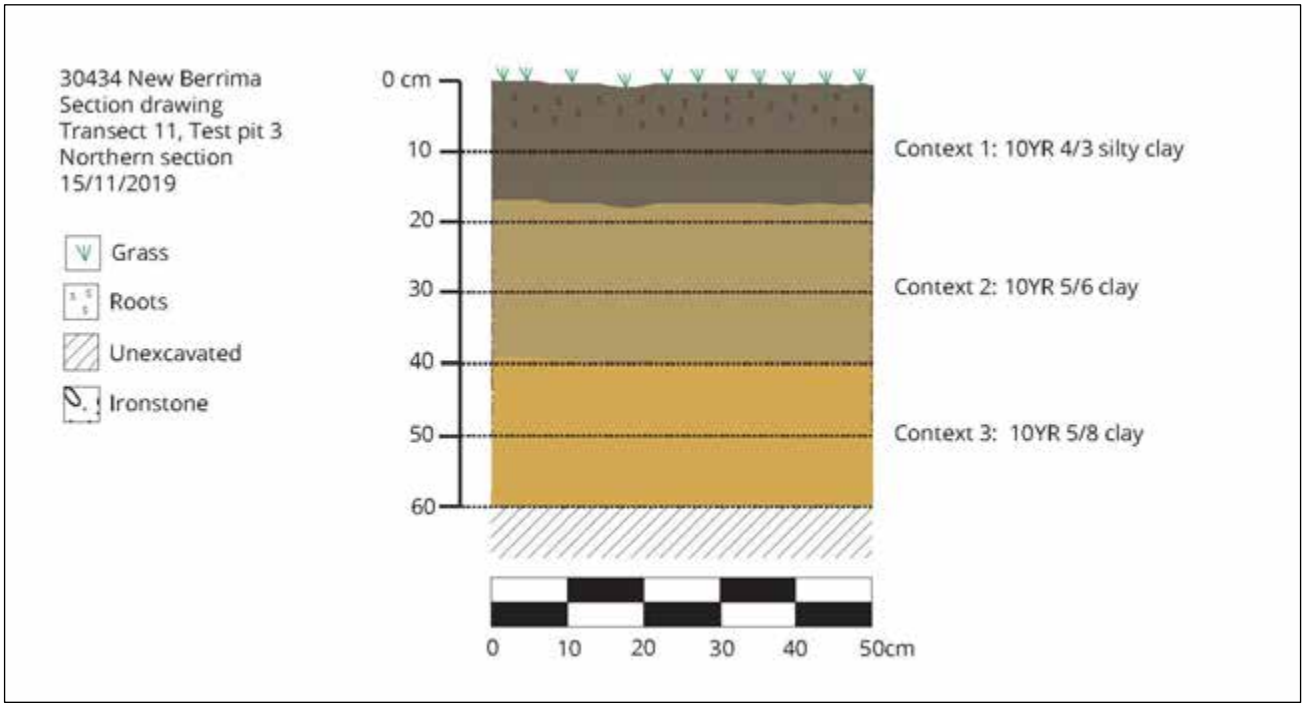


Plate 20 Transect 11, test pit 3 showing stratigraphic profiles of the lower slope landform

6.4.2 Mid slope

A total of 36 test pits were excavated across the mid slope landform at intervals of 40 metres in order to determine the extent and nature of the archaeological deposits. Nine artefacts were identified in seven test pits (Figure 10). All artefacts were located within clayey silt or sandy clay contexts. The majority of the artefacts were encountered in the top three contexts, between 0 and 300 millimetres in depth, with artefact occurrence decreasing past this point.

Soil stratigraphy was relatively consistent across the mid slope landform. Test pits typically had three contexts that consisted of a greyish brown clayey silt present to approximately 180 millimetres, which overlaid a light grey clayey silt that was present to between 300 and 400 millimetres. Below this context was a light yellowish brown sandy clay present to between 400 and 600 millimetres. Some test pits contained a high percentage of ironstone (60-80%) inclusions, while others consisted of a clay base (Plate 21 and Plate 22). The soil profiles are relatively consistent with the Moss Vale Highlands soil landscape (Mitchell 2002, p.117) and with the mapped soil profile identified along Berrima Road, 275 metres north of the study area (NSW Soil and Land Information Systems 2001).

Plate 21 Test pit 6.4, showing soil profiles within the mid slope landform

Plate 22 Test pit 7.4, showing soil profiles within the mid slope landform

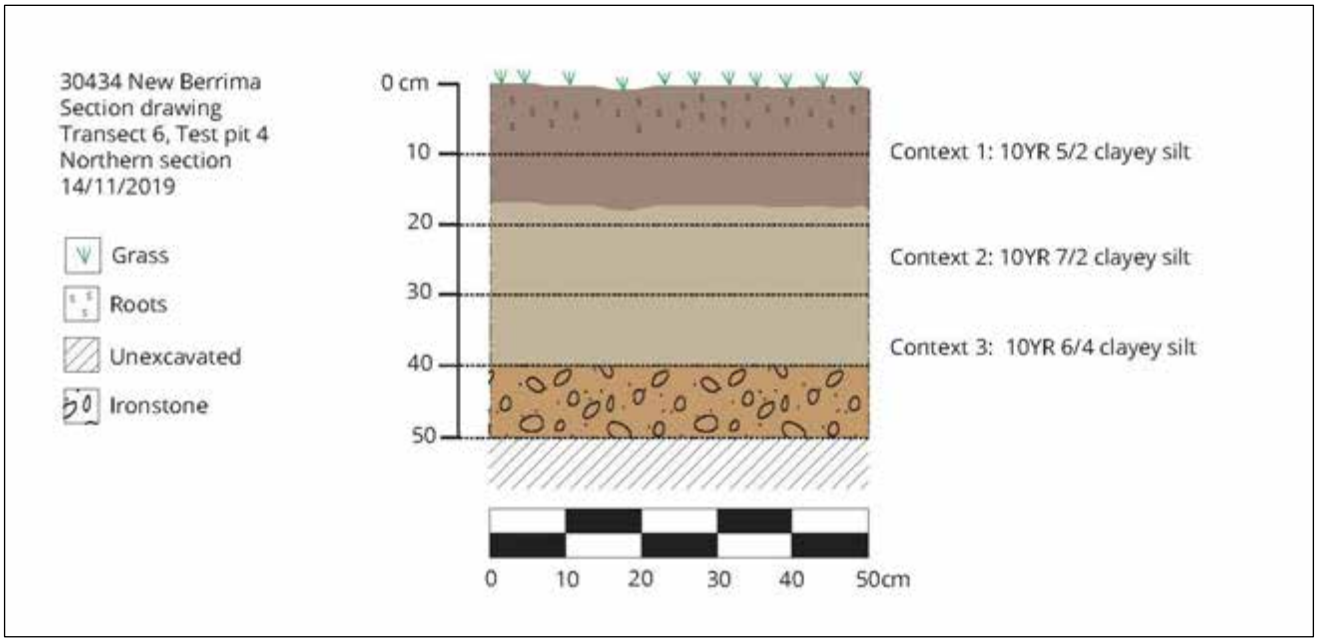


Plate 23 Transect 6, test pit 4 showing stratigraphic profiles of the mid slope landform

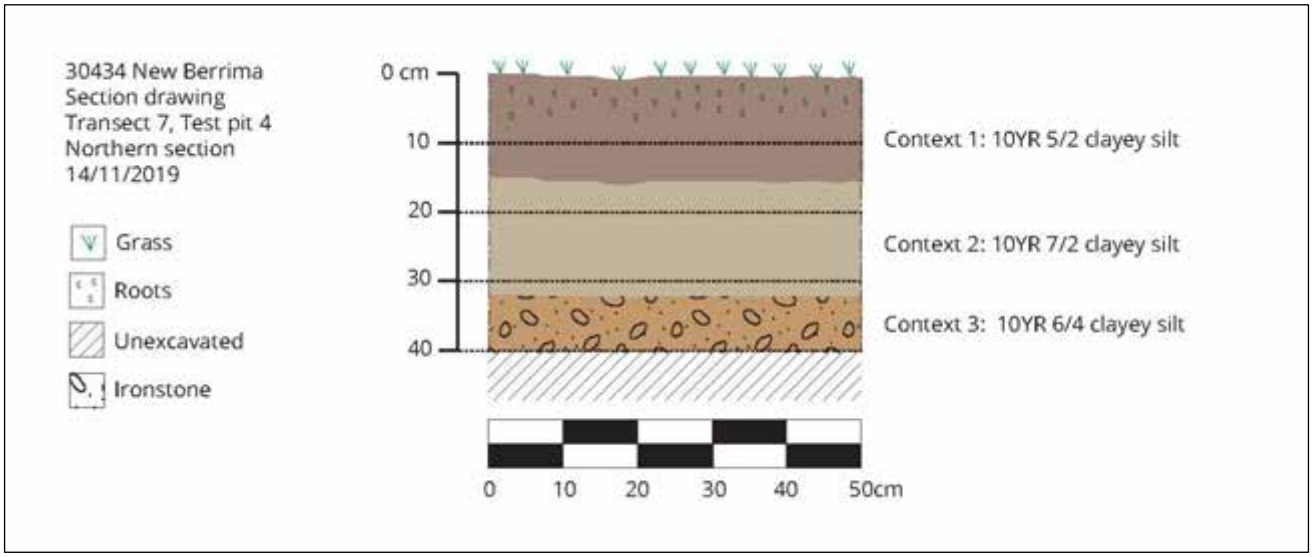


Plate 24 Transect 7, test pit 4 showing stratigraphic profiles of the mid slope landform

6.4.3 Upper slope

A total of 15 test pits were excavated across the mid slope landform at intervals of 40 metres in order to determine the extent and nature of the archaeological deposits. One artefacts was identified in one test pit (Figure 10), which was located within a clayey silt context between 200 and 300 millimetres in depth.

Soil stratigraphy was relatively consistent across the mid slope landform. Test pits typically had three contexts that consisted of a brown clayey silt present to approximately 185 millimetres, which overlaid a yellowish brown clayey silt that was present to between 300 and 400 millimetres. Below this context was a yellowish brown sandy clay present to between 400 and 600 millimetres. Some test pits contained a high percentage of ironstone (60-80%) inclusions, while others consisted of a clay base (Plate 25 and Plate 26). The soil profiles are relatively consistent with the Moss Vale Highlands soil landscape (Mitchell 2002, p.117) and with the

mapped soil profile identified along Berrima Road, 275 metres north of the study area (NSW Soil and Land Information Systems 2001).

Plate 25 Test pit 8.8, showing soil profiles within the upper slope landform

Plate 26 Test pit 16.5, showing soil profiles within the upper slope landform

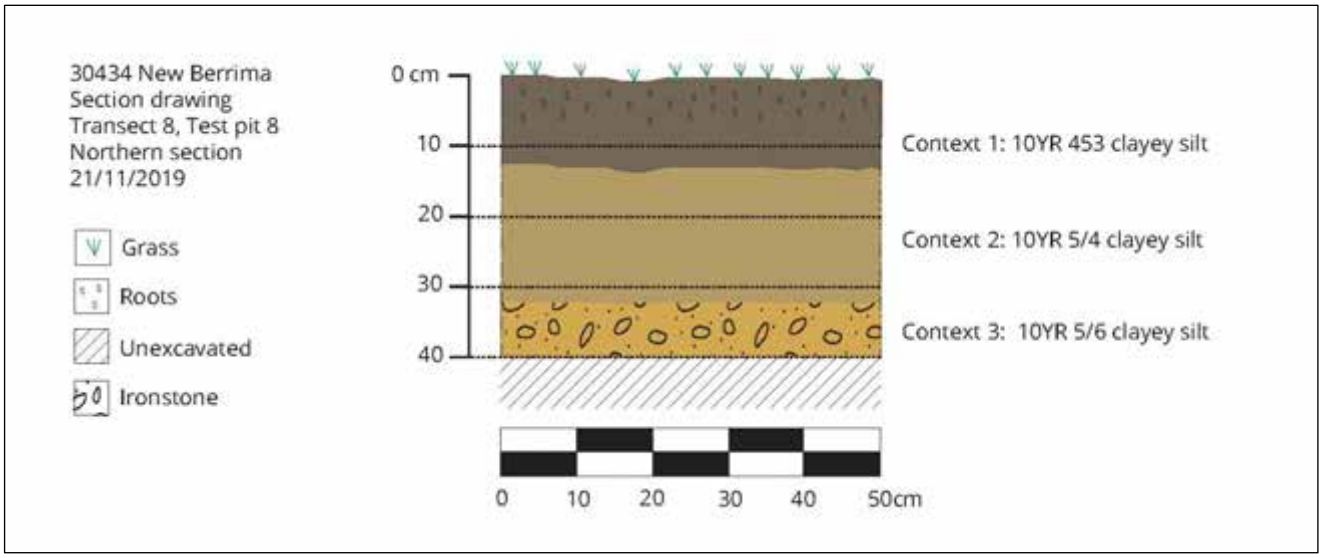


Plate 27 Transect 5, test pit 2 showing stratigraphic profiles of the upper slope landform

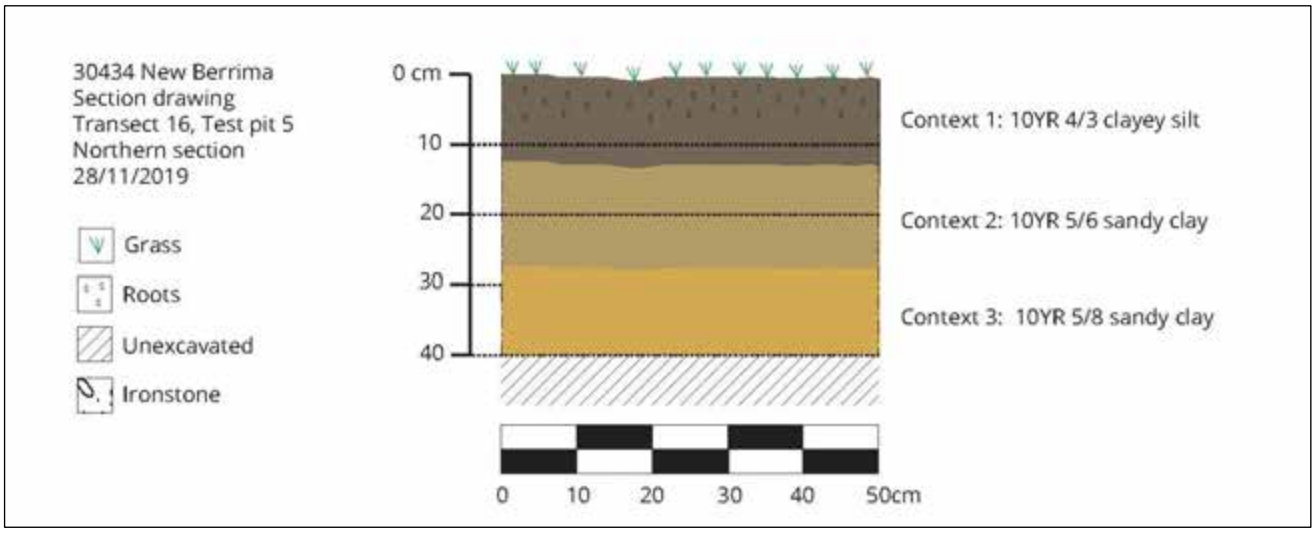


Plate 28 Transect 6, test pit 1 showing stratigraphic profiles of the upper slope landform

6.4.4 Crest

A total of 22 test pits were excavated across the crest landform at intervals of 40 metres in order to determine the extent and nature of the archaeological deposits. Two artefacts were identified in two test pits (Figure 10). All artefacts were located within sandy clay. The artefacts were encountered in the top two contexts, between 0 and 200 millimetres in depth.

Soil stratigraphy remained relatively consistent across the crest landform, with three main contexts encountered in each test pit. This typically consisted of a brown clayey silt present to approximately 150 millimetres, which overlaid a yellowish brown sandy clay that was present to around 250 millimetres. Below this context was a yellowish brown clayey silt present to approximately 300 millimetres with a high percentage of ironstone (60-80%) inclusions (Plate 29). The soil profiles are relatively consistent with the Moss Vale Highlands soil landscape (Mitchell 2002, p.117) and with the mapped soil profile identified along Berrima Road, 275 metres north of the study area (NSW Soil and Land Information Systems 2001).

However, there was one test pit that displayed a different soil profile. The test pit is located in close proximity to AHIMS 52-4-0691 (CPark A02) and contained three contexts that consisted a brown clayey silt present to approximately 130 millimetres, which overlaid a strong brown silty clay that was present to 320 millimetres. Below this context was a strong orangey brown sandy clay present to between 470 millimetres (Plate 30). There were no inclusions in this test pit and the soil was more compacted compared to the other test pits in this landform.

Plate 29 Test pit 10.2, showing soil profiles within the crest landform

Plate 30 Test pit 3.3, showing soil profiles within the cres landform

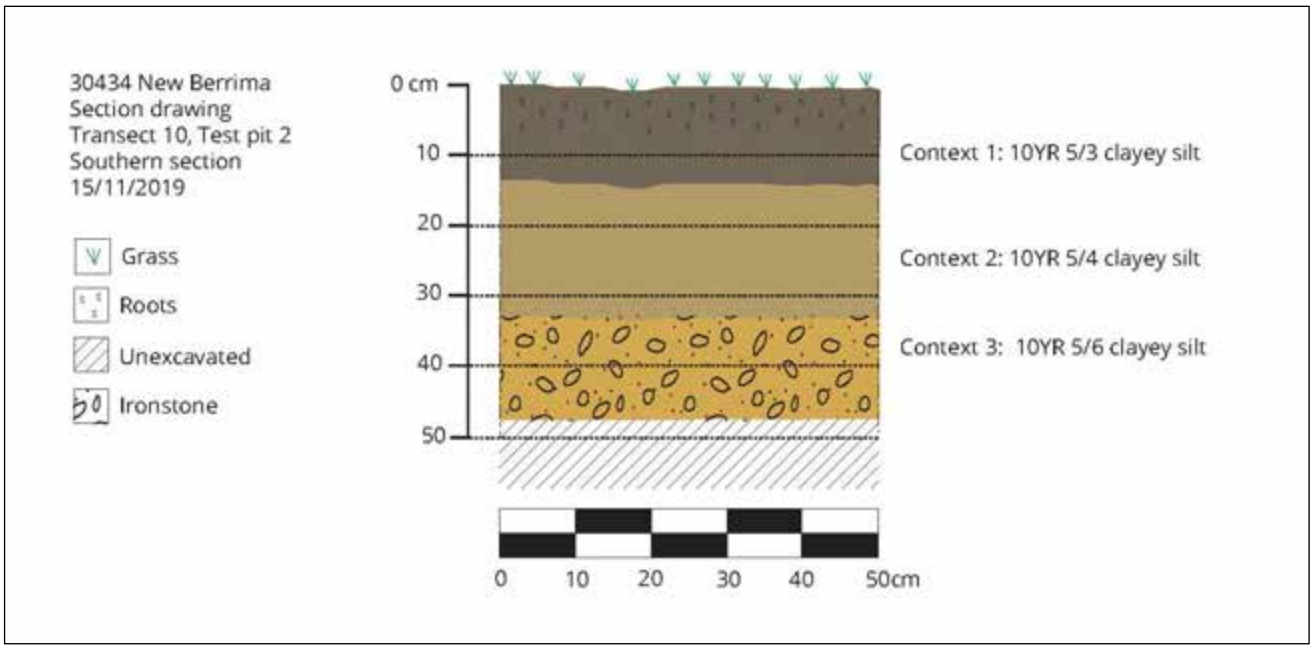


Plate 31 Transect 5, test pit 2 showing stratigraphic profiles of the crest landform

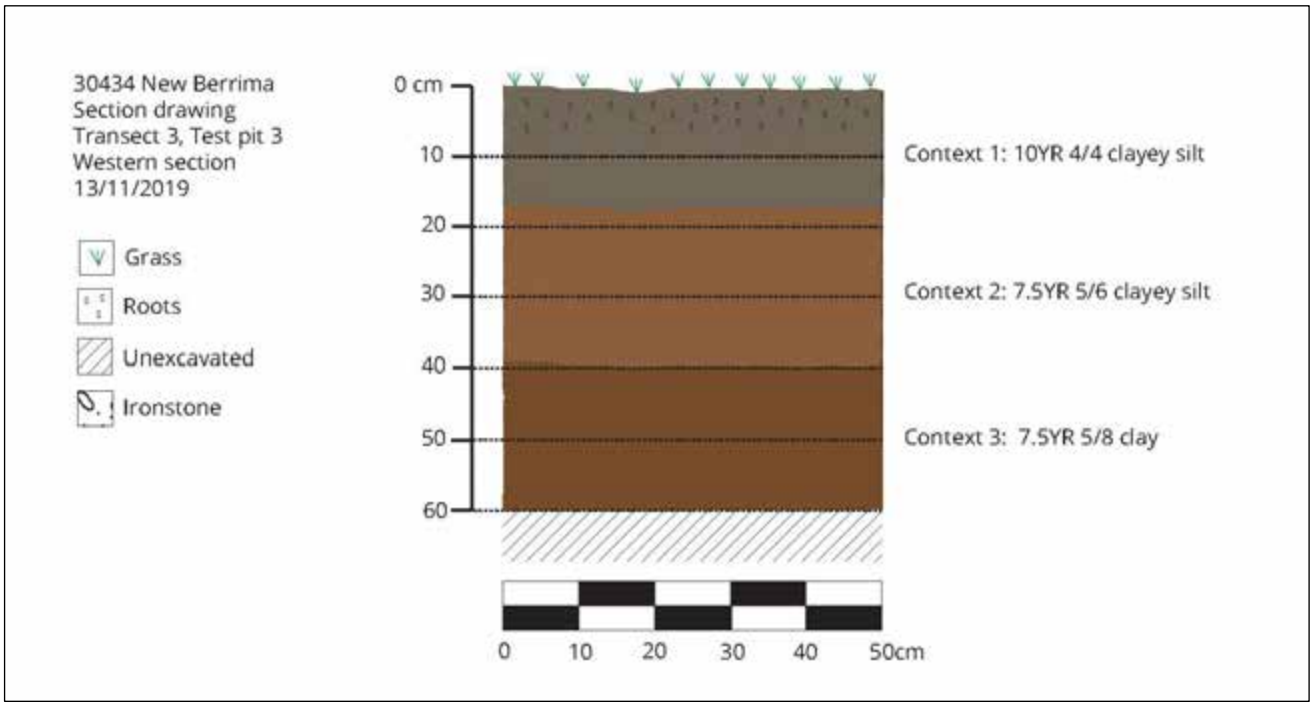


Plate 32 Transect 6, test pit 1 showing stratigraphic profiles of the crest landform

6.4.5 Open depression

The open depression landform is located within the three drainage areas that flow towards Stony Creek. A total of 30 test pits were excavated at intervals of 40 metres in order to determine the extent and nature of the archaeological deposits. One artefact was identified in one test pit (Figure 10), which was located within a clayed silt context between 0 and 100 millimetres in depth.

Soil stratigraphy remained relatively consistent across the open depression landform, with two to three main contexts encountered in each test pit. This typically consisted of a brown clayey silt present to approximately 150 millimetres, which overlaid a pale brown sandy clay that was present to approximately 300 millimetres. Below this context was a yellowish brown sandy clay present to between 300 and 400 millimetres with a low percentage of small ironstone (20-40%) inclusions (Plate 33 and Plate 34). The soil profiles are relatively consistent with the Moss Vale Highlands soil landscape (Mitchell 2002, p.117) and with the mapped soil profile identified along Berrima Road, 275 metres north of the study area (NSW Soil and Land Information Systems 2001).

Plate 33 Test pit 5.2, showing soil profiles within the open depression landform

Plate 34 Test pit 6.1, showing soil profiles within the open depression landform

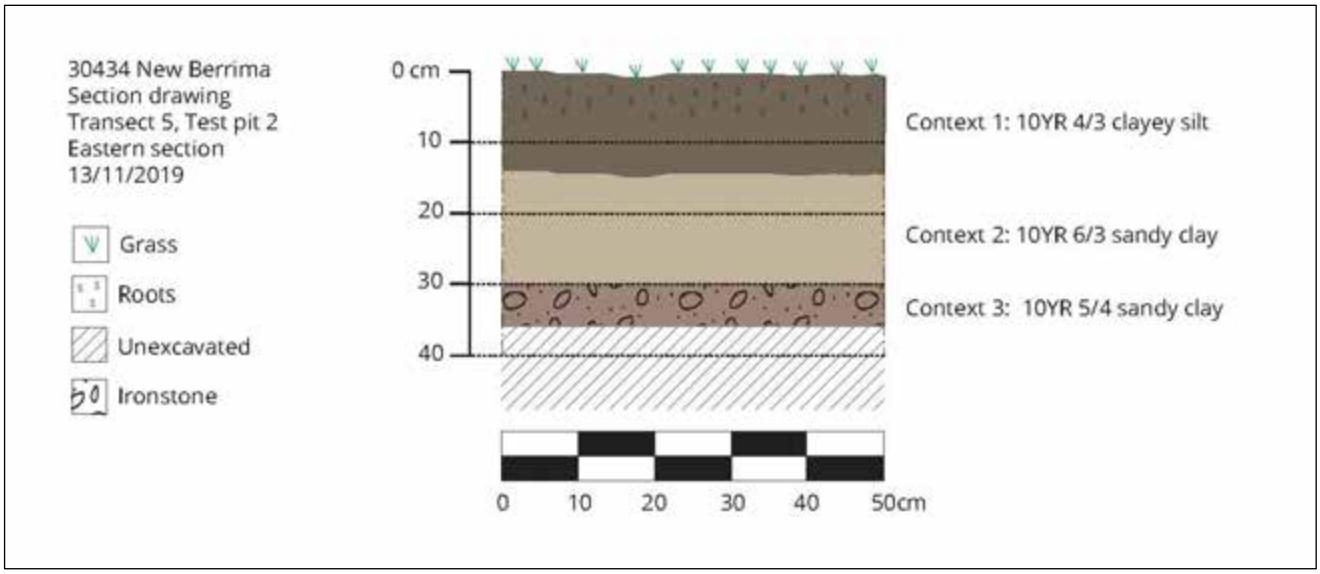


Plate 35 Transect 5, test pit 2 showing stratigraphic profiles of the open depression landform

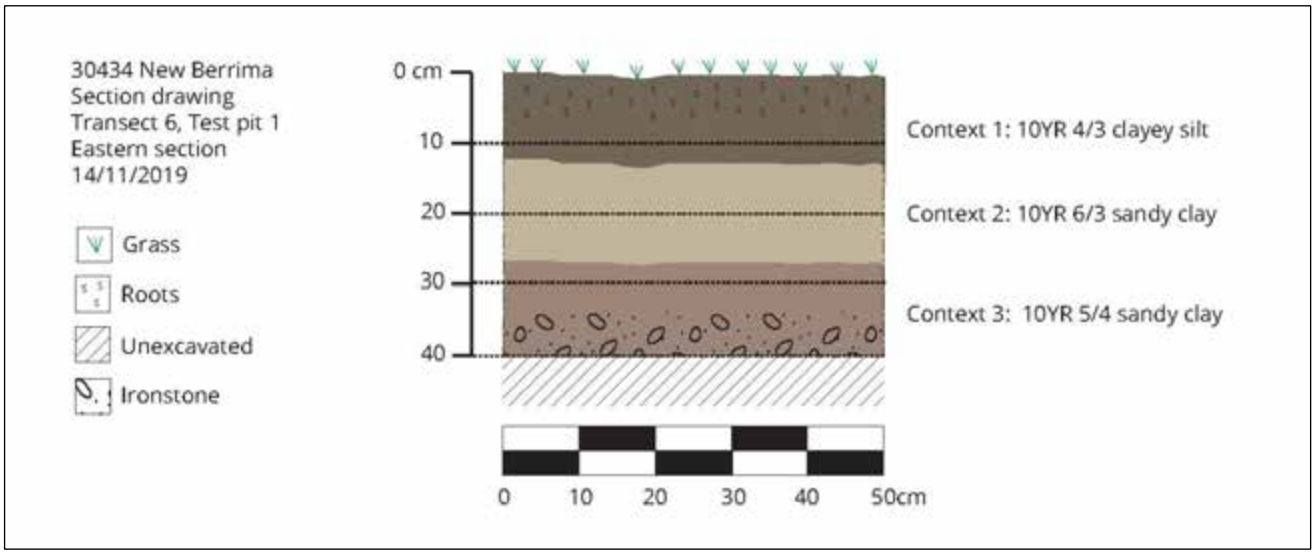
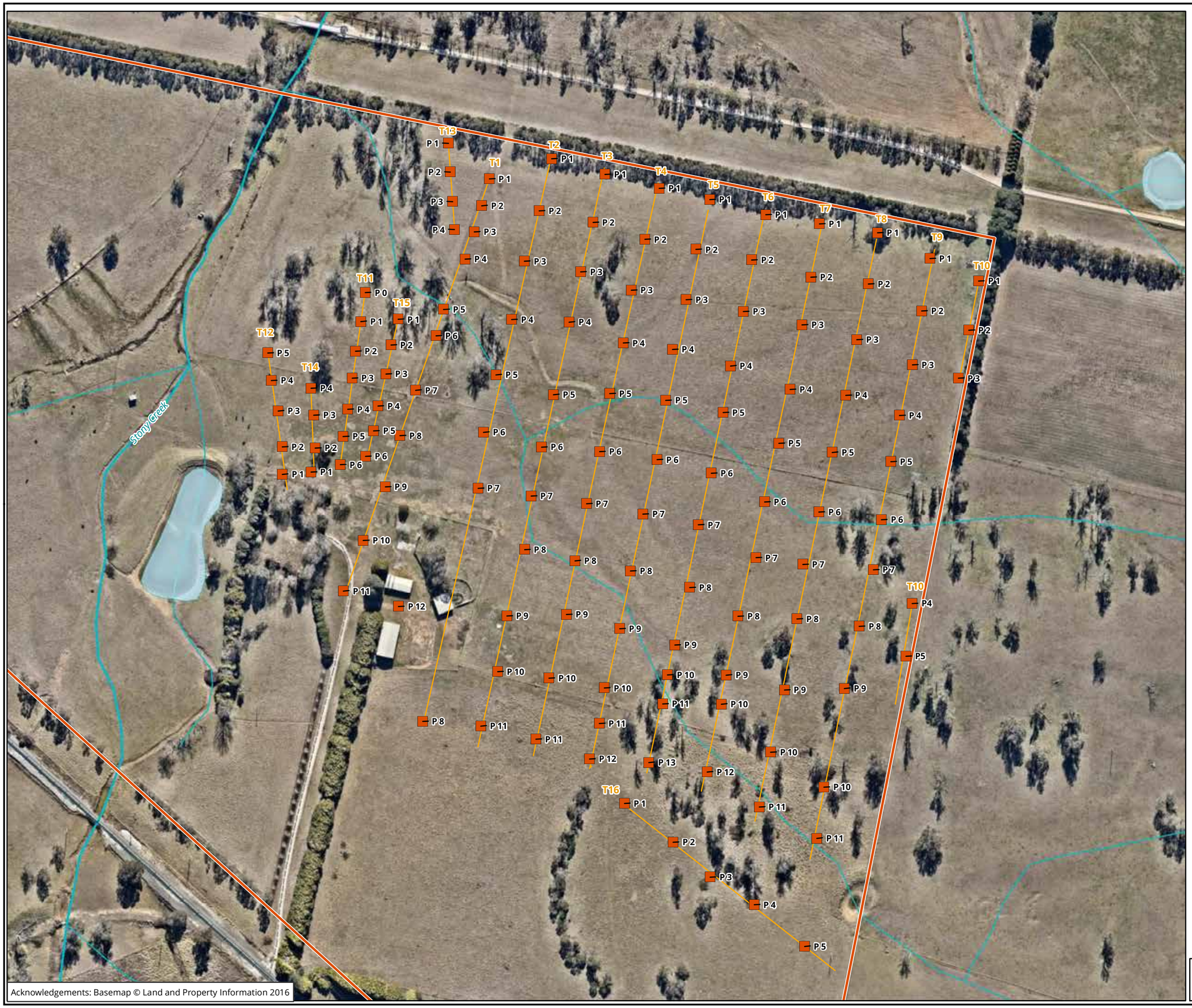
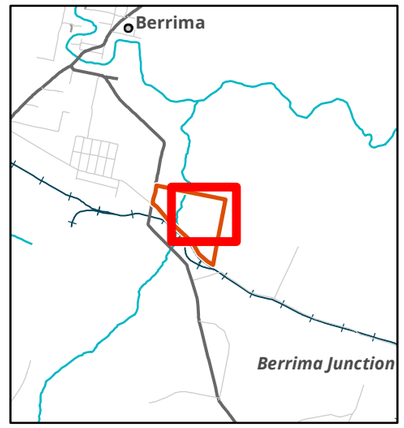


Plate 36 Transect 6, test pit 1 showing stratigraphic profiles of the open depression landform





Legend

- Study area
- Test Pit
- Transect

Acknowledgements: Basemap © Land and Property Information 2016

Figure 10 Test pit and transect locations

0 25 50 75 100

Metres

Scale: 1:2,500 @ A3

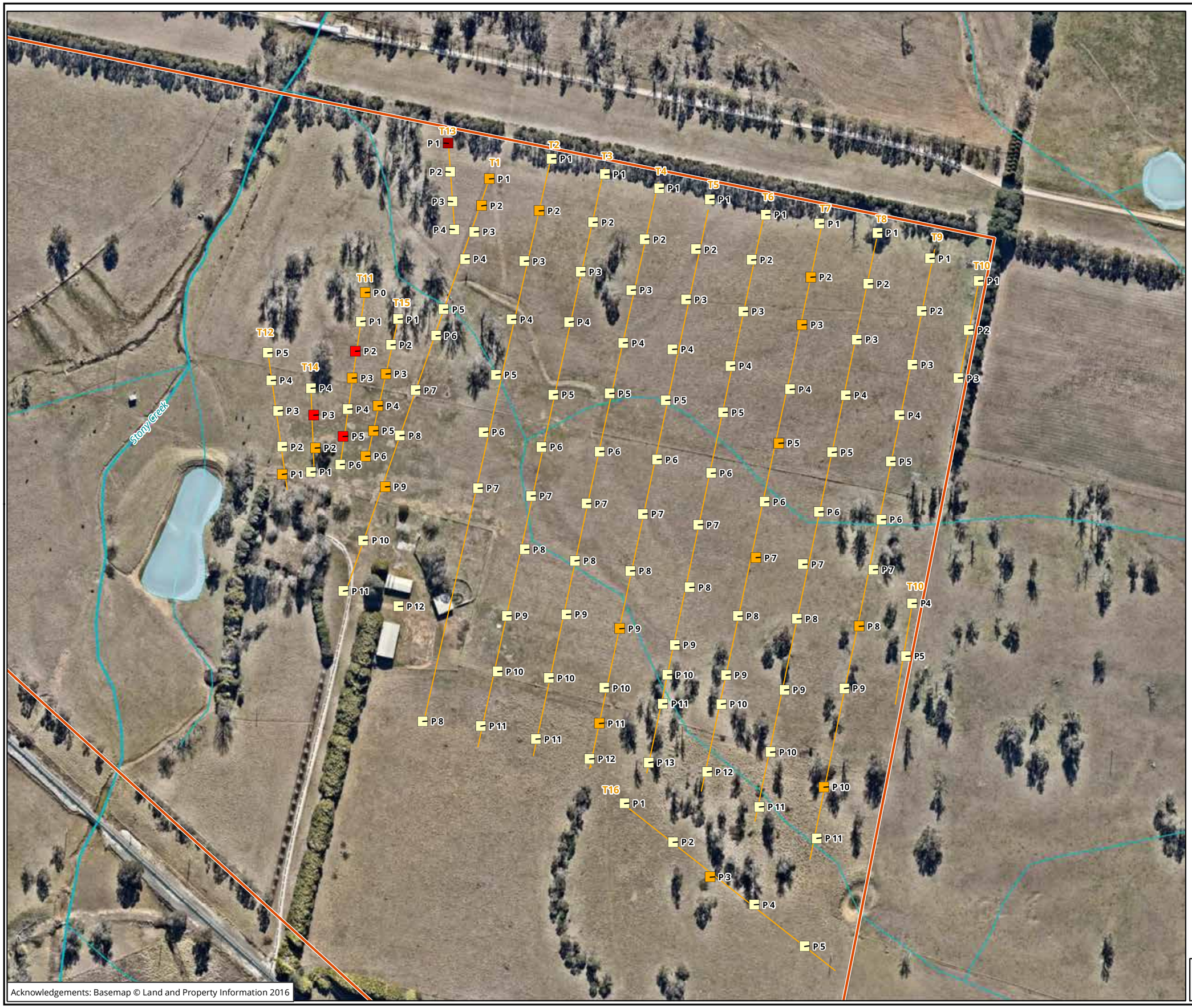
Coordinate System: GDA 1994 NSW Lambert

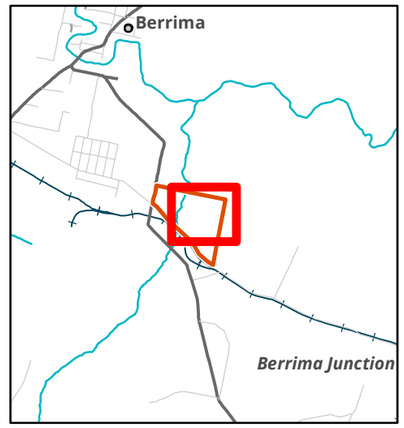
N

Biosis Pty Ltd

Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 30434
Date: 16 December 2019,
Checked by: SJK, Drawn by: AEDM, Last edited by: lwilson
Location:\\bio-data-01\matters$\30400s\30434\Mapping
30434_AR_F10_TestPits





Legend

Study area

Test pit artefact density

- 0
- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20

Figure 11 Artefact densities per test pit

0 25 50 75 100

Metres

Scale: 1:2,500 @ A3

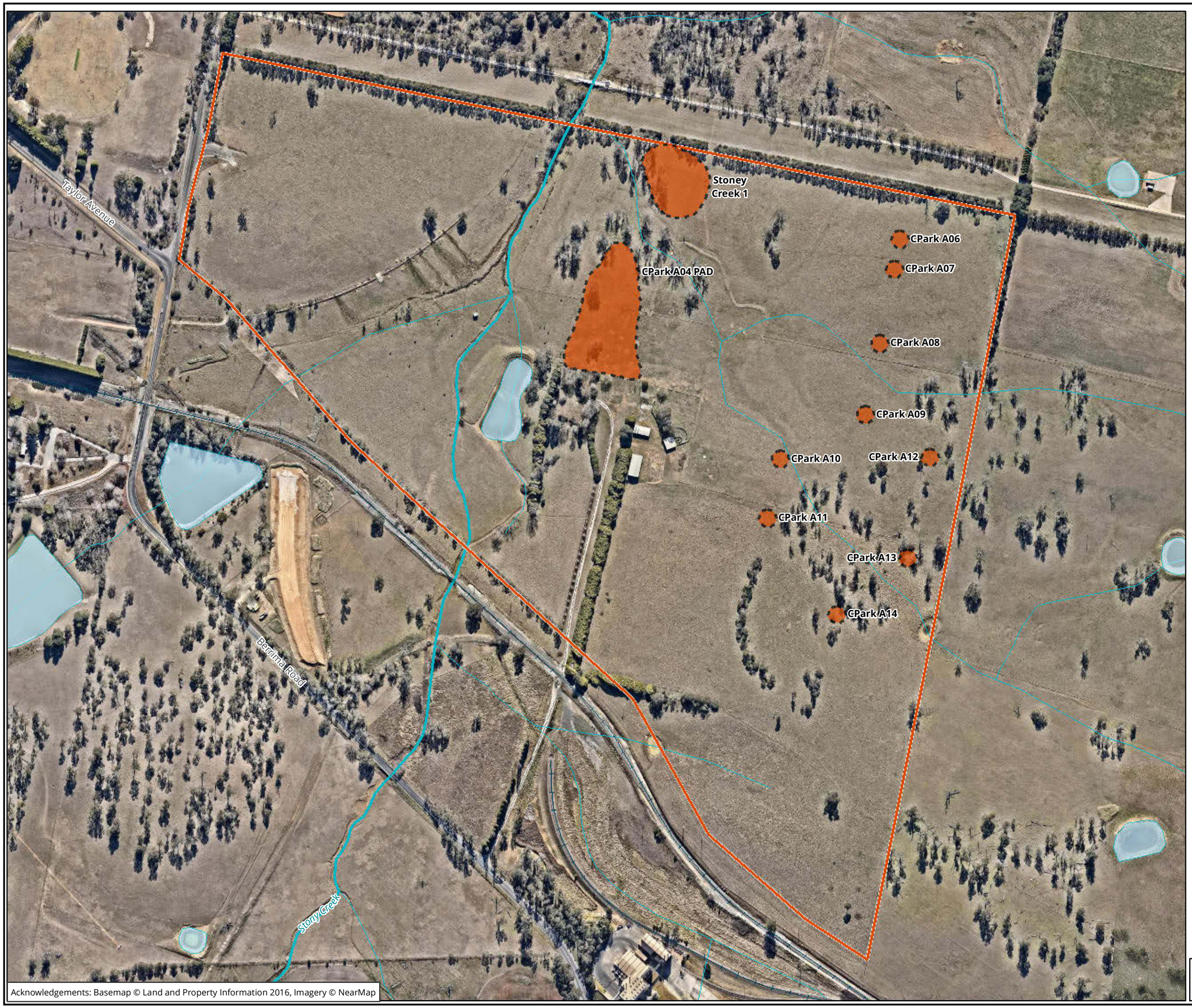
Coordinate System: GDA 1994 NSW Lambert

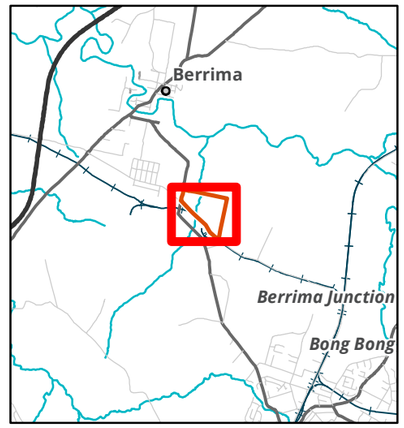
N

Biosis Pty Ltd

Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 30434
Date: 16 December 2019,
Checked by: SJK, Drawn by: LW, Last edited by: lwilson
Location:\\bio-data-01\matters$\30400s\30434\Mapping
30434_AR_F11_TPdensities





Legend

Study area

New Aboriginal sites

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap

Figure 12 Location of Aboriginal sites within the study area

0 50 100 150 200

Metres

Scale: 1:4,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

N

Biosis Pty Ltd

Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 30434
Date: 13 January 2020,
Checked by: SJK, Drawn by: LW, Last edited by: amurray
Location:P:\30400s\30434\Mapping
30434_AR_F12_AboriginalSites

7 Artefact analysis

The following analysis has been undertaken for the sub-surface artefacts identified during test excavation within the study area. A total of 67 artefacts were identified during the test excavation program. The analysis addresses a series of themes which seek to understand when and how stone was procured, worked and distributed within the overall study area:

- Artefact assemblage composition.
- Artefact size and distribution.
- Stone raw material procurement.
- Flake analysis.
- Tool analysis.

7.1 Analysis methodology

Stone artefacts from the excavation program were recorded and analysed in the Biosis offices at Wollongong. Artefacts were individually analysed and recorded in an excel spread sheet developed by Biosis for the collection of artefact data. The excel sheet contains catergories that allow the recorder to capture all relevant artefact attributes; this way a comprehensive typological, technological and metrical analysis of the assemblage can be undertaken. Analysis of the assemblage was undertaken using of a standard digital vernier caliper and a 10x hand lens. All measurements were recorded in millimetres to two decimal places. Appendix 3 contains the detailed sub-surface lithics recordings.

The analysis of the test pit excavations has been undertaken both individually and as a whole assemblage. This method allows comparisons to be made between this assemblage and other nearby assemblages and also allows attempts to determine past land use of the study area.

7.2 Sub-surface stone artefact analysis

A total of 67 artefacts from 137 test pits were recorded from the sub-surface excavations (Table 11). The majority of artefacts were collected from Transect 11 (n=20, 28.85%), followed by Transect 13 (n=12, 17.91%). All artefacts in Transect 13 were identified in TP1, making it the test pit with the highest single artefact count. Transect 14 (n=9, 13.43), Transect 15 (n=7, 10.45%) and Transect 1 (n=5, 7.46%) each contained between 5 and 10 artefacts, while Transects 7 (n=4, 5.97%), 5 (n=3, 4.48%), 2 (n=3, 4.48%), 9 (n=2, 2.99%), 12 (n=1, 1.49%) and 16 (n=1, 1.49%) each contained less than 5 artefacts.

Table 11 Count of artefacts by pit and transect

Transect no.	TP0	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10	TP11	Total
1	0	2	1	0	0	0	0	0	0	0	2	0	5
2	0	0	3	0	0	0	0	0	0	0	0	0	3
5	0	0	0	0	0	0	0	0	0	1	0	2	3
7	0	0	1	1	0	1	0	1	0	0	0	0	4

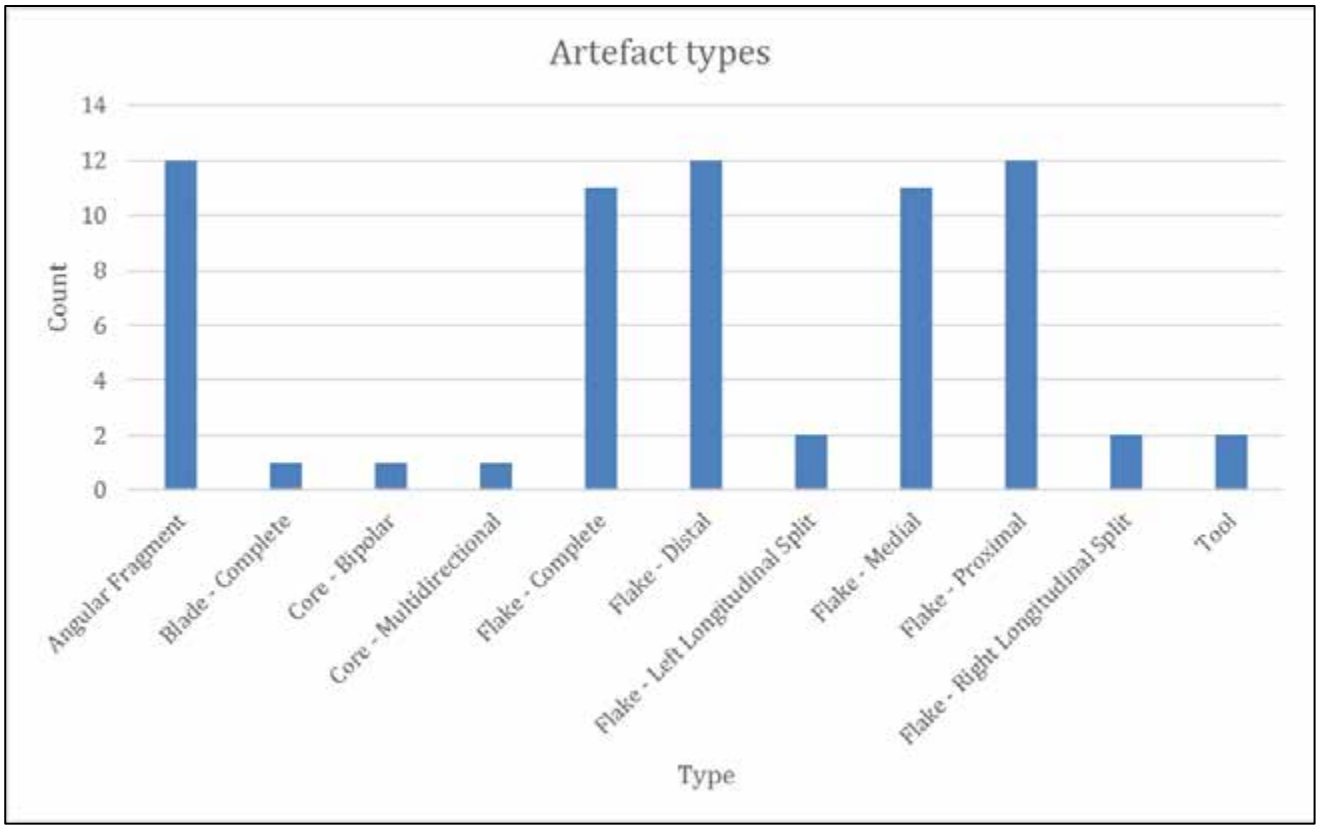
Transect no.	TP0	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10	TP11	Total
9	0	0	0	0	0	0	0	0	1	0	1	0	2
11	3	0	6	3	0	8	0	0	0	0	0	0	20
12	0	1	0	0	0	0	0	0	0	0	0	0	1
13	0	12	0	0	0	0	0	0	0	0	0	0	12
14	0	0	3	6	0	0	0	0	0	0	0	0	9
15	0	0	0	3	2	1	1	0	0	0	0	0	7
16	0	0	0	1	0	0	0	0	0	0	0	0	1

7.2.1 Assemblage composition

A review of artefact types across the Site 2 study area as a whole shows that no single artefact type dominated the assemblage (Table 12). Angular fragments, distal flake fragments and proximal flake fragments each made up 17.91% of the assemblage (n=12) making them the three most common artefact types in the assemblage (Graph 5). Complete flakes and medial flake fragments were next most recorded artefact type within the assemblage, each making up 16.42% (n=11) of the total assemblage. They were followed by longitudinal flake fragments, which made up 5.97% (n=4) of the assemblage.

Table 12 Artefact types

Artefact type	Count	Percentage (%)
Angular Fragment	12	17.91
Blade - Complete	1	1.49
Core - Bipolar	1	1.49
Core - Multidirectional	1	1.49
Flake - Complete	11	16.42
Flake - Distal	12	17.91
Flake - Longitudinal Split	4	5.97
Flake - Medial	11	16.42
Flake - Proximal	12	17.91
Tool	2	2.99
Total	**67**	**100**



Graph 5 Composition of artefact types

The assemblage also contained one (1.49%) flake displaying blade like features (length twice as long as width, parallel arrases on dorsal face), and two cores (2.99%) consisting of one bipolar (1.49%) and one multidirectional (1.49%) core. Two tools (2.99%) were also identified within the Site 2 study area.

7.2.2 Size and distribution

The vertical distribution of artefacts at a site can be a good indicator of occupation intensity, as spits with higher concentration are likely to have seen longer or more intensive occupation than spits with smaller artefact concentrations (Table 11). The vertical distribution of artefacts across the study area shows the highest number of artefacts occurring in spit 2 followed by spit 1 and spit 3. This peak in spit 2 suggests that the period of occupation was most intensive during the deposition of this spit. A trend in the vertical distribution of artefacts can also be seen clearly in this assemblage, with artefact numbers decreasing in both directions from spit 2. This trend could indicate that the area was less heavily occupied prior to and proceeding the period of spit 2's deposition; although, it is important to determine if these trends are not also the result of post depositional movement of artefacts.

Table 13 Concentration of artefacts per spit

Spit number (mm)	Artefact count (n=)	Percentage (%)
Spit 1 (0-100)	20	29.85
Spit 2 (100-200)	28	41.79
Spit 3 (200-300)	15	22.39
Spit 4 (300-400)	3	4.48

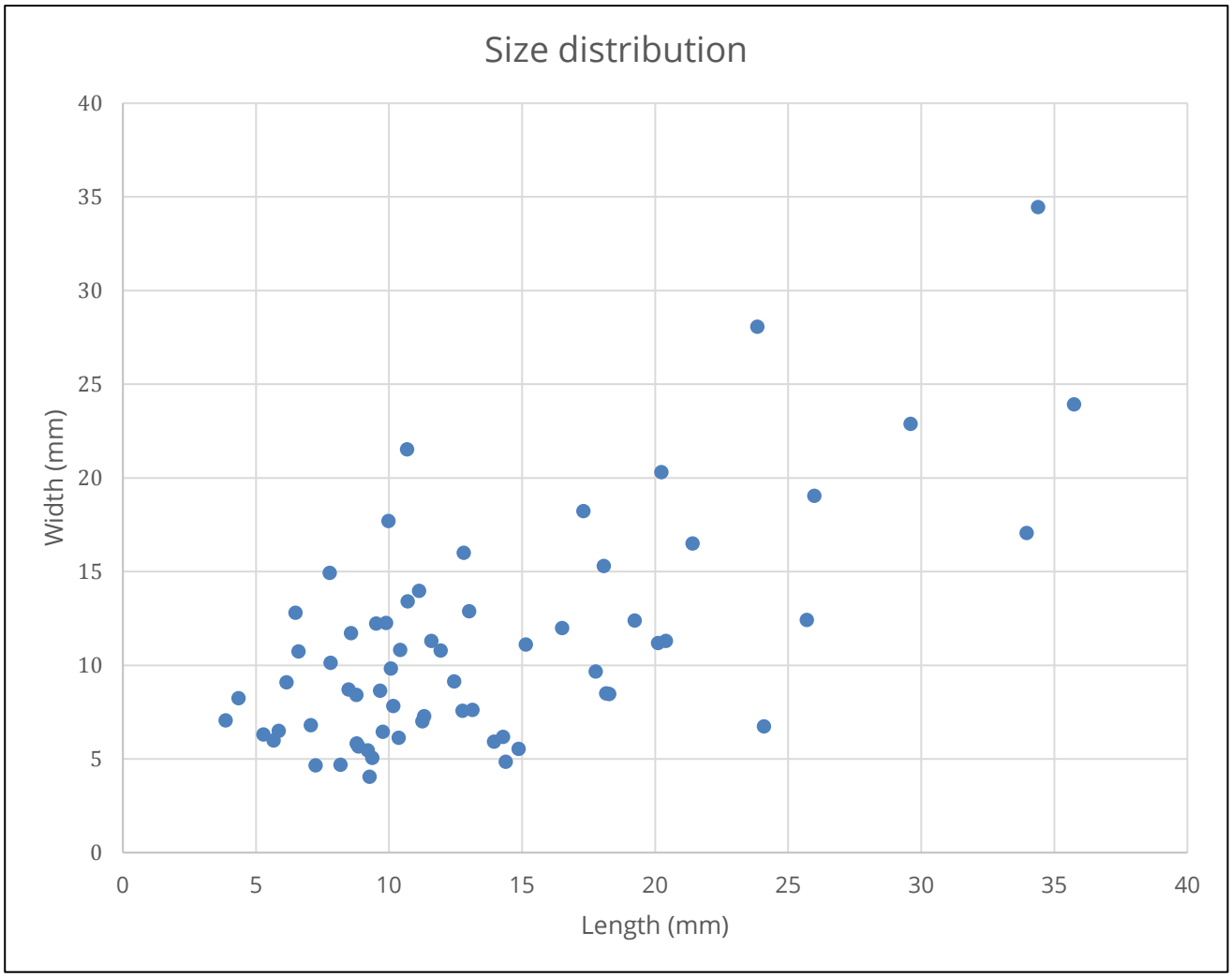
Spit number (mm)	Artefact count (n=)	Percentage (%)
Spit 5 (400-500)	1	1.49
Total	**67**	**100**

One way to determine the level of post depositional movement of artefacts is to look at the size distribution of artefacts throughout the soil profile. There are a number of ways to assess the size of artifacts including measures of length vs thickness, width vs thickness and maximum length. Size decreases with depth potentially indicate that post-depositional processes have occurred as smaller artefacts are more likely to be affected by size sorting as a result of soil movement or disturbance (Richardson 1992). Therefore, if artefacts are moving through the soil there will tend to be concentrations of smaller artefacts at the base of an excavation whereas larger artefacts are more likely to remain in their original position (Baker 1978).

A review of the average maximum length of artefacts by each spit shows potential size distributions. It can be seen that the largest average artefact size was identified in spit 5, followed by spit 4, spit 1, spit 2 and finally spit 3. The result of this analysis indicate that there are no clear trends in artefact size by depth and suggest that minimal post depositional movement of artefacts through the soil profile has occurred.

Table 14 Mean maximum length of artefacts by spit

Spit number	Mean length (mm)
1	17.67
2	15.09
3	14.75
4	17.79
5	21.66



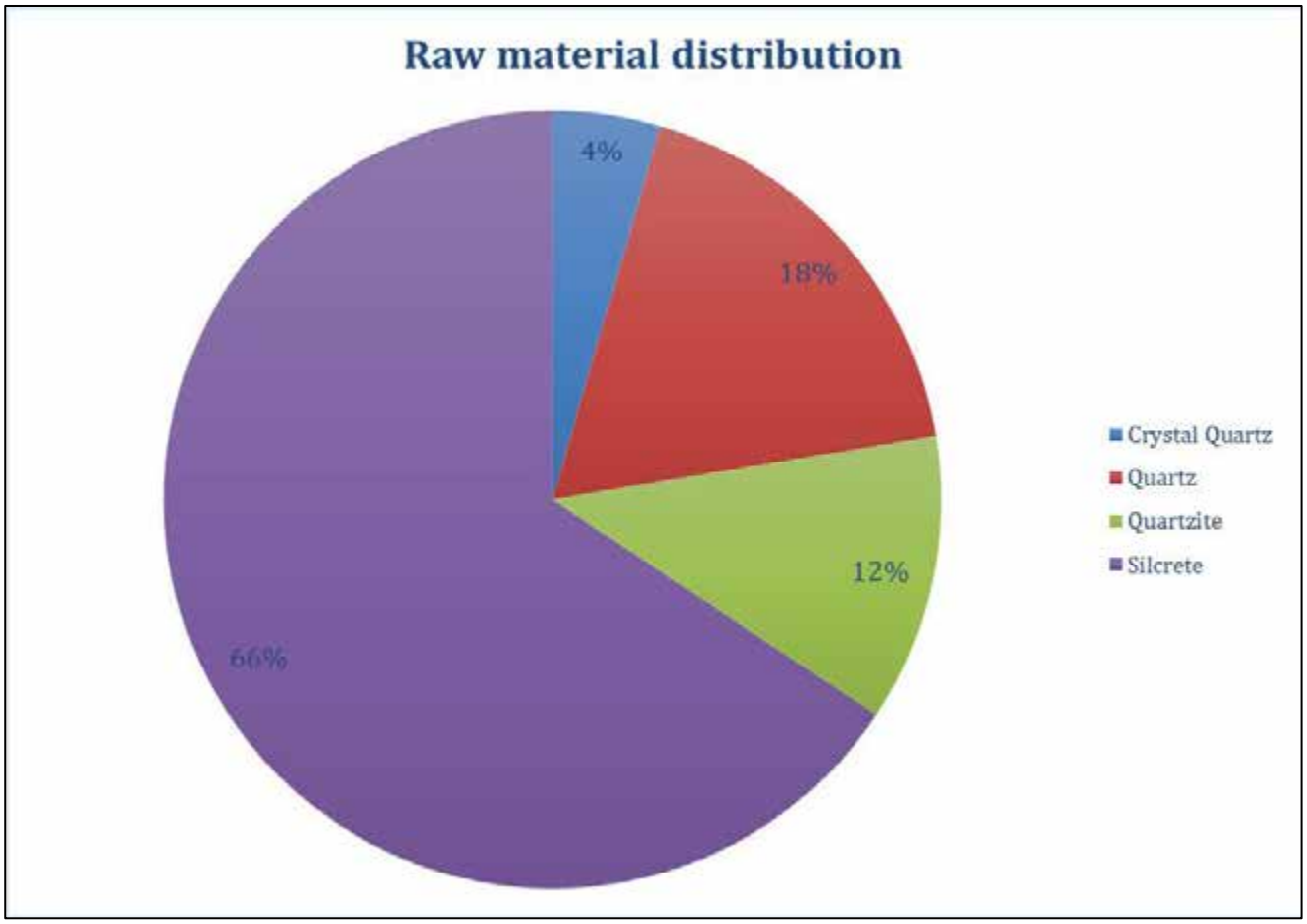
Graph 6 Size distribution of assemblage

7.2.3 Raw material procurement

Four raw material types were identified in the sub-surface assemblage (Table 15). The two dominant raw material types identified across the study area as a whole consisted of silcrete 65.67% (n=44) and quartz 17.91% (n=12) making up 83.58% of the assemblage (Graph 7). Less common raw material types include quartzite 11.94% (n=8) and three pieces of crystal quartz (4.48%).

Table 15 Raw material counts

Raw material	Number of artefacts (n)	Percentage of assemblage (%)
Crystal quartz	3	4.48
Quartz	12	17.91
Quartzite	8	11.94
Silcrete	44	65.67
Total	**67**	**100**



Graph 7 Raw material types

The cortex (weathered exterior of a rock) provides information about the origin of stone sources. Artefacts with a rough cortex were acquired from a primary source, such as an *in situ* outcrop. Artefacts with a smooth or water-rolled cortex originate from a secondary source, such as a river cobble from a waterway. The amount of cortex on an artefact often indicates the distance artefacts were transported from the source (Hiscock & Mitchell 1993, pp.12–17). A high percentage of cortex on an artefact indicates that the source of stone was nearby; while artefacts with less cortex or no cortex were transported further from the source. As cores are transported away from the source they are typically highly reduced and the flakes from these cores are smaller. The amount of cortex present in an assemblage also provides information on the potential uses of a site, as cores and flakes with high cortex are often found at sites were raw material extraction was occurring, whilst small flakes with lower percentages of cortex often dominate faunal and floral resource processing areas further from a raw material source (Odell 2004).

The analysis of the cortex on the recorded artefacts indicates a highly reduced assemblage with 98.51% (n=67) of the assemblage containing no cortex and the remaining 1.49% (n=1) displaying less than 25% remaining cortex. This indicates that the assemblage has been highly reduced and suggests that raw material sources being used in the study area have undergone primary reduction at a different location, which is likely some distance to the current study area.

Table 16 Cortex on artefacts within the assemblage

Cortex (%)	Total (n)	Percentage (%)
0	66	98.5
1-24	1	1.5
25-49	0	0
50-74	0	0
75-100	0	0
Total	**67**	**100**

7.2.4 Flake analysis

A total of 76.12% (n=51) of the total assemblage was made up of flakes and flake fragments. Platform types in the flake assemblage made up of nine flaked platforms (36%) (platforms containing 1 to 2 negative flakes on the surface), followed by eight plain platforms (32%) (platforms with a flat or natural surface which do not contain flake scars or cortex), seven crushed platforms (28%) (platforms which have been destroyed) and 1 cortical platform (4) (platforms containing evidence of cortex).

Table 17 Flakes by platform type

Platform type	Total (n)	Percentage (%)
Cortical	1	4
Crushed	7	28
Flaked	9	36
Plain/natural	8	32
Total	**25**	**100**

The dominant termination type in the assemblage was feather terminations, making up 61.29% (n=19) of total terminations. Feather terminations are generally achieved when the knapper has struck the core at an appropriate distance from the core edge and with the appropriate amount of force to detach a sharp flake, meaning the knapper is showing some degree of control in the process (Holdaway & Stern 2004, pp.132–133). Hinge terminations accounted for 16.13% (n=5) of the assemblage, while plunge terminations made up 9.68% (n=3). Both hinge and plunge termination occur when incorrect striking locations or force are applied. Hinge terminations generally occur when not enough force is applied to fully detach a flake, while plunge termination occur when too much force is applied resulting in a flake that extends further than intended (Holdaway & Stern 2004, p.130). The assemblage also exhibited two retouched terminations associated with potential tools (6.45%) and one each of an axial and crushed termination, both of which are representative of bipolar flaking.

The high presence of feather terminations and the small amount of hinge and plunge terminations suggests reduction of cores may have been occurring in a controlled manner; however, these results could also be the result of artefact selection, with feather terminations selected and transported to the study area more frequently than the others (Table 16).

Table 18 Artefact assemblage by termination type

Termination type	Total (n)	Percentage (%)
Axial	1	3.23
Crushed	1	3.23
Feather	19	61.29
Hinge	5	16.13
Plunge	3	9.68
Retouched	2	6.45
Total	**31**	**100**

7.2.5 Tool analysis

Tools in the assemblage consisted of a flat edged scraper with steep but shallow scalar retouch and a series of irregular flake scars overlaying the scalar retouch, suggestive of edge damage from potential use (1.49%). The second tool identified was a notched piercer (1.49%) featuring two invasive, notched retouch scars and two less invasive scalar flakes. Both tools also displayed similar retouch intensities, with the flat edged scraper displaying an average Kuhn Index of 0.48 and the notched piercer displaying an average index of 0.61.

Both scrapers were made on distal flake fragments and displayed similar flake morphologies, suggesting a possible similarity in the reduction sequence for these tools; although the severely limited sample size makes it impossible to accurately determine if this is the case (Plate 40).

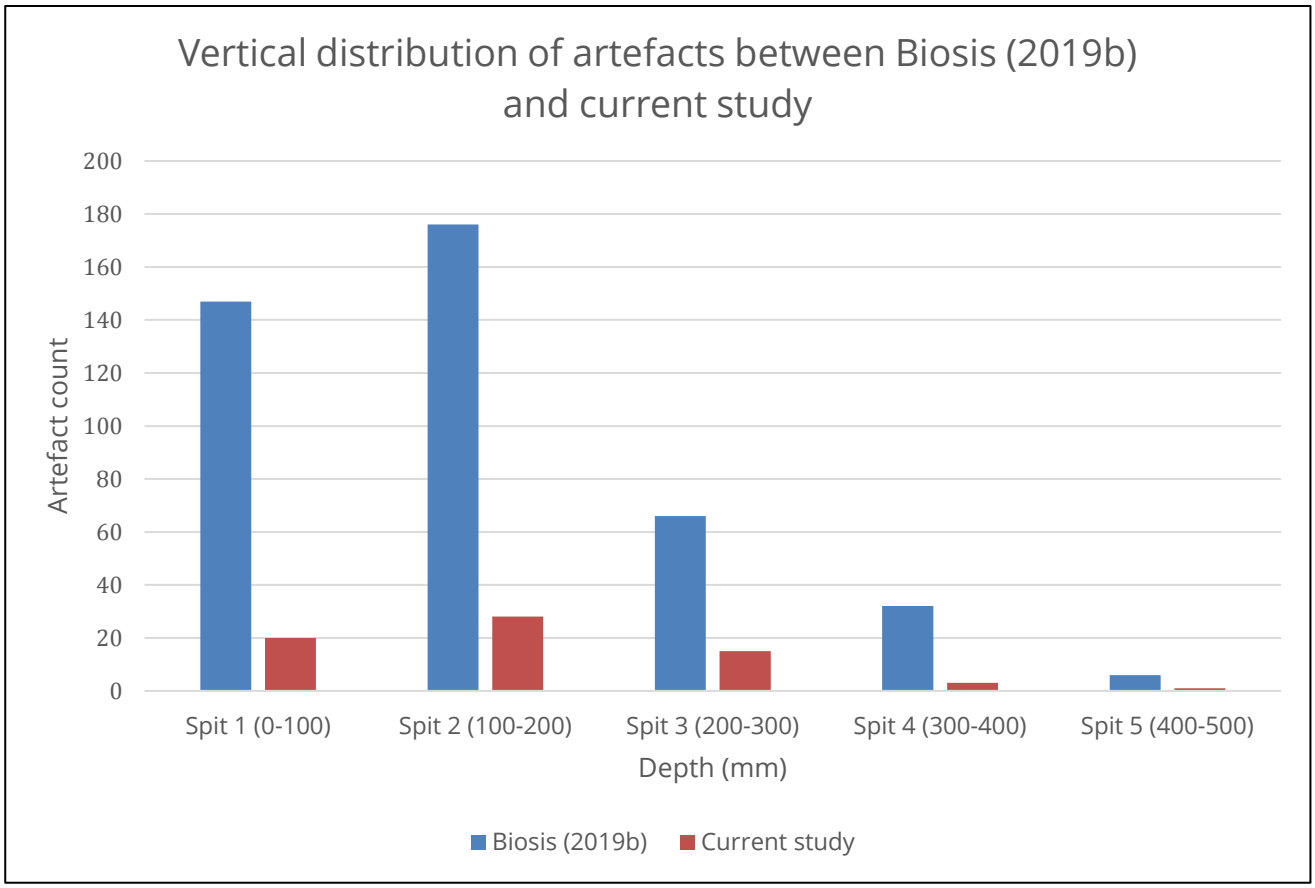
Plate 37 Photo of flat edged scraper on left and notched piercer on right

7.3 Comparative analysis and discussion

Biosis (2019) previously undertook an ACHA assessment covering the hill slopes and creek terraces on the eastern side of Stony Creek, immediately adjacent to the Site 2 study area. The Biosis (2019) assessment included a program of test excavations and artefact analysis. The current assessment has undertaken a similar methodology allowing for comparative analysis between the two sites to be undertaken.

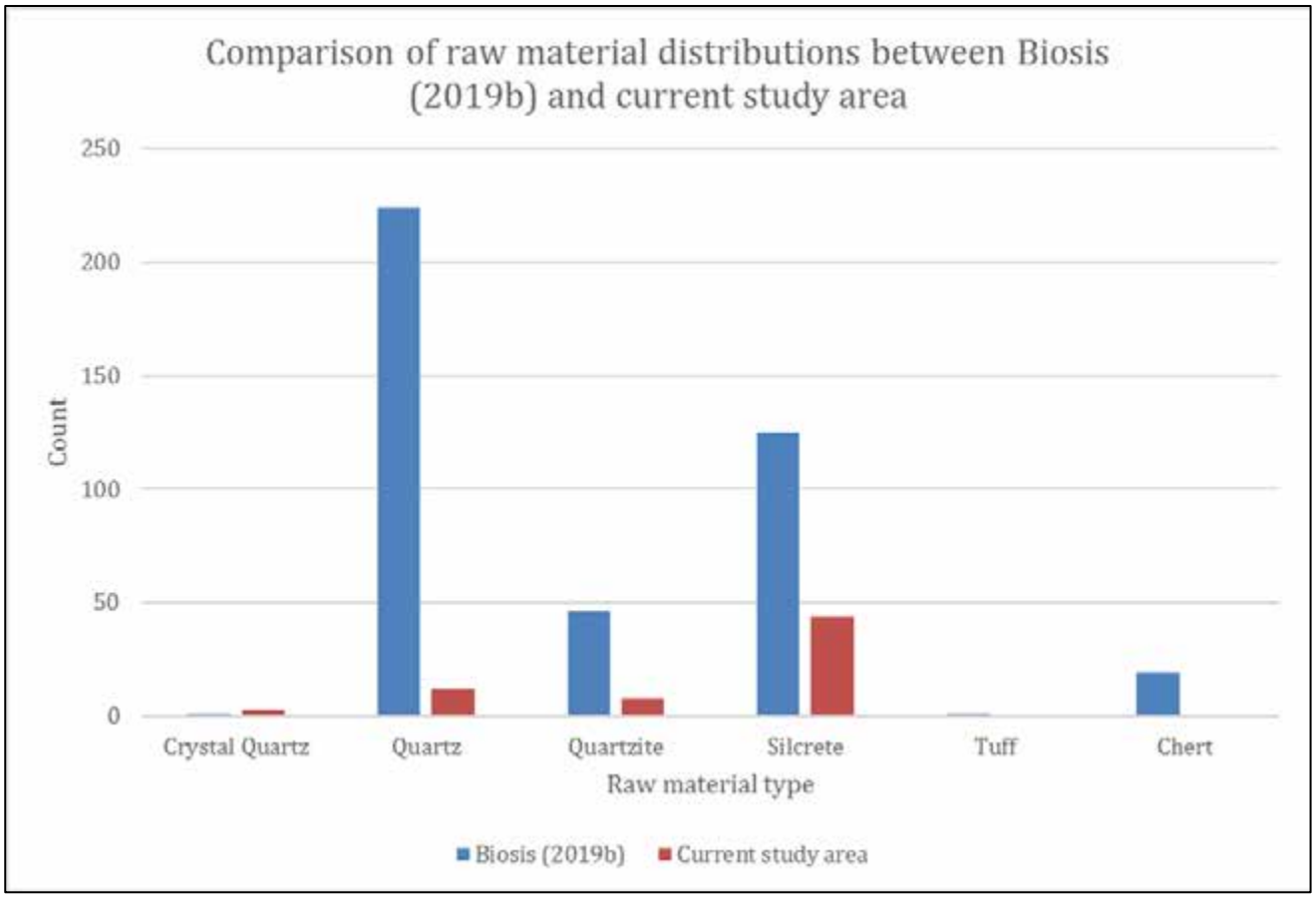
Biosis (2019) excavated a total area of 75.5 metres squared and identified a total of 427 artefacts and a density of 5.66 artefacts per metre squared, while the current assemblage excavated a total of 33.75 metres squared and identified 67 artefacts with a total density of 1.99 artefacts per metre squared. The Biosis (2019) site contained a higher density of artefacts compared to the current site, suggesting it was an area of more intensive occupation.

The distribution of both assemblages within the soil profile displayed similarities, with both sites containing the highest concentrations of artefacts respectively in Spit 2, followed by Spit 1, Spit 3, Spit 4 and Spit 5. These distribution trends comparable as indicated in Graph 8, suggesting the vertical distribution is indicative of an intact sub surface deposit with the majority of occupation occurring during the deposition of soils in Spit 2 and Spit 1.



Graph 8 Vertical distributions of artefacts in Biosis (2019b) and current study

Review of the raw material distributions between the two sites also highlights several similarities and differences reflecting potential differences in use. Biosis (2019) identified a total of six different raw material types, with quartz the most abundant raw material type making up 52.46% of that assemblage, followed by silcrete making up 29.27%. Comparatively, the current assemblage features silcrete as the most prevalent raw material type making up 65.67% of the assemblage, followed by quartz at 17.91%, and contains only four raw material types. One possible reason for these difference is again attributable to the differences in site use. The higher proportion of quartz at in the previous assessment by Biosis (2019) could occur as a result of the site being a focus for longer term occupation. Quartz is often flaked using a bipolar method, requiring the use of a secondary stone as an anvil. As a result it is likely that this method of reduction was undertaken in areas of increased sedentism where anvils could be left for repeated use rather than requiring transport. In contrast the current study area contains a higher number of silcrete artefacts, which can be more easily produced using freehand reduction allowing them to be transported and manufactured in areas of less sedentism such as resource gathering areas and short term campsites.



Graph 9 Raw material distribution between Biosis (2019b) and current study area

The degree of cortex at both sites was highly comparable with 94.85% of the Biosis (2019) assemblage containing less than 25% cortex and 100% of the current assemblage containing less than 25% cortex. Both of these sites contain low levels of cortex suggesting raw materials were transported to the sites from an external location.

The artefact makeup of the assemblages at each site displayed considerable variation. The Biosis (2019) assemblage was made up of a high percentage of angular fragments, with 42.99% of the assemblage consisting of this artefact type, whereas angular fragments only made up 17.91% of the total assemblage in the current study area. The Biosis (2019) assemblage also had a higher percentage of cores compared to the current study area, with 8.9% of the assemblage made up of cores compared to the 2.98% of the current study area. Of these cores types, the majority consisted of bipolar cores at Biosis (2019) while the current study area was not dominated by any one type. The increased number of bipolar cores at Biosis (2019) compared to the current study area indicates that bipolar flaking was a highly utilised reduction technique at Biosis (2019) but not in the current study area. These bipolar cores also correspond to the increased amount of quartz at Biosis (2019) and further support the hypothesis that this area was more intensely occupied than the current study area as documents above.

In comparison the current assessment had higher percentages of longitudinal, distal and medial flake fragments compared to Biosis (2019), while the percentages of complete flakes, tools and proximal flakes was relatively similar. The variation in assemblage typologies suggests variation in use of the sites, with the Biosis (2019) site exhibiting more intensive use compared to the current study area. The large difference in the amounts of angular fragments making up the assemblage could be a result of more intensive flake

production as a result of increased use of the site, with angular fragments formed during the reduction process, particularly in the case of quartz bipolar reduction. It could also be an indicator of increased artefact breakage via trampling, which will also occur more frequently in more intensively occupied sites. The increased number of cores at Biosis (2019) compared to the current study area also supports this hypothesis, with more cores found by Biosis (2019) suggesting an increased level of artefact production compared to the current study area.

Table 19 Comparison of artefact percentages between Biosis (2019) and Current study

Artefact type	Current %	Biosis %
Angular Fragment	17.91	42.39
Core - Bipolar	1.49	6.56
Core - Multidirectional	1.49	1.87
Core - unidirectional	0	0.47
Flake - Complete	17.91	15.94
Flake - Distal	17.91	8.19
Flake - Longitudinal Split	5.97	1.64
Flake - Medial	16.42	5.85
Flake - Proximal	17.91	13.82
Rejuvenation flake	0	0.23
Total	**100**	**100**

Variations in tool types also suggests a more intensive use of the Biosis (2019) site compared to the current study area. Biosis (2019) identified a total of 11 different tool types, including anvils, a range of backed artefacts, burins, eloura and four different scraper types. In comparison, the current assemblage has a much lower tool diversity, featuring only two types consisting of a flat edged scraper and a notched piercing tool. The increased tool diversity at Biosis (2019) suggests a site of more intensive occupation where multiple activities may have occurred, while the reduced diversity at the current site could be indicative of transitory discard or low density occupation (Shott 1986).

An assessment undertaken by EMM (2017), was located approximately five kilometres to the south-east of the study area and encompassed similar landforms to the current study area including hill slopes and creek terraces. The results of this assessment and EMM (2017) also contains several differences and similarities to one another. EMM (2017) identified a total of 281 artefacts from 160 50 by 50 centimetre test pits, resulting in an average density of 7 artefacts per square metre across their entire study area. This is significantly higher than the current assemblage's density of 1.99 metres per square metre, suggesting a lower intensity occupation of the current study area compared to EMM's (2017) study area.

The distribution of both assemblages within the soil profile displayed similarities, with both sites containing the highest concentrations of artefacts within the first 20 centimetres of deposit (EMM 2017, p.122), suggesting the majority of occupation was occurring during the deposition of soils in Spit 1 and Spit 2. However, the EMM (2017) assemblage contained the majority of artefacts within spit 1, compared to the current study which identified the highest density of artefacts in Spit 2. This may be a result of increased

disturbances across the EMM study area, such as ploughing which will have brought artefacts closer to the surface.

The frequencies of artefacts found in the EMM study area varied slightly from the results of the current study. The most common artefact type found by EMM (2017) consisted of complete flakes making up 27% (n=75) of their assemblage. This was followed by proximal and distal fragments at16% each (n=46) and flaked pieces (angular fragments) also making up 16% (n=45). Cores accounted for 7% (n=19) of the EMM assemblage and tools only 4% (n=11). These results are similar to the results of the current assemblage, with flakes and angular fragments occurring in similar percentages, although cores occurred more frequently in the EMM (2017) assemblage and similar to Biosis (2019) there was a higher diversity of tool types in the EMM assemblage compared to the current assemblage. These general trends suggest the use of the current study are varied to the EMM study area, however, the EMM study area covered an area of six kilometres, which is significantly larger than the current study area and may not take into account site patterning effects.

Raw material within the EMM (2017) study area showed that silcrete was the dominant raw material, accounting for 44% (n=123). This was followed by quartz which made up 37% of the EMM assemblage. Less common raw materials identified by EMM also included indurated Mudstone Tuff (IMT) (9%), quartzite (6%), chert (2%), volcanic stone (1%), petrified wood (1%) and igneous granite (0.4%). These results are similar to the current study, with silcrete followed by quartz the two dominant artefact types, although the EMM (2017) assemblage contained a higher diversity of raw materials in use. These results are noted by EMM (2017, p.144) as being consistent with a number of previous studies undertaken in the Southern Highlands.

7.4 Response to research questions

Do non-disturbed or minimally-disturbed soil profiles exist within areas of archaeological potential?

Yes, the majority of soil profiles across the study area displayed undisturbed or minimally disturbed contexts. Only two of the 137 test pits displayed disturbances. One test pit in transect 12 contained a small number of historical items and one test pit in transect 14 contained asbestos, which are likely are the associated with the removal the house in 2015.

Does the deposit contain archaeological material?

Yes, a total of 67 artefacts recovered from 156 test pits during the subsurface excavations. The highest density of artefacts were recorded from transect 11, which contained 20 artefacts and accounted for 29.9% of the total sub-surface assemblage. Transect 13 was the next most populous with 19.4% and Transect 14 accounting for 13.4%. No other transect contained more than 10% of the assemblage. These three transects combined make up 62.7% of the entire assemblage.

Is the subsurface archaeology similar to other archaeological sites in local area?

The current assemblage shares some minor similarities to another local assemblage in the vicinity (Biosis Pty Ltd 2019), with both sites displaying similar vertical artefact distributions that place the majority of artefacts in Spit 2 followed by Spit 1. Both sites also displayed very low levels of cortex on artefacts, suggesting transport of raw material to site after primary reduction has been undertaken. However, the current assemblage is largely dissimilar to the Biosis (2019) assemblage. The current study area had a smaller density of artefacts with 1.99 artefacts occurring per square metre excavated compared to the 5.66 per square metre identified by Biosis (2019). The current assemblage contained different ratios of raw materials with lower diversity of material types. Silcrete followed by quartz were the dominant raw materials identified in the current study area; however, the opposite was true for Biosis (2019) which contained quartz in the highest density followed by silcrete. There were also variations in the types of artefacts identified at both sites. The current assemblage

contained significantly less angular fragments than Biosis (2019), less cores and a lower diversity of different tool types.

The differences between Biosis (2019) and the current assemblage suggest differing uses between the two sites, with the Biosis (2019) site representing longer term or more intensive occupation where frequent reductions was occurring, as evidenced by the number of cores and high percentage of angular fragments. In contrast the current study area was less intensively occupied and did not experience as frequent raw material reduction. The similarities in vertical distribution and cortex levels, as well as the proximity of the sites to each other may suggest that these two sites are related, given they appear to have been deposited in similar proportions throughout the soil profile and both lack cortex. It is possible that the Biosis (2019) study area was the focus of occupation in the local area, while the current study area constitutes a satellite location associated with MVEnt Site 1 such as resource gathering or staging area where less artefact manufacture would have occurred.

What is the nature of potential lithic assemblages?

The lithic assemblage is made up of a total of 67 artefacts recovered from 137 test pits, resulting in an average density of 1.99 artefacts per metre squared. These artefacts are primarily distributed in the top 20 centimetres of soil deposits, with the highest percentage of artefacts located in spit 2, followed by spit 1. Densities then drop off with depth of the deposit below spit 2.

The overall assemblage is not dominated by any single artefact type. Angular fragments, distal flake fragments and proximal flake fragments each made up 17.91% of the assemblage (n=12) making them the three most common artefact types in the assemblage. They were followed by complete flakes and medial flake fragments, each making up 16.42% (n=11) of the total assemblage, then longitudinal flake fragments making up 5.97% (n=4) of the assemblage, cores (2.99%, n=2) consisting of one bipolar (1.49%) and one multidirectional (1.49%) core, tools (2.99%, n=2) and one blade like complete flake (1.49%).

The assemblage is made up of four different raw material types. Silcrete is the most prevalent raw material type present in the study area, accounting for 65.67% (n=44) of the assemblage. This is followed by quartz 17.91%, n=12), quartzite (11.94% n=8) and crystal quartz (4.48%, n=3). Cortex on artefacts indicates a highly reduced assemblage that potentially indicates long distance sourcing of raw materials. A total of 98.5% of the assemblage displayed no cortex, and the remaining 1.5% displayed less than 25% cortex. This is evidence that primary reduction of cores has been undertaken at a different location to the study area, and the cortex less products transported to site.

The flaked assemblage was not dominated by any singular platform type, although flaked platforms occurred most frequently (36%, n=9), followed by plain (32%, n=8), crushed (28%, n=7), and cortical platforms (4%, n=1). The assemblage was dominated by feather terminations, with hinge terminations accounting for 16.13% (n=5) of the assemblage, plunge terminations making up 9.68% (n=3), axial and crushed terminations making up 3.23% each (n=1). The assemblage also contained two retouched terminations which were associated with two potential tools. These tools consisted of a flat edged scraper with a Kuhn index of 0.48 and a notched piercer which displayed a higher Kuhn index of 0.61 due to the larger more invasive notching retouch scars present.

Is the lithic typology similar to the assemblages from other subsurface excavations in the region?

Comparison with excavations undertaken by EMM (2017), located approximately five kilometres to the south-east of the study area, shows similarities and differences between the two assemblages. Densities between the two sites was varied with EMM (2017) identifying an average density of 7 artefacts per square metre across their entire study area compared the 1.99 for the current study area.

The distribution of both assemblages within the soil profile displayed similarities, with both sites containing the highest concentrations of artefacts within the first 20 centimetres of deposit; however, the EMM (2017)

assemblage contained the majority of artefacts within spit 1, compared to the current study which identified the highest density of artefacts in Spit 2.

Use of raw materials was generally similar, with silcrete followed by quartz to the two most prevalent raw material types in both assemblages. Differences between the two assemblages were also present. Silcrete occurred in a much higher frequency in the current study area compared to EMM (2017); however, EMM (2017) contained a higher diversity of raw material types, with eight different raw material types present compared to the four of the current study area.

The frequencies of artefacts found in the EMM study area also varied slightly from the results of the current study, with some similarities and differences. Proximal and distal fragments, flaked pieces (angular fragments), and tools all occurred in similar percentages between the studies Cores and complete flakes occurred more frequently in the EMM (2017) study area and there was a higher diversity of tool types in the EMM (2017) study area.

Are any of the archaeological materials of scientific or cultural significance?

Stoney Creek 1 (AHIMS 52-4-0196) consists of three axe grinding grooves on a sandstone floater measuring approximately 2.3 by 1.5 meters located east of Stony Creek. A number of circular depressions, or Gnamma holes, were also observed ranging in size of 50-140 millimetres in diameter. Three of these holes appear to have been subjected to grinding to increase the diametre. Test excavation undertaken by Biosis across the entire Site 2 study area recovered 67 artefacts from 137 test pits. The majority of the artefacts are located in close proximity to the grinding grooves and are likely an extension of this site. The site contains a moderate number of artefacts including a range of tool types such as complete flakes, cores, and flake fragments made using different raw material types and largely intact stratified deposits. Two tools were recorded from the excavation program, which included a flat edged scraper with steep but shallow scalar retouch and a notched piercer.

Excavations undertaken by Biosis west of Stony Creek in 2018 at MVEnt Site 1 (AHIMS 52-4-0175/52-4-0197) recovered 427 artefacts from 156 test pits. The site contained a large number of artefacts including a range of tool types. A total of 13 tools were recorded from the excavation program, which included backed artefacts, Bondi points, an anvil, asymmetrical blade, dihedral burin, eloura, geometric microlith, round edge scraper, scraper, steep edge scraper and a thumbnail scraper. This site demonstrated ongoing long-term occupation of the study area by Aboriginal people. It is likely that Stoney Creek 1 and the recovered subsurface artefact scatter are associated with MVEnt Site 1 on the opposite side of Stony Creek; however, it was not as intensely occupied by Aboriginal people with the focus of occupation at MVEnt Site 1.

What management is appropriate? Does the area warrant further investigation?

The archaeological test excavations have identified a moderate density intact subsurface archaeological deposit within a terrace landform associated with Stoney Creek 1 (AHIMS 52-4-0196); therefore, it is recommended that this area be protected and conserved during and after to the construction of the brick making plant. Furthermore, ongoing management of the grinding grooves and other sites identified during the test excavations will be managed by updating the current ACHMP. The ACHMP will outline how the grinding grooves will be protected during the construction and operation of the proposed brick making plant, and help guide future development in the vicinity.

8 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.

8.1 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, EES, 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 EES 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.

8.2 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).

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.

The site contents ratings used for archaeological sites are shown in Table 13, and the site condition ratings in Table 14.

Table 20 Site content ratings

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

Rating	Description
	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 21 Site condition ratings

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 subsurface 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.

The representativeness ratings used for archaeological sites are shown in Table 15.

Table 22 Site representativeness ratings

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 shown in Table 16

Table 23 Scientific significance ratings

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 within the study area and during the sub-surface testing. The results are in Table 19.

8.2.1 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 24 Scientific significance assessment of archaeological sites recorded within the study area.

Site name	Site content	Site condition	Representativeness	Scientific significance
CPark A02 AHIMS 52-4-0691	1	1	1	3 – Low
CPark A03 AHIMS 52-4-0692	1	1	1	3 – Low
Stoney Creek 1 AHIMS 52-4-0196	2	3	2	7 - High

Site name	Site content	Site condition	Representativeness	Scientific significance
CPark A04 PAD AHIMS 52-4-0701	2	2	1	5 – Moderate
CPark A05 AHIMS 52-4-0696	1	1	1	3 – Low
CPark A06 AHIMS 52-4-0695	1	1	1	3 – Low
CPark A07 AHIMS 52-4-0694	1	1	1	3 – Low
CPark A08 AHIMS 52-4-0693	1	1	1	3 – Low
CPark A09 AHIMS 52-4-0702	1	1	1	3 – Low
CPark A10 AHIMS 52-4-0703	1	1	1	3 – Low
CPark A11 AHIMS 52-4-0698	1	1	1	3 – Low
CPark A12 AHIMS 52-4-0697	1	1	1	3 – Low
CPark A13 AHIMS 52-4-0699	1	1	1	3 – Low
CPark A14 AHIMS 52-4-0700	1	1	1	3 – Low

Table 25 Statements of scientific significance for archaeological sites recorded within the study area.

Site name	Statement of significance
CPark A02 AHIMS 52-4-0691	CPark A02 consists of a broken grinding stone identified on the crest of a small hillock in the north section, approximately 80 meters south of the fence line. A small group of juvenile native trees form a tree lane directly west (about 6 metres) of the grinding stone. The artefact had been broken some time ago, with the break occurring along its width. The grinding stone measures 90 millimetres long 100 millimetres wide and 50 millimetres high. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A03 AHIMS 52-4-0692	CPark A03 is a single flake identified in the north-west corner of the old homestead block, inside the fence. The area whilst being part of the house block is relatively undisturbed. This proximal flake (2 millimetres long by 1.4 millimetres wide) consists of pale yellow silcrete with a missing left margin and distal point. There is also evidence that it has been heated. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Stoney Creek 1	Stoney Creek 1 consists of three axe grinding grooves on a sandstone floater measuring

Site name	Statement of significance
AHIMS 52-4-0196	approximately 2.3 by 1.5 meters located within the creek course. A number of circular depressions, or Gnamma holes, were also observed ranging in size of 50-140 millimetres in diameter. Three of these holes appear to have been subjected to grinding to increase the diametre. The site card no longer remains for this site; however, it was easily relocated during the archaeological survey. Test excavations identified a moderate density, intact subsurface archaeological deposit of 49 subsurface artefacts within the vicinity of the grinding grooves, which are likely associated with Stoney Creek 1. This site type has been identified occasionally within the local region and has therefore been assessed as having high archaeological significance. The site has low historical and moderate aesthetic value.
CPark A04 PAD (AHIMS 52-4-0701)	CPark A04 PAD was identified during test excavations and consists of a moderate density, intact subsurface archaeological deposit of 34 subsurface artefacts. This site is located within a slightly elevated terrace landform east of Stony Creek and south of the Stoney Creek 1, which it is likely associated with. The artefacts include complete flakes, flake fragments and one bipolar core. Raw materials consists of silcrete, quartz, crystal quartz and quartzite. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as moderate. The site has low historical and moderate aesthetic value.
CPark A05 AHIMS 52-4-0696	CPark A05 consists of three silcrete flake fragments identified at a depth of 200 millimetres during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A06 AHIMS 52-4-0695	CPark A06 consists of a quartz medial flake fragment measuring 12.4 by 9.1 millimetres, which was identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A07 AHIMS 52-4-0694	CPark A07 consists of a quartz angular fragment measuring 19.2 by 12.4 millimetres, which was identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A08 AHIMS 52-4-0693	CPark A08 consists of a silcrete medial flake fragment measuring 7.2 by 4.6 millimetres, which was identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A09 AHIMS 52-4-0702	CPark A09 consists of a silcrete proximal flake fragment measuring 23.8 by 28 millimetres, which was identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A10 AHIMS 52-4-0703	CPark A10 consists of a quartzite proximal flake fragment measuring 7.7 by 14.9 millimetres, which was identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A11 AHIMS 52-4-0698	CPark A11 consists of two complete silcrete flakes measuring 5.8 by 6.5 millimetres and 6.5 by 10.7 millimetres, which were identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The

Site name	Statement of significance
	site has low historical and moderate aesthetic value.
CPark A12 **AHIMS 52-4-0697**	CPark A12 consists of a silcrete angular fragment measuring 35.7 by 23.9 millimetres, which was identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A13 **AHIMS 52-4-0699**	CPark A13 consists of a complete quartz flake measuring 9.2 by 5.4 millimetres, which was identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
CPark A14 **AHIMS 52-4-0700**	CPark A14 consists of a crystal quartz medial flake fragment measuring 14.2 by 6.1 millimetres, which was identified during test excavations. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.

9 Impact assessment

As previously outlined, the project proposes to construct a brick making plant and associated infrastructure on a 14.87 hectare area within the western portion of lot 1 DP 78511 (Site 2). The proposed development will include:

- 25,600m^2 factory building with amenities and lunchroom.
- Office and laboratory.
- Raw materials shed.
- Yard storage, which will provide space for 43,200 pallets stacked six high.
- Export yard and container area.
- Carpark for 36 staff plus 2 visitors plus disabled parking
- Service requirements such as electricity, gas, water and sewer.

9.1 Predicted physical impacts

The proposed works will consist of bulk earthworks and site infrastructure, followed by the construction of a masonry plant as described above, as well as road ways and landscaping. All of these activities will have the potential to impact Aboriginal sites. A summary of impacts is provided below in Table 19 and shown in Figure 13.

Table 26 Summary of potential archaeological impacts

AHIMS site no.	Site name	Significance	Type of harm	Degree of harm	Consequence of harm
AHIMS 52-4-0691	CPark A02	Low	Direct	Total	Total loss of value
AHIMS 52-4-0692	CPark A03	Low	Direct	Total	Total loss of value
AHIMS 52-4-0196	Stoney Creek 1	High	Direct	Partial	Partial loss of value
AHIMS 52-4-0701	CPark A04 PAD	Moderate	Direct	Partial	Partial loss of value
AHIMS 52-4-0696	CPark A05	Low	Direct	Total	Total loss of value
AHIMS 52-4-0695	CPark A06	Low	Direct	Total	Total loss of value
AHIMS 52-4-0694	CPark A07	Low	Direct	Total	Total loss of value
AHIMS 52-4-0693	CPark A08	Low	Direct	Total	Total loss of value
AHIMS 52-4-0702	CPark A09	Low	Direct	Total	Total loss of value
AHIMS 52-4-0703	CPark A10	Low	Direct	Total	Total loss of value
AHIMS 52-4-0698	CPark A11	Low	Direct	Total	Total loss of value
AHIMS 52-4-0697	CPark A12	Low	Direct	Total	Total loss of value

AHIMS site no.	Site name	Significance	Type of harm	Degree of harm	Consequence of harm
AHIMS 52-4-0699	CPark A13	Low	Direct	Total	Total loss of value
AHIMS 52-4-0700	CPark A14	Low	Direct	Total	Total loss of value

9.2 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' (Australia ICOMOS 2013). 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 the design of the development is the primary mitigation and management strategy, and should be implemented where practicable. As noted above, the proposed works cannot avoid impacts to the archaeological sites identified within the study area. It is not feasible for the proposed works to completely avoid impacts to these sites; therefore, the following mitigation measures developed in consultation with the RAPs, and which considered the principles of ecologically sustainable development (ESD) and intergenerational equity in their design, are proposed.

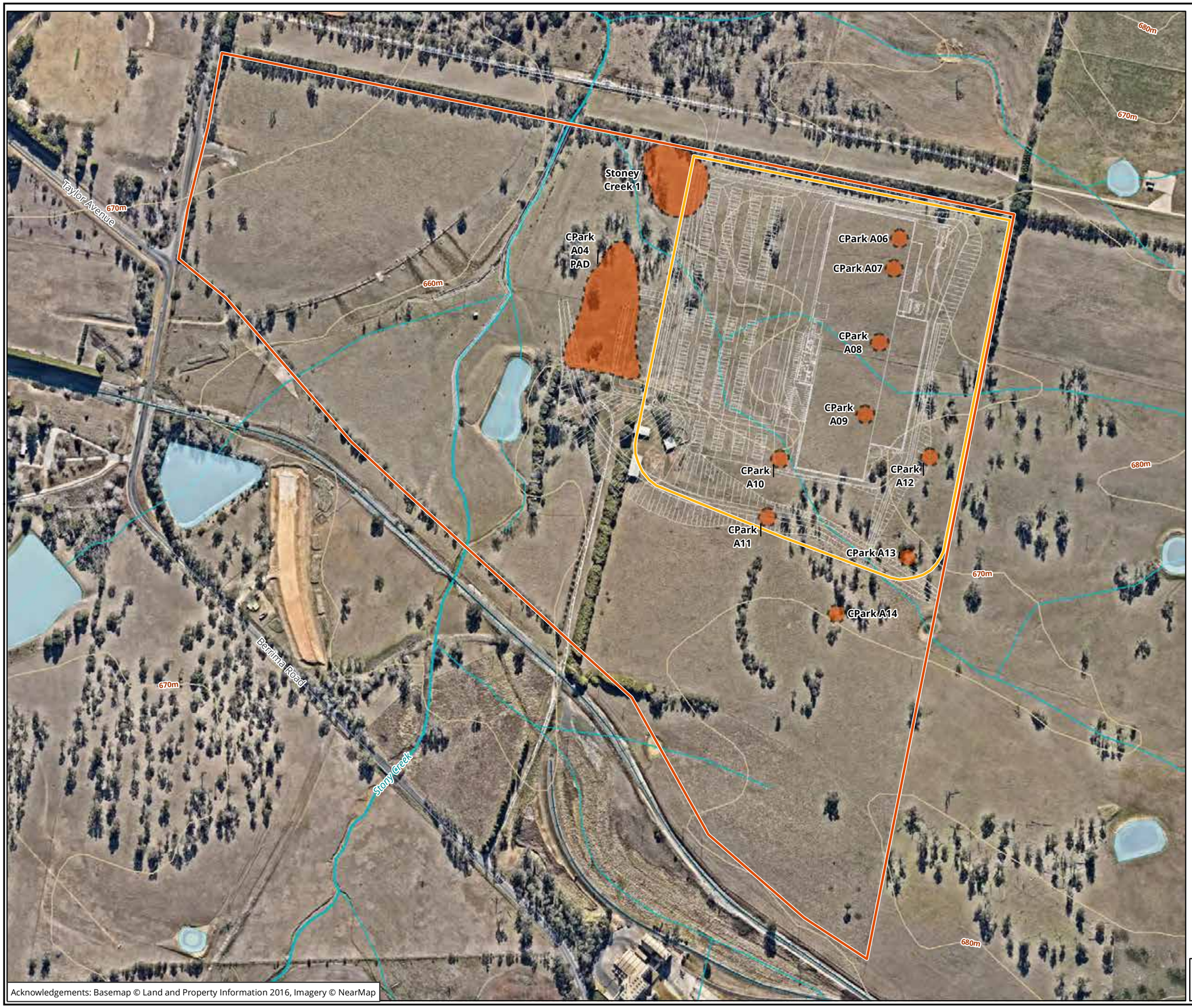
AHIMS 52-4-0196 (Stoney Creek 1) consists of axe grinding grooves and Gnamma holes on a sandstone floater. The artefact scatter CPark A04 PAD located on the same terrace landform is likely associated with this site. The test excavations that have been undertaken at CPark A04 PAD, and subsequent artefact analysis, has increased current understanding of the site and our knowledge of Aboriginal occupation in the wider Southern Highlands region, which ensures that any scientific and cultural information can be accessed and used by future generations. The grinding grooves and subsurface artefact scatter are outside of the proposed development area and will not be impacted. However, the grinding grooves should be conserved and protected during and after construction of the brick making plant (Figure 14).

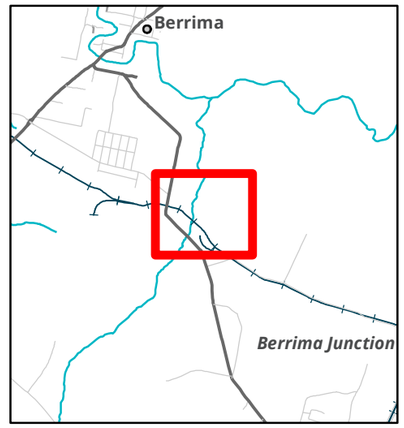
CPark A04 PAD (AHIMS 52-4-0701) consists of a moderate density, intact subsurface archaeological deposit of 34 subsurface artefacts and is likely associated with AHIMS 52-4-0196 (Stoney Creek 1). It is located within a slightly elevated terrace landform east of Stony Creek and south of AHIMS 52-4-0196. The artefacts include complete flakes, flake fragments and one bipolar core. Raw materials consists of silcrete, quartz, crystal quartz and quartzite. This site will be partially impacted by the proposed development and will be managed and mitigated under an ACHMP, which will include monitoring during works.

Due to the results of the Stage 1 test excavations and ACHA, Brickworks Ltd have considered the location of the brick making plant carefully and positioned it as far away from Stony Creek, the riparian zone, and AHIMS 52-4-0196 (Stoney Creek 1) as possible. It has therefore being positioned along the eastern boundary, which has enabled the riparian zone to be extended and the visual impacts of the proposed development to be mitigated.

A draft ACHMP was prepared by Biosis for Stage 1 (west of the current Site 2 study area) and submitted to EES for comment. EES supported the draft ACHMP, pending completion of archaeological investigations within Stage 1 and Aboriginal community consultation. The outcome of the test excavations and consultation provided additional information regarding the site complex AHIMS 52-4-0175/ 52-4-0197 (MVEnt Site 1). The ACHMP outlined how MVEnt Site 1 would be protected during the construction and operation of the proposed masonry plant within the Stage 1 study area. The ACHMP was sent to the RAPs on the 20 March, who were given 14 days to review the document as advised by EES, and feedback from EES is still pending.

Should approval be granted for the project, the ACHMP for Stage 1 will be updated to include the results of test excavations for Site 2 and provided to the RAPs for community consultation and comment. The updating of the ACHMP will include the cumulative impacts of both Stage 1and Site 2 on the multiple grinding grooves located on either side of Stony Creek. The protection of the grinding groove panels will help to achieve intergenerational equity by allowing the retention of cultural materials for the education and enjoyment of future generations. Furthermore, the updated ACHMP will include the management and mitigation strategies proposed for those sites to be impacted by the Site 2 works (CPark A02, CPark A03, CPark A05, CPark A06, CPark A07, CPark A08, CPark A09, CPark A10, CPark A11, CPark A12, CPark A13 and CPark A14), which will consist of the salvage of surface artefacts and reburial following construction.





Legend

- Study area
- Site 2
- Proposed development
- New Aboriginal sites

Figure 13 Impacs to Aboriginal sites

0 50 100 150 200

Metres
Scale: 1:4,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

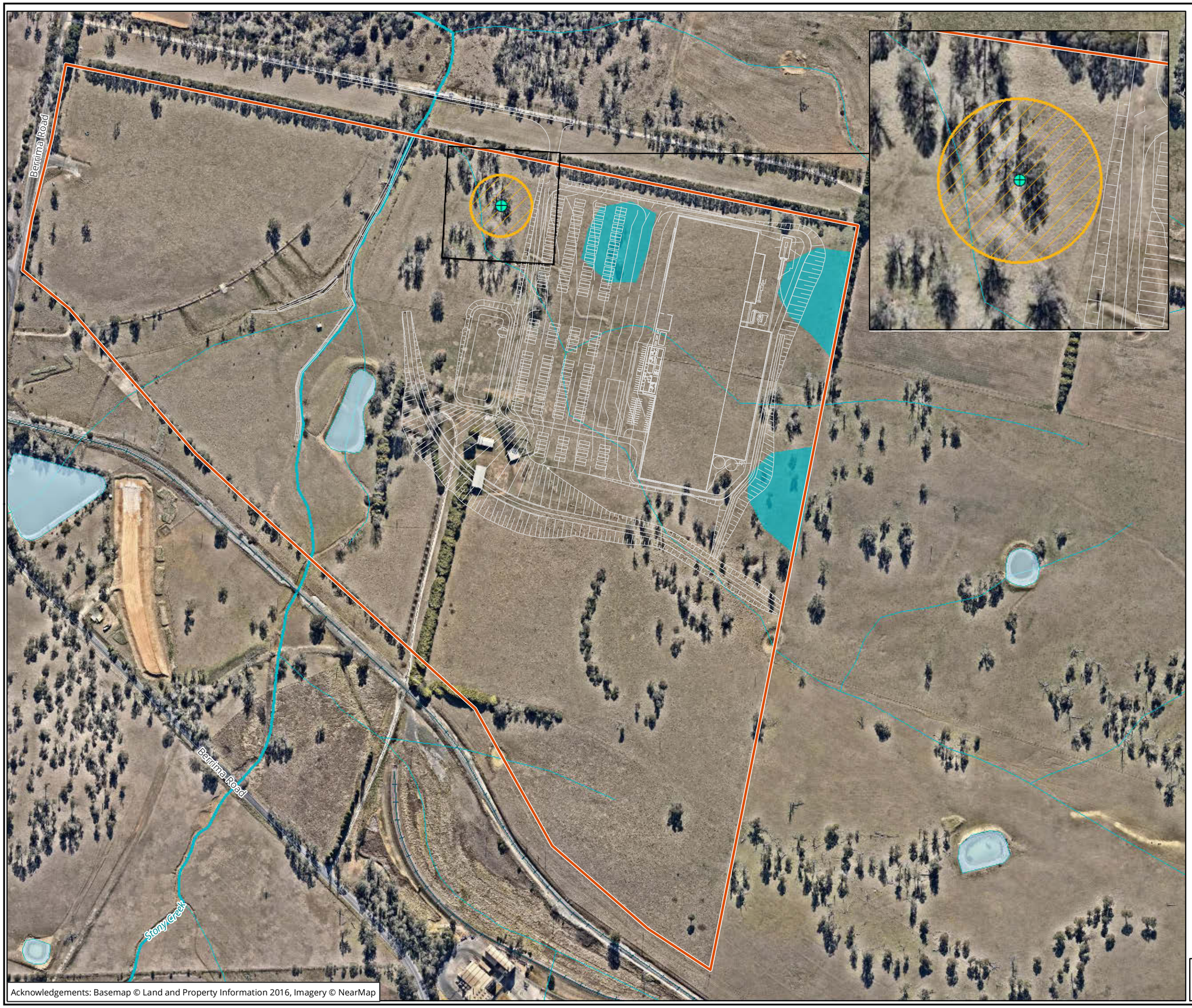
N

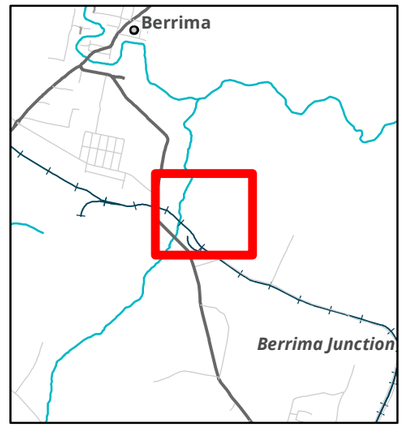
biosis.

Biosis Pty Ltd

Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 30434
Date: 28 January 2020,
Checked by: SJK, Drawn by: AEDM, Last edited by: amurray
Location:P:\30400s\30434\Mapping
30434_AR_F13_ImpactSites





Legend

- Study area
- Updated location of 52-4-0196
- Grinding grooves 35m buffer

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap

Figure 14 Grinding grooves buffer

0 50 100 150 200

Metres

Scale: 1:4,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

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Biosis Pty Ltd

Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 30434
Date: 28 January 2020,
Checked by: SJK, Drawn by: LW, Last edited by: amurray
Location:P:\30400s\30434\Mapping
30434_AR_F14_GrindGrooves

10 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: Conservation of part of AHIMS 52-4-0196 (Stoney Creek 1)

Stoney Creek 1 (AHIMS 52-4-0196) was relocated during the survey and test excavations within Site 2 identified a moderate density, intact subsurface archaeological deposit within a slightly elevated terrace landform associated with the grinding grooves. The grinding grooves and subsurface artefact scatter are outside of the proposed development area and will not be impacted. However, the grinding grooves should be protected with a buffer and fencing (Figure 14).

Recommendation 2: ACHMP

The current ACHMP for Stage 1 should be updated in consultation with RAPs and EES to include the Site 2 development area. The ACHMP will facilitate the implementation of the management and mitigation strategies for all 14 sites located within the study area by clearly outlining Aboriginal site management requirements including the management of unexpected finds.

Recommendation 3: Continued consultation with the registered Aboriginal parties

The proponent should continue to inform the RAPs about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project. A copy of the final report will be sent to the RAPs, EES and the AHIMS register.

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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 : 30434 SJK

Client Service ID : 462896

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-4-0074	WR 10;	AGD	56	260720	6178200	Open site	Valid	Artefact : -	Open Camp Site	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-4-0032	Belanglo	AGD	56	251791	6176510	Open site	Valid	Artefact : -	Open Camp Site	498
	Contact	**Recorders**	ASRSYS					**Permits**		
52-4-0057	Throsby Park;	AGD	56	261430	6173080	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Laura-Jane Smith					**Permits**		
52-4-0058	B3 (Berrima)	AGD	56	254100	6178700	Open site	Valid	Artefact : -	Open Camp Site	376
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-2-1300	WR 2;	AGD	56	256320	6179590	Open site	Valid	Artefact : -	Open Camp Site	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1301	WR 3;	AGD	56	254770	6180780	Open site	Valid	Artefact : -	Open Camp Site	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1302	WR 4;	AGD	56	254600	6180890	Closed site	Valid	Artefact : -	Shelter with Deposit	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1303	WR 5;	AGD	56	254320	6180930	Closed site	Valid	Artefact : -	Shelter with Deposit	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1304	WR 6;	AGD	56	254130	6181040	Open site	Valid	Artefact : -	Open Camp Site	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1305	WR 7;	AGD	56	254200	6181630	Open site	Valid	Artefact : -	Open Camp Site	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1306	WR 8;	AGD	56	254600	6181000	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1307	WR 9;	AGD	56	254870	6180850	Open site	Valid	Artefact : -	Open Camp Site	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1308	WR 11;	AGD	56	256370	6179420	Open site	Valid	Artefact : -	Open Camp Site	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-2-1309	WR PAD;	AGD	56	255430	6180130	Closed site	Valid	Artefact : -	Shelter with Deposit	1428
	Contact	**Recorders**	Elizabeth Rich,Laura-Jane Smith					**Permits**		
52-1-0050	Berrima, HCA07	AGD	56	253250	6181110	Open site	Valid	Artefact : -	Open Camp Site	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-4-0193	Chelsea Gardens Locale 1	GDA	56	259735	6171659	Open site	Valid	Artefact : 8		103880

Report generated by AHIMS Web Service on 08/11/2019 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 252860 - 260683, Northings : 6172346 - 6183428 with a Buffer of 1000 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 90

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact Searle	**Recorders**	Doctor.Rebecca Parkes					**Permits**		
52-4-0194	Chelsea Gardens Locale 2	GDA	56	259070	6171860	Open site	Valid	Artefact : 11		103880
	Contact Searle	**Recorders**	Doctor.Rebecca Parkes					**Permits**		
52-4-0171	MVSW AO3	GDA	56	257552	6172443	Open site	Valid	Artefact : -		103681
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**	4070	
52-4-0172	MVSW AO2	GDA	56	257452	6172480	Open site	Valid	Artefact : -		103681
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**	4070	
52-4-0173	MVSW A01	GDA	56	257742	6172648	Open site	Destroyed	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**	4117	
52-4-0174	MVSW1	GDA	56	257685	6172342	Open site	Valid	Artefact : -		103681
	Contact T Russell	**Recorders**	Total Earth Care Pty Ltd,Mr.Matthew Barber,NGH Heritage - Fyshwick					**Permits**	4070	
52-4-0175	MVEnt Site 1	GDA	56	256469	6178366	Open site	Valid	Artefact : -, Grinding Groove : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
52-4-0176	MVEnt Art 58	GDA	56	259622	6177233	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**		
52-4-0177	MVEnt Art 57	GDA	56	259619	6177232	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Communications Infrastructure P/L					**Permits**		
52-4-0178	MVEnt Art 16	GDA	56	256298	6176275	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**		
52-4-0179	MVEnt Art 42	GDA	56	258388	6175784	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**		
52-4-0180	MVEent Art 43	GDA	56	258416	6176086	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**		
52-4-0181	MVEnt Art 41	GDA	56	258379	6175782	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**		
52-4-0182	MVEnt Art 34	GDA	56	256495	6176650	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**		
52-4-0183	MVEnt Art 15	GDA	56	256624	6177078	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**	3945	
52-4-0184	MVEnt Art 14	GDA	56	256208	6176043	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**		
52-4-0186	MVEnt Art 12	GDA	56	256151	6177414	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Total Earth Care Pty Ltd					**Permits**	3945	
52-4-0187	MVEnt Site 7	GDA	56	259399	6176087	Open site	Valid	Artefact : -		

Report generated by AHIMS Web Service on 08/11/2019 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 252860 - 260683, Northings : 6172346 - 6183428 with a Buffer of 1000 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 90

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact Searle	**Recorders** Total Earth Care Pty Ltd						**Permits**		
52-4-0188	MVEnt Site 6	GDA	56	256797	6174871	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders** Total Earth Care Pty Ltd						**Permits**		
52-4-0189	MVEnt Site 5	GDA	56	255736	6176238	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders** Total Earth Care Pty Ltd						**Permits**		
52-4-0190	MVEnt Site 4	GDA	56	255991	6176600	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders** Total Earth Care Pty Ltd						**Permits**		
52-4-0191	MVEnt Site 3	GDA	56	256413	6176860	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders** Total Earth Care Pty Ltd						**Permits**	3945	
52-4-0192	MVEnt Site 2	GDA	56	256280	6177715	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders** Total Earth Care Pty Ltd						**Permits**		
52-4-0169	MVSW A18	GDA	56	257957	6172256	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders** Total Earth Care Pty Ltd						**Permits**		
52-4-0170	MVSW AO4	GDA	56	257566	6172410	Open site	Valid	Artefact : -		103681
	Contact Searle	**Recorders** Total Earth Care Pty Ltd						**Permits**	4070	
52-4-0196	Stoney Creek1	AGD	56	256635	6178392	Open site	Valid	Grinding Groove : 3		
	Contact Searle	**Recorders** Mr.Graham Moore						**Permits**		
52-4-0197	Stoney Creek2	AGD	56	256488	6178407	Open site	Valid	Grinding Groove : -		
	Contact Searle	**Recorders** Mr.Graham Moore						**Permits**		
52-2-1215	B 2;	AGD	56	254730	6179500	Open site	Valid	Artefact : -	Open Camp Site	1220
	Contact	**Recorders** Margrit Koettig						**Permits**		
52-4-0431	HC_130	GDA	56	251966	6178815	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders** EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic						**Permits**	3945	
52-4-0432	HC_131	GDA	56	251896	6178733	Open site	Valid	Artefact : -		
	Contact	**Recorders** EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic						**Permits**	3945	
52-4-0433	HC_132	GDA	56	251937	6177740	Open site	Valid	Artefact : -		
	Contact	**Recorders** EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic						**Permits**	3945	
52-4-0434	HC_133	GDA	56	252354	6177721	Open site	Valid	Artefact : -		
	Contact	**Recorders** EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic						**Permits**		
52-4-0435	HC_134	GDA	56	252333	6178036	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders** EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic						**Permits**	3945	

Report generated by AHIMS Web Service on 08/11/2019 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 252860 - 260683, Northings : 6172346 - 6183428 with a Buffer of 1000 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 90

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-4-0436	HC_135	GDA	56	252118	6178852	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0437	HC_136	GDA	56	252051	6178874	Open site	Valid	Artefact : -, Grinding Groove : -, Potential Archaeological Deposit (PAD) : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0438	HC_137	GDA	56	252136	6178965	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0440	HC_138	GDA	56	252146	6178939	Open site	Valid	Grinding Groove : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0441	HC_139	GDA	56	252231	6178964	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0442	HC_141	GDA	56	251863	6178938	Open site	Valid	Artefact : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits		
52-4-0446	HC_145	GDA	56	253478	6178671	Open site	Valid	Artefact : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0447	HC_146	GDA	56	253599	6178492	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0448	HC_147	GDA	56	253913	6177815	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0449	HC_148	GDA	56	254046	6177627	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0450	HC_149	GDA	56	252000	6178570	Open site	Valid	Artefact : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	
52-4-0451	HC_150	GDA	56	252109	6178761	Open site	Valid	Artefact : -		
Contact		Recorders	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					Permits	3945	

Report generated by AHIMS Web Service on 08/11/2019 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 252860 - 260683, Northings : 6172346 - 6183428 with a Buffer of 1000 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 90

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-4-0452	HC_151	GDA	56	252186	6178750	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**	3945	
52-4-0453	HC_152	GDA	56	252144	6178419	Open site	Valid	Artefact : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**	3945	
52-4-0459	HC_158	GDA	56	254007	6177841	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**		
52-4-0471	HC_170	GDA	56	251881	6178266	Open site	Valid	Artefact : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**	3945	
52-4-0473	HC_172	GDA	56	251887	6178544	Open site	Valid	Artefact : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**	3945	
52-4-0474	HC_173	GDA	56	251992	6178447	Open site	Valid	Artefact : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**	3945	
52-4-0475	HC_174	GDA	56	252251	6178482	Open site	Valid	Artefact : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**	3945	
52-4-0477	HC_176	GDA	56	256131	6177778	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**		
52-4-0478	HC_177	GDA	56	255574	6177334	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	EMGAMM-St Leonards (previously EMGA),Mr.Ryan Desic					**Permits**	3945	
52-4-0386	BR-IF1;	GDA	56	258825	6175904	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Lance Syme					**Permits**		
52-4-0387	BR-IF2	GDA	56	258633	6175948	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Lance Syme					**Permits**		
52-4-0689	Chelsea Gardens Locale 3	GDA	56	260040	6172378	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
52-4-0691	CPark A02	GDA	56	256752	6178340	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
52-4-0692	CPark A03	GDA	56	256542	6178190	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
52-2-1216	B 1;	AGD	56	255440	6180240	Open site	Valid	Artefact : -	Open Camp Site	1220

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-1-0389	wingercarribee iso glass	GDA	56	255483	6180343	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Ian J Kalaf Solicitor & Attorney,Mr.Matthew Alexander					**Permits**		
52-4-0684	New Berrima Reburial	GDA	56	257088	6178638	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
52-1-0053	Berrima, HCA10	AGD	56	255650	6182650	Open site	Valid	Artefact : -	Open Camp Site	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-1-0054	Mount Misery, HCA11	AGD	56	256000	6182000	Open site	Valid	Artefact : -	Open Camp Site	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-1-0055	Mount Misery, HCA12	AGD	56	256360	6182940	Closed site	Valid	Artefact : -	Shelter with Deposit	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-1-0048	Berrima, HCA05	AGD	56	252960	6179980	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-1-0049	Berrima, HCA06	AGD	56	253190	6180460	Open site	Valid	Artefact : -	Open Camp Site	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-1-0051	Berrima, HCA08	AGD	56	253580	6181360	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-1-0052	Berrima, HCA09	AGD	56	255280	6182630	Open site	Valid	Artefact : -	Open Camp Site	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-1-0056	Mount Misery, HCA13	AGD	56	256460	6182890	Closed site	Valid	Artefact : -	Shelter with Deposit	498
	Contact	**Recorders**	Margrit Koettig					**Permits**		
52-4-0122	Throsby Park	AGD	56	260500	6173520	Open site	Valid	Artefact : -		102977
	Contact	**Recorders**	Heritage Archaeology					**Permits**		
52-1-0302	Little Minnows Grinding Grooves	GDA	56	258964	6179830	Open site	Valid	Grinding Groove : -		
	Contact	**Recorders**	Mr.Brad Davies					**Permits**		
52-4-0577	Throsby Park Tree	GDA	56	261180	6173373	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Ms.Rose O'Sullivan					**Permits**		
48-4-0369	BSMV PAD2	GDA	56	257699	6172658	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Matthew Barber,NGH Heritage - Fyshwick					**Permits**	4117	
52-4-0654	New Berrima IS01	GDA	56	257211	6178923	Open site	Valid	Artefact : -		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 30434 SJK

Client Service ID : 462896

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S				Permits			

Report generated by AHIMS Web Service on 08/11/2019 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 252860 - 260683, Northings : 6172346 - 6183428 with a Buffer of 1000 meters. Additional Info : ACHA. Number of Aboriginal sites and Aboriginal objects found is 90

Appendix 2 Artefact analysis

Transect no.	Test pit no.	Spit no.	Type	Raw material	Cortex (%)	Platform type	Platform width (mm)	Platform depth (mm)	Termination	Retouch type	Retouch location	Length (mm)	Width (mm)	Thickness (mm)	Flake scars	Tool type	Notes
1	1	3	Flake - Distal	Quartz	None	–	–	–	Feather	–	–	8.85	5.68	1.91	–	–	–
1	1	3	Angular Fragment	Quartz	None	–	–	–	–	–	–	9.36	5.06	3.33	–	–	–
1	2	1	Flake - Medial	Silcrete	None	–	–	–	–	–	–	25.98	19.05	5.16	–	–	–
1	10	3	Flake - Distal	Quartzite	None	–	–	–	Feather	–	–	25.69	12.43	5.8	–	–	–
1	10	4	Flake - Proximal	Quartz	None	Crushed	–	–	–	–	–	11.25	7.02	1.43	–	–	–
2	2	2	Flake - Left Longitudinal Split	Silcrete	None	–	8.19	4.02	Feather	–	–	18.15	8.51	3.34	–	–	–
2	2	2	Flake - Medial	Silcrete	None	–	–	–	–	–	–	7.8	10.14	5.44	–	–	–
2	2	2	Angular Fragment	Silcrete	None	–	–	–	–	–	–	9.26	4.05	2.42	–	–	–
5	9	1	Flake - Proximal	Quartzite	None	Flaked	11.62	4.88	–	–	–	7.77	14.94	3.59	–	–	Bending initiation
5	11	3	Flake - Complete	Silcrete	None	Crushed	–	–	Hinge	–	–	5.85	6.5	2.06	–	–	–
5	11	2	Flake - Complete	Silcrete	None	Crushed	–	–	Feather	–	–	6.59	10.74	2.79	–	–	–
7	2	1	Flake - Medial	Quartz	None	–	–	–	–	–	–	12.44	9.14	3.11	–	–	–
7	3	2	Angular Fragment	Quartz	None	–	–	–	–	–	–	19.23	12.4	8.44	1	–	Core fragment
7	5	2	Flake - Medial	Silcrete	None	–	–	–	–	–	–	7.23	4.67	1.48	–	–	–
7	7	3	Flake - Proximal	Silcrete	None	Flaked	22.02	12.33	–	–	–	23.83	28.08	11.57	–	–	–
9	8	1	Angular Fragment	Silcrete	None	–	–	–	–	–	–	35.73	23.93	12.74	1	–	Core fragment
9	10	3	Flake - Complete	Quartz	None	Plain/natural	4.44	1.73	Feather	–	–	9.2	5.46	1.84	–	–	–
11	0	2	Flake - Proximal	Quartz	None	Plain/natural	4.83	1.93	–	–	–	9.76	6.45	3.01	–	–	–
11	0	4	Flake - Right Longitudinal Split	Silcrete	None	–	8.55	5.71	Feather	–	–	24.08	6.74	5.14	–	–	–
11	0	5	Flake - Distal	Silcrete	None	–	–	–	Feather	–	–	10.67	21.53	3.45	–	–	–
11	2	2	Flake - Distal	Silcrete	None	–	–	–	Feather	–	–	13.01	12.89	4.6	–	–	–
11	2	1	Flake - Proximal	Silcrete	None	Flaked	14.29	6.39	–	–	–	21.4	16.5	6.16	–	–	–
11	2	1	Flake - Proximal	Silcrete	None	Plain/natural	7.39	2.69	–	–	–	11.12	13.98	3.35	–	–	–
11	2	1	Angular Fragment	Silcrete	None	–	–	–	–	–	–	13.13	7.62	3.48	–	–	–
11	2	1	Angular Fragment	Silcrete	None	–	–	–	–	–	–	20.4	11.31	5.49	–	–	–
11	2	1	Flake - Complete	Crystal Quartz	None	Crushed	–	–	Crushed	–	–	8.77	8.42	2	–	–	Bipolar flake with crushing on

Transect no.	Test pit no.	Spit no.	Type	Raw material	Cortex (%)	Platform type	Platform width (mm)	Platform depth (mm)	Termination	Retouch type	Retouch location	Length (mm)	Width (mm)	Thickness (mm)	Flake scars	Tool type	Notes
																	proximal and distal edge
11	3	1	Flake - Complete	Silcrete	None	Plain/natural	2.87	1.72	Plunge	–	–	20.23	20.31	3.69	–	–	–
11	3	3	Flake - Proximal	Silcrete	None	Plain/natural	6.36	4.51	–	–	–	10.41	10.83	5.35	–	–	Bending initiation
11	3	4	Flake - Complete	Silcrete	None	Crushed	–	–	Plunge	–	–	12.8	16.01	4.25	–	–	–
11	5	1	Flake - Distal	Silcrete	None	–	–	–	Feather	–	–	10.06	9.83	2.64	–	–	–
11	5	1	Flake - Proximal	Silcrete	None	Flaked	9.26	2.1	–	–	–	9.51	12.23	2.26	–	–	–
11	5	1	Angular Fragment	Silcrete	None	–	–	–	–	–	–	29.59	22.9	11.08	1	–	Core fragment
11	5	2	Flake - Distal	Silcrete	None	–	–	–	Retouched	Scalar and edge damage	Q3	16.5	12	5.65		Scraper – Flat edged	Steep scalar retouch on distal edge with edge damage along same edge removing parts of scalar negative scars
11	5	2	Flake - Distal	Silcrete	None	–	–	–	Feather	–	–	10.69	13.42	4.13	–	–	–
11	5	2	Angular Fragment	Silcrete	None	–	–	–	–	–	–	15.13	11.12	10.13	–	–	–
11	5	2	Angular Fragment	Silcrete	None	–	–	–	–	–	–	9.66	8.65	7	–	–	–
11	5	2	Flake - Complete	Silcrete	None	Flaked	12.52	7.12	Feather	–	–	6.48	12.81	4.49	–	–	–
12	1	1	Angular Fragment	Quartzite	None	–	–	–	–	–	–	14.38	4.86	4.58	–	–	–
13	1	1	Flake - Medial	Silcrete	None	–	–	–	–	–	–	10.15	7.84	4.78	–	–	–
13	1	1	Flake - Complete	Silcrete	None	Plain/natural	2.98	1.5	Plunge	–	–	11.93	10.8	5.85	–	–	–
13	1	2	Flake - Left Longitudinal Split	Silcrete	None	–	7.25	4.17	Feather	–	–	33.95	17.06	5.24	–	–	–
13	1	2	Flake - Medial	Quartzite	None	–	–	–	–	–	–	18.06	15.3	6.66	–	–	–
13	1	2	Flake - Medial	Silcrete	None	–	–	–	–	–	–	8.78	5.84	2.81	–	–	–
13	1	2	Angular Fragment	Quartzite	None	–	–	–	–	–	–				–	–	–
13	1	2	Flake - Distal	Silcrete	None	–	–	–	Feather	–	–	8.17	4.7	2.26	–	–	–
13	1	2	Flake - Medial	Quartzite	None	–	–	–	–	–	–	6.14	9.09	2.43	–	–	–
13	1	2	Core - Multidirectional	Quartz	None	–	–	–	–	–	–	17.76	9.68	6.66	3	–	–
13	1	3	Flake - Proximal	Quartzite	None	Plain/natural	9.01	2.94	–	–	–	8.57	11.73	3.45	–	–	–
13	1	3	Flake - Medial	Silcrete	None	–	–	–	–	–	–	5.28	6.32	2.53	–	–	–
13	1	3	Flake - Distal	Quartzite	None	–	–	–	Feather	–	–	3.86	7.07	0.94	–	–	–
14	2	2	Flake - Complete	Silcrete	1-32%	Cortical	13.93	4.27	Hinge	Edge damage	Q2	34.38	34.46	8.28	–	–	Overhang removal, platform preparation

Transect no.	Test pit no.	Spit no.	Type	Raw material	Cortex (%)	Platform type	Platform width (mm)	Platform depth (mm)	Termination	Retouch type	Retouch location	Length (mm)	Width (mm)	Thickness (mm)	Flake scars	Tool type	Notes
14	2	2	Flake - Proximal	Quartz	None	Flaked	14.71	6.27	–	–	–	9.97	17.7	5.11	–	–	Bending initiation
14	2	2	Core - Bipolar	Quartz	None	Crushed	–	–	Axial	–	–	11.32	7.29	3.42	1	–	Bipolar flake core
14	3	1	Blade - Complete	Silcrete	None	Flaked	4.46	2.04	Hinge	–	–	13.94	5.93	1.59	–	–	Microblade flake
14	3	1	Flake - Proximal	Quartz	None	Crushed	–	–	–	–	–	12.76	7.57	2.56	–	–	–
14	3	1	Flake - Distal	Silcrete	None	–	–	–	Feather	–	–	10.36	6.13	4.37	–	–	–
14	3	1	Flake - Distal	Silcrete	None	–	–	–	Retouched	Notched	Q3	11.59	11.31	3.53	–	Point - Engraver, Drill or Piercer	Possible piercer, several notch retouch flakes forming a point on distal edge
14	3	2	Flake - Medial	Silcrete	None	–	–	–	–	–	–	7.05	6.81	1.55	–	–	–
14	3	2	Flake - Complete	Silcrete	None	Plain/natural	3.18	0.55	Feather	–	–	5.66	6	1.06	–	–	–
15	3	2	Flake - Right Longitudinal Split	Silcrete	None	–	3.55	1.9	Hinge	–	–	18.27	8.47	3.06	–	–	–
15	3	2	Flake - Distal	Silcrete	None	–	–	–	Hinge	–	–	9.88	12.27	2.23	–	–	–
15	3	3	Angular Fragment	Crystal Quartz	None	–	–	–		–	–	20.11	11.2	6.97	–	–	–
15	4	3	Flake - Distal	Silcrete	None	–	–	–	Feather	–	–	4.34	8.25	1.4	–	–	–
15	4	3	Flake - Distal	Quartz	None	–	–	–	Feather	–	–	8.48	8.72	3.11	–	–	–
15	5	3	Flake - Proximal	Silcrete	None	Flaked	15.4	6.17	–	–	–	17.3	18.24	9.2	–	–	–
15	6	2	Flake - Complete	Silcrete	None	Flaked	3.89	2.05	Feather	–	–	14.86	5.55	2.04	–	–	–
16	3	3	Flake - Medial	Crystal Quartz	None	–	–	–	–	–	–	14.28	6.19	1.57	–	–	–

Appendix 3 Test excavation results

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
Transect 1										
1	11/11/2019	Lower slope terrace	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7.5	2
			2	150	320	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	8	
			3	350	500	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
2	11/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	1
			2	180	350	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	350	500	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
3	11/11/2019	Lower slope terrace	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	150	330	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	330	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
4	11/11/2019	Lower slope terrace	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	150	330	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	330	420	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
5	11/11/2019	Open depression	1	0	120	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	120	320	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	330	420	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
6	11/11/2019	Open depression	1	0	120	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	120	250	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	250	420	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
7	18/11/2019	Lower slope terrace	1	0	160	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	160	320	10YR 5/6 yellowish brown	Silty Clay	Ironstone fragments small	8.5	
			3	350	400	10YR 5/8 yellowish brown	Clay	Large ironstone fragments	9	
8	18/11/2019	Lower slope terrace	1	0	130	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	130	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments small	7.5	
			3	300	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
9	18/11/2019	Lower slope terrace	1	0	130	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	130	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments small	7.5	
10	27/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	2
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	Ironstone fragments small	8.5	

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
			3	320	500	10YR 5/8 yellowish brown	Clay	Ironstone fragments	9	
11	27/11/2019	Crest	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			3	320	500	10YR 5/8 yellowish brown	Clay	Ironstone fragments	9	
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
12	27/11/2019	Crest	1	0	80	10YR 5/6 yellowish brown	Silty Clay	Rootlets	8.5	–
			2	80	200	10YR 5/8 yellowish brown	Clay	–	9	
Transect 2										
1	12/11/2019	Mid slope	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7.5	–
			2	150	320	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	8	
			3	350	500	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
2	12/11/2019	Mid slope	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7	3
			2	150	300	10YR 4/3 brown	Clayey Silt	Rootlets	7	
			3	330	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
3	12/11/2019	Mid slope	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	150	330	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	330	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
4	12/11/2019	Open depression	1	0	100	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	100	200	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	200	300	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
5	12/11/2019	Open depression	1	0	250	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	250	350	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	350	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
6	18/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	180	360	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	360	400	10YR 5/8 yellowish brown	Clay	Large ironstone fragments	9	
7	18/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	180	400	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	400	500	10YR 5/8 yellowish brown	Clay	Large ironstone fragments	9	
8	27/11/2019	Crest	1	0	160	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	160	320	2.5YR 5/2 greyish brown	Silty Clay	–	8.5	
			3	320	400	10YR 5/8 yellowish brown	Silty Clay	–	8.5	

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
Transect 3										
1	13/11/2019	Mid slope	1	0	20	10YR 5/3 brown	Clayey Silt	Rootlets	8	–
			2	200	600	10YR 6/6 brownish yellow	Silty Clay	Small pebbles <2mm	8.5	
			3	600	700	10YR 7/8 yellow	Clayey Silt	Small ironstone pebbles <5mm	8.5	
2	13/11/2019	Crest	1	0	170	10YR 4/4 dark yellowish brown	Clayey Silt	Rootlets	8	–
			2	170	320	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments, gravel	7.5	
			3	320	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
3	13/11/2019	Crest	1	0	150	10YR 4/4 dark yellowish brown	Clayey Silt	Rootlets	8	–
			2	150	350	7.5YR 5/6 strong brown	Clayey Silt	Small ironstone pebbles <5mm	8.5	
			3	350	500	7.5YR 5/8 strong brown	Clay	Small ironstone pebbles <5mm	8.5	
4	13/11/2019	Mid slope	1	0	200	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	200	400	10YR 5/6 yellowish brown	Clayey Silt	Small gravel	8	
5	13/11/2019	Open depression	1	0	200	10YR 4/3 brown	Clayey Silt	Rootlets, small gravel	7	–
			2	200	350	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments, gravel	7.5	
			3	350	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
6	19/11/2019	Open depression	1	0	130	2.5YR 6/4 light yellowish brown	Silty Clay	Rootlets, ironstone fragments	8	–
			2	130	300	2.5 YR 5/4 light olive brown	Silty Clay	Large ironstone fragments	8.5	
7	19/11/2019	Open depression	1	0	200	10YR 4/3 brown	Silty Clay	Rootlets small ironstone fragments	8	–
			3	320	400	10YR 5/6 yellowish brown	Clay	Large ironstone fragments	9	
8	19/11/2019	Mid slope	1	0	160	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	160	300	10YR 5/4 brown	Silty Clay	–	8.5	
			3	300	400	10YR 6/3 pale brown	Clay	Large ironstone fragments	9	
9	19/11/2019	Lower slope terrace	1	0	120	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	120	300	10YR 5/4 brown	Silty Clay	–	8.5	
			3	300	400	10YR 5/8 yellowish brown	Clay	Large ironstone fragments	9	
10	19/11/2019	Crest	1	0	120	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	120	280	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	280	300	10YR 5/8 yellowish brown	Silty Clay	–	8.5	
11	27/11/2019	Crest	1	0	120	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	120	280	10YR 5/6 yellowish brown	Silty Clay	Ironstone fragments	8.5	
			3	400	300	10YR 5/8 yellowish brown	Silty Clay	Ironstone fragments	8.5	

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
Transect 4										
1	13/11/2019	Mid slope	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	150	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
2	13/11/2019	Crest	1	0	170	10YR 4/3 brown	Clayey Silt	Rootlets, small gravel	7	–
			2	170	320	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments, gravel	7.5	
			3	320	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
3	13/11/2019	Crest	1	0	100	10YR 4/3 brown	Clayey Silt	Rootlets, small gravel	7	–
			2	100	230	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments, gravel	7.5	
			3	230	300	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
4	13/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
5	14/11/2019	Open depression	1	0	200	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	200	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
6	19/11/2019	Mid slope	1	0	120	10YR 5/2 greyish brown	Clayey Silt	Rootlets, small gravel	7	–
			2	120	320	10YR 6/2 light brownish grey	Sandy Clay	Ironstone fragments, gravel	7.5	
			3	320	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
7	19/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	300	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	400	10YR 5/8 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
8	19/11/2019	Open depression	1	0	120	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	120	260	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	350	10YR 5/8 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
9	20/11/2019	Mid slope	1	0	120	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	120	260	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	400	10YR 5/8 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
10	19/11/2019	Crest	1	0	120	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	120	280	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	280	300	10YR 5/8 yellowish brown	Silty Clay	–	8.5	
11	27/11/2019	Crest	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	8	–

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
			2	180	280	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	280	400	10YR 5/8 yellowish brown	Silty Clay	–	8.5	
Transect 5										
1	13/11/2019	Open depression	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
2	13/11/2019	Open depression	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	150	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	350	10YR 5/4 yellowish brown	Sandy Clay	Small ironstone fragments <5mm	8.5	
3	13/11/2019	Open depression	1	0	200	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	200	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
4	13/11/2016	Open depression	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	400	10YR 5/4 yellowish brown	Sandy Clay	Small ironstone fragments <5mm	8.5	
5	13/11/2019	Open depression	1	0	200	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	200	300	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
6	19/11/2019	Mid slope	1	0	120	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	120	240	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	240	600	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
7	19/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	300	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	400	10YR 5/8 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
8	19/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	260	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	7.5	
			3	260	600	10YR 5/8 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
9	20/11/2019	Open depression	1	0	120	10YR 5/3 brown	Clayey Silt	Rootlets	7	1
			2	120	320	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	320	400	10YR 5/6 yellowish brown	Sandy Clay	ironstone fragments	8.5	
10	19/11/2019	Mid slope	1	0	120	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	120	300	10YR 6/4 light yellowish brown	Sandy Clay	Ironstone fragments	7.5	
			3	300	350	10YR 6/6 brownish yellow	Sandy Clay	Large ironstone fragments >40mm	8.5	

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
11	27/11/2019	Crest	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	2
			2	180	280	10YR 6/4 light yellowish brown	Sandy Clay	–	7.5	
			3	280	350	10YR 5/8 yellowish brown	Sandy Clay	–	8.5	
12	27/11/2019	Crest	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	320	10YR 6/4 light yellowish brown	Sandy Clay	–	7.5	
			3	320	400	10YR 5/8 yellowish brown	Sandy Clay	–	8.5	
Transect 6										
1	13/11/2019	Mid slope	1	0	280	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	280	380	10YR 7/2 light grey	Clayey Silt	Charcoal flecks	7.5	
			3	380	400	10YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
2	14/11/2019	Mid slope	1	0	180	10YR 5/3 brown	Clayey Silt	Rootlets	8.5	–
			2	180	300	2.5Y 6/4 light yellowish brown	Clayey Silt	Large ironstone gravel >20mm at base	8.5	
3	14/11/2019	Mid slope	1	0	200	10YR 5/3 brown	Clayey Silt	Rootlets	8.5	–
			2	200	300	2.5Y 6/4 light yellowish brown	Clayey Silt	Large ironstone gravel >20mm	8.5	
4	14/11/2019	Mid slope	1	0	180	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	180	400	10YR 7/2 light grey	Clayey Silt	Charcoal flecks	7.5	
			3	400	500	10YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
5	14/11/2019	Open depression	1	0	170	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	170	300	10YR 7/2 light grey	Clayey Silt	Charcoal flecks	7.5	
			3	300	400	10YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
6	20/11/2019	Open depression	1	0	100	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	100	240	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	240	300	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
7	20/11/2019	Mid slope	1	0	100	10YR 4/3 brown	Clayey Silt	Rootlets	8	–
			2	100	230	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks	7.5	
			3	230	300	10YR 5/8 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
8	20/11/2019	Mid slope	1	0	100	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	100	200	10YR 7/2 light grey	Clayey Silt	Charcoal flecks	7.5	
			3	200	300	10YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
9	20/11/2019	Open depression	1	0	120	10YR 5/3 brown	Clayey Silt	Rootlets	7	–
			2	120	320	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
			3	320	400	10YR 5/6 yellowish brown	Sandy Clay	Ironstone fragments	8.5	
10	20/11/2019	Open depression	1	0	130	10YR 4/2 dark greyish brown	Clayey Silt	Rootlets	8.5	–
			2	130	280	10YR 6/2 light brownish grey	Clayey Silt	Charcoal flecks	8	
			3	280	400	10YR 5/4 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
11	20/11/2019	Open depression	1	0	130	10YR 4/2 dark greyish brown	Clayey Silt	Rootlets	8.5	–
			2	130	280	10YR 6/2 light brownish grey	Clayey Silt	Charcoal flecks	8	
			3	280	400	10YR 5/4 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
13	28/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	300	10YR 6/4 light yellowish brown	Sandy Clay	–	7.5	
			3	300	400	10YR 5/8 yellowish brown	Sandy Clay	–	8.5	
Transect 7										
1	14/11/2019	Mid slope	1	0	170	10YR 5/3 brown	Clayey Silt	Rootlets	8.5	–
			2	170	300	10YR 6/4 light yellowish brown	Clayey Silt	Large ironstone gravel >20mm at base	8.5	
2	14/11/2019	Mid slope	1	0	180	10YR 5/3 brown	Clayey Silt	Rootlets	8.5	1
			2	180	300	10YR 5/6 yellowish brown	Clayey Silt	Large ironstone gravel >20mm	8.5	
3	14/11/2019	Mid slope	1	0	180	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	1
			2	180	320	10YR 7/2 light grey	Clayey Silt	Charcoal flecks	7.5	
			3	320	400	10YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
4	14/11/2019	Mid slope	1	0	160	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	160	320	10YR 7/2 light grey	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	320	400	10YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
5	14/11/2019	Mid slope	1	0	180	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	1
			2	180	300	10YR 6/6 brownish yellow	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	300	400	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
6	21/11/2019	Open depression	1	0	100	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	100	240	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments small	7.5	
			3	240	400	10YR 5/4 yellowish brown	Sandy Clay	Small ironstone fragments	8.5	
7	21/11/2018	Mid slope	1	0	180	10YR 5/3 brown	Clayey Silt	Rootlets	8	1
			2	180	320	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks, small gravel, ironstone fragments	7.5	
			3	320	500	10YR 5/6 yellowish brown	Clayey Silt	Ironstone fragments	7	
8	20/11/2019	Mid slope	1	0	160	10YR 5/3 brown	Clayey Silt	Rootlets	8	–

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
			2	160	260	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	260	300	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
9	20/11/2019	Mid slope	1	0	160	10YR 5/3 brown	Clayey Silt	Rootlets	8	–
			2	160	320	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	320	400	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
10	20/11/2019	Open depression	1	0	100	10YR 5/3 brown	Clayey Silt	Rootlets	8	–
			2	100	240	10YR 6/4 light yellowish brown	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	260	300	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
12	28/11/2019	Open depression	1	0	100	10YR 4/2 dark greyish brown	Clayey Silt	Rootlets	8.5	–
			2	100	280	10YR 6/2 light brownish grey	Clayey Silt	Charcoal flecks	8	
			3	280	400	10YR 5/4 yellowish brown mottled	Clayey Silt	Small ironstone pebbles	7	
Transect 8										
1	15/11/2019	Upper slope	1	0	170	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	170	280	10YR 7/2 light grey	Clayey Silt	Charcoal flecks	7.5	
			3	280	400	10YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
2	15/11/2019	Upper slope	1	0	170	10YR 5/2 greyish brown	Clayey Silt	Rootlets, large ironstone pieces <50	8	–
			2	170	300	10YR 6/6 brownish yellow	Clayey Silt	Charcoal flecks, large ironstone gravel <50	7.5	
			3	300	400	10YR 5/6 yellowish brown	Clayey Silt	Large ironstone pebbles <50	7	
3	15/11/2019	Upper slope	1	0	180	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	180	300	10YR 7/2 light grey	Clayey Silt	–	7.5	
			3	300	400	10YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
4	15/11/2019	Upper slope	1	0	180	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	180	300	10YR 6/6 brownish yellow	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	300	400	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
5	15/11/2019	Mid slope	1	0	160	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	160	230	10YR 6/6 brownish yellow	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	230	300	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
6	21/11/2019	Open depression	1	0	180	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	180	300	10YR 6/6 brownish yellow	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	300	400	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
7	21/11/2019	Upper slope	1	0	160	10YR 5/3 brown	Clayey Silt	Rootlets	8	–

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
			2	160	300	10YR 5/4 yellowish brown	Clayey Silt	Small gravel, ironstone fragments	7.5	
			3	300	400	10YR 5/6 yellowish brown	Clayey Silt	Ironstone fragments	7	
8	21/11/2019	Upper slope	1	0	130	10YR 5/3 brown	Clayey Silt	Rootlets	8	–
			2	130	320	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks, small gravel, ironstone fragments	7.5	
			3	320	400	10YR 5/6 yellowish brown	Clayey Silt	Ironstone fragments large	7	
9	21/11/2019	Upper slope	1	0	160	10YR 5/3 brown	Clayey Silt	Rootlets	8	–
			2	160	320	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks, small gravel	7.5	
			3	320	400	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
10	28/11/2019	Upper slope	1	0	160	10YR 4/2 dark greyish brown	Clayey Silt	Rootlets	8.5	–
			2	160	320	10YR 6/2 light brownish grey	Clayey Silt	Charcoal flecks	8	
			3	320	400	2.5YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
11	28/11/2019	Open depression	1	0	100	10YR 4/2 dark greyish brown	Clayey Silt	Rootlets	8.5	–
			2	100	280	10YR 6/2 light brownish grey	Clayey Silt	Charcoal flecks	8	
			3	280	400	10YR 5/4 yellowish brown mottled	Clayey Silt	Small ironstone pebbles	7	
Transect 9										
1	15/11/2019	Upper slope	1	0	200	10YR 5/2 greyish brown	Clayey Silt	Rootlets, large ironstone pieces <50mm	8	–
			2	200	300	10YR 5/6 yellowish brown	Clayey Silt	Large ironstone pebbles <50mm	7	
2	15//11/2019	Crest	1	0	170	10YR 5/2 greyish brown	Clayey Silt	Rootlets, large ironstone pieces <50mm	8	–
			2	170	300	10YR 6/6 brownish yellow	Clayey Silt	Charcoal flecks, large ironstone gravel <50mm	7.5	
			3	300	400	10YR 5/6 yellowish brown	Clayey Silt	Large ironstone pebbles <50mm	7	
3	15/11/2019	Crest	1	0	200	10YR 5/2 greyish brown	Clayey Silt	Rootlets, large ironstone pieces <50mm	8	–
			2	200	400	10YR 5/6 yellowish brown	Clayey Silt	Large ironstone pebbles <50mm	7	
4	15/11/2019	Upper slope	1	0	220	10YR 5/2 greyish brown	Clayey Silt	Rootlets	8	–
			2	220	400	10YR 6/6 brownish yellow	Clayey Silt	Charcoal flecks, small gravel	7.5	
5	15/11/25019	Upper slope	1	0	170	10YR 4/3 brown	Clayey Silt	Rootlets	7.5	–
			2	170	320	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	8	
			3	320	500	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments >30mm	8.5	
6	21/11/2019	Open depression	1	0	170	10YR 4/3 brown	Clayey Silt	Rootlets	7.5	–
			2	170	320	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	8	
			3	320	500	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments >30mm	8.5	
7	21/11/2019	Upper slope	1	0	160	10YR 5/3 brown	Clayey Silt	Rootlets	8	–

Test pit number	Date excavated	Landform	Context	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Soil description	Inclusions	PH	Artefacts
			2	160	300	10YR 5/4 yellowish brown	Clayey Silt	Small gravel, ironstone fragments	7.5	
			3	300	400	10YR 5/6 yellowish brown	Clayey Silt	Ironstone fragments	7	
8	21/11/2019	Transect	1	0	130	10YR 5/3 brown	Clayey Silt	Rootlets	8	1
			2	130	240	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks, small gravel, ironstone fragments	7.5	
			3	260	300	10YR 5/6 yellowish brown	Clayey Silt	Ironstone fragments large	7	
9	21/11/2019	Upper slope	1	0	130	10YR 5/3 brown	Clayey Silt	Rootlets	8	–
			2	130	280	10YR 5/4 yellowish brown	Clayey Silt	Small gravel	7.5	
			3	280	300	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	7	
10	28/11/2019	Upper slope	1	0	160	10YR 4/2 dark greyish brown	Clayey Silt	Rootlets	8.5	1
			2	160	320	10YR 6/2 light brownish grey	Clayey Silt	Charcoal flecks	8	
			3	320	500	2.5YR 6/4 light yellowish brown	Clayey Silt	Small ironstone pebbles	7	
11	28/11/2019	Open depression	1	0	100	10YR 4/2 dark greyish brown	Clayey Silt	Rootlets	8.5	–
			2	100	280	10YR 6/2 light brownish grey	Clayey Silt	Charcoal flecks	8	
			3	280	400	10YR 5/6 yellowish brown	Clayey Silt	Small ironstone pebbles	8	
Transect 10										
1	15/11/2019	Crest	1	0	170	10YR 4/3 brown	Clayey Silt	Rootlets	7.5	–
			2	170	300	10YR 5/4 yellowish brown	Sandy Clay	Ironstone fragments	8	
			3	300	400	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
2	15/11/2019	Crest	1	0	200	10YR 4/3 brown	Clayey Silt	Rootlets	7.5	–
			2	200	300	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
3	15/11/2019	Crest	1	0	150	10YR 4/3 brown	Clayey Silt	Rootlets	7.5	–
			2	150	300	10YR 5/4 yellowish brown	Sandy Clay	Large ironstone fragments >40mm	8.5	
4	21/11/2019	Crest	1	0	120	10YR 5/3 brown	Clayey Silt	Rootlets	8	–
			2	120	260	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks, small gravel, ironstone fragments	7.5	
			3	260	350	10YR 5/6 yellowish brown	Clayey Silt	Ironstone fragments large	7	
5	21/11/2019	Crest	1	0	130	10YR 5/3 brown	Clayey Silt	Rootlets	8	–
			2	130	320	10YR 5/4 yellowish brown	Clayey Silt	Charcoal flecks, small gravel, ironstone fragments	7.5	
			3	320	470	10YR 5/6 yellowish brown	Clayey Silt	Ironstone fragments large	7	
Transect 11										
0	18/11/22019	Lower slope terrace	1	0	130	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets, charcoal flecks	8	3
			2	130	450	10YR 5/6 yellowish brown	Silty Clay	–	8.5	

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			3	450	600	10YR 5/8 yellowish brown	Clay	–	9	
1	15/11/2019	Lower slope terrace	1	0	120	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets	8	–
			2	120	260	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	260	400	10YR 5/8 yellowish brown	Clay	–	9	
2	15/11/2019	Lower slope terrace	1	0	160	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets	8	6
			2	160	320	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	350	400	10YR 5/8 yellowish brown	Clay	–	9	
3	15/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	8	3
			2	180	400	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	400	600	10YR 5/8 yellowish brown	Clay	–	9	
4	18/11/22019	Lower slope terrace	1	0	160	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	160	340	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	340	400	10YR 5/8 yellowish brown	Clay	–	9	
5	18/11/22019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	8	8
			2	180	360	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	380	500	10YR 5/8 yellowish brown	Clay	–	9	
6	18/11/22019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	8	–
			2	180	400	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	400	600	10YR 5/8 yellowish brown	Clay	–	9	
Transect 12										
1	22/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets glass and ceramic fragments	7.5	1
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8	
			3	320	500	10YR 5/8 yellowish brown	Clay	–	8.5	
2	22/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	–
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8	
			3	320	400	10YR 5/8 yellowish brown	Clay	–	8.5	
3	22/11/2019	Open depression	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	–
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8	
			3	320	500	10YR 5/8 yellowish brown	Clay	–	8.5	
4	22/11/2019	Open depression	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	–
			2	180	320	10YR 6/3 pale brown	Silty Clay	–	8	

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			3	320	500	10YR 6/4 light yellowish brown	Clay	Small ironstone fragments	8.5	
5	22/11/2019	Open depression	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	–
			2	180	320	10YR 6/3 pale brown	Silty Clay	–	8	
			3	320	400	10YR 5/8 yellowish brown	Clay	Small ironstone fragments	8.5	
Transect 13										
1	22/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	12
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8	
			3	320	500	10YR 5/8 yellowish brown	Clay	–	8.5	
2	26/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	–
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8	
			3	320	500	10YR 5/8 yellowish brown	Clay	–	8.5	
3	26/11/2019	Lower slope terrace	1	0	120	10YR 4/3 brown	Silty Clay	Rootlets	7.5	–
			2	120	280	10YR 5/6 yellowish brown	Silty Clay	Ironstone fragments	8	
			3	280	350	10YR 5/8 yellowish brown	Clay	Large ironstone fragments	8.5	
4	26/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	320	10YR 6/3 pale brown	Sandy Clay	Ironstone fragments	7.5	
			3	320	400	10YR 5/4 yellowish brown	Sandy Clay	–	8.5	
Transect 14										
1	22/11/2019	Lower slope terrace	1	0	100	10YR 4/3 brown	Silty Clay	Rootlets, brick fragments, asbestos	v	
2	22/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	3
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8	
			3	320	400	10YR 5/8 yellowish brown	Clay	–	8.5	
3	22/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	6
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8	
			3	320	400	10YR 5/8 yellowish brown	Clay	–	8.5	
4	22/11/2019	Lower slope terrace	1	0	180	10YR 4/3 brown	Silty Clay	Rootlets	7.5	–
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8	
			3	320	400	10YR 5/8 yellowish brown	Clay	–	8.5	
Transect 15										
1	26/11/2019	Lower slope terrace	1	0	180	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets	8	–
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8.5	

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			3	320	400	10YR 5/8 yellowish brown	Clay	Large ironstone fragments	9	
2	26/11/2019	Lower slope terrace	1	0	180	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets	8	–
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	320	400	10YR 5/8 yellowish brown	Clay	–	9	
3	26/11/2019	Lower slope terrace	1	0	180	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets	8	3
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	320	400	10YR 5/8 yellowish brown	Clay	Ironstone fragments	9	
4	26/11/2019	Lower slope terrace	1	0	180	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets	8	2
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	320	400	10YR 5/8 yellowish brown	Clay	Ironstone fragments	9	
5	26/11/2019	Lower slope terrace	1	0	180	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets	8	1
			2	180	320	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	320	400	10YR 5/8 yellowish brown	Clay	Ironstone fragments	9	
6	27/11/2019	Lower slope terrace	1	0	160	10YR 4/4 dark yellowish brown	Silty Clay	Rootlets	8	1
			2	160	320	10YR 5/6 yellowish brown	Silty Clay	–	8.5	
			3	320	400	10YR 5/8 yellowish brown	Clay	Ironstone fragments	9	
Transect 16										
1	28/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	300	10YR 5/6 yellowish brown	Sandy Clay	–	7.5	
			3	300	400	10YR 5/8 yellowish brown	Sandy Clay	–	8.5	
2	28/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	180	300	10YR 5/6 yellowish brown	Sandy Clay	–	7.5	
			3	300	400	10YR 5/8 yellowish brown	Sandy Clay	–	8.5	
3	28/11/2019	Mid slope	1	0	180	10YR 4/3 brown	Clayey Silt	Rootlets	7	1
			2	180	300	10YR 5/6 yellowish brown	Sandy Clay	–	7.5	
			3	300	400	10YR 5/8 yellowish brown	Sandy Clay	–	8.5	
4	28/11/2019	Mid slope	1	0	120	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	120	280	10YR 5/6 yellowish brown	Sandy Clay	–	7.5	
			3	280	400	10YR 5/8 yellowish brown	Sandy Clay	–	8.5	
5	28/11/2019	Upper slope	1	0	120	10YR 4/3 brown	Clayey Silt	Rootlets	7	–
			2	120	280	10YR 5/6 yellowish brown	Sandy Clay	–	7.5	

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			3	280	400	10YR 5/8 yellowish brown	Sandy Clay	–	8.5	