South Kiama Planning Proposal: Archaeological Report

FINAL REPORT

Prepared for Unicomb Development Services Pty Ltd on behalf of White Constructions Pty Ltd

18 December 2020

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- Trevor Unicomb (Unicomb Developments).
- James Davis (Aboriginal representative).
- Leanne Tungai (Aboriginal representative).
- Tracy Henry (Illawarra Local Aboriginal Land Council).

Biosis staff involved in this project were:

- Lauren Harley for mapping.

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Photos

Glossary

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
Biosis	Biosis Pty Ltd
CHMP	Cultural Heritage Management Plan
Consultation requirements	*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*
DA	Development Application
DECCW	Department of Environment, Climate Change and Water (now Heritage NSW)
DP	Deposited Plan
EP&A Act	*Environmental Planning and Assessment Act 1979*
GPS	Global Positioning System
GSV	Ground Surface Visibility
Heritage Act	*Heritage Act 1977*
Heritage NSW	Department of Premier and Cabinet (DPC)
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
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
PAD	Potential Archaeological Deposit
RAP	registered Aboriginal party
study area	Defined as Lot 1 DP707300, Lot 5 DP740252 Lot 101 DP1077617, Lot 102 DP 1077617 and Lot 8 DP 258605
the Code	*Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*

Summary

Biosis Pty Ltd (Biosis) was commissioned by Unicomb Development Services Pty Ltd on behalf of White Constructions Pty Ltd to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for a planning proposal for an announced re-zoning and subdivision. This Archaeological Report (AR) documents the findings of the archaeological test investigations conducted as part of the ACHA. As required under Section 2.3 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010a) (the Code), the AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

The study area includes Lot 1 Deposited Plan (DP) 707300, Lot 5 DP 740252 Lot 101 DP 1077617, Lot 102 DP 1077617 and Lot 8 DP 258605 (Figure 1). The study area is approximately 2 kilometres south of Kiama, and approximately 37 kilometres south of the Wollongong central business district.

There are 104 Aboriginal cultural heritage sites registered with the Aboriginal Heritage Information Management System (AHIMS) register within the vicinity of the study area. No AHIMS sites have been previously recorded within the study area.

Kiama Municipal Council is the Determining Authority and will assess the development application (DA) and all supporting documents, including the ACHA. This will aid in the determination of the re-zoning and establish any potential impacts to Aboriginal Cultural Heritage the proposed rezoning and subdivision may have. A Master Plan has been developed for this subdivision, however it may be subject to change.

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 *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b) (consultation requirements).

An archaeological survey was conducted on 6 July 2017 by Alexander Beben (Principal Archaeologist) and James Cole (Archaeologist), and by Samantha Keats (Consultant Archaeologist) on 29 January 2020, covering part Lot 102 DP 1077617 and Lot 8 DP 258605 only. A survey of the entire study area was also undertaken on 4 September 2020 by Matthew Smith (Project Archaeologist) and Tracy Henry (representative of Illawarra Local Aboriginal Land Council (LALC). 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 exposure.

Three areas of potential archaeological deposit (PAD) were identified during the surveys, with all three areas located on mid to lower slopes beside creeklines.

A program of archaeological test excavation was undertaken between 28 September 2020 and 2 October 2020 by Maggie Butcher (Consultant Archaeologist), Mathew Smith (Project Archaeologist) and Matthew Tetlaw (Research Assistant – Heritage) of Biosis. A total of 33 test pits were excavated within the three areas of PAD, and two additional areas (Area 4 and Area 5) at the request of registered Aboriginal party (RAP) representatives. A total of 16 artefacts were uncovered from the 33 test pits excavated as part of the test excavations. Artefact density per excavation unit varied from zero to a maximum of three.

Four low density Aboriginal sites were identified during the test excavations, South Kiama-01 (containing artefact bearing pits of PAD1 and PAD2), South Kiama-02 (containing artefact bearing pits of PAD3), South Kiama-03 (containing the artefact bearing pits of Area 4) and South Kiama-04 (containing the artefact bearing pit of Area 5). A comparison of these sites with other excavations taken place in the local area and along the south coast of NSW has concluded that the study area was likely utilised as a transitory area and that the artefact scatters are most likely remnants of Aboriginal people traversing the area on the way to more

permanent campsites with more abundant resources. These Aboriginal sites are of low scientific research potential and have been assessed as holding low scientific significance. However, there is the potential for very low density artefact scatters or isolated artefacts to be present throughout the lower slope and floodplain/flat landforms across the study area.

Management 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: Continued consultation with the registered Aboriginal parties

It is recommended that White Constructions Pty Ltd continue to inform the RAPs about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project. This recommendation is in keeping with the consultation requirements.

Recommendation 2: Avoidance of Aboriginal sites and sensitive landforms

Four Aboriginal sites were identified within the study area, South Kiama-01, South Kiama-02, South Kiama-03 and South Kiama-04. The lower slope and floodplain/flat landforms within the study area were also identified as having potential to contain very low density artefact scatters or isolated artefacts. Any potential works should avoid and/or minimise impacts to these sites, however in the instance they cannot be avoided, Recommendations 3 to 7 should be implemented.

Recommendation 3: Application for an Aboriginal Heritage Impact Permit (AHIP)

If the Master Plan and subsequent development cannot avoid impacts to South Kiama-01, South Kiama-02, South Kiama-03 and South Kiama-04, and the lower slope and Floodplain/flat landforms, it is recommended that the proponent apply to Heritage NSW, Department of Premier and Cabinet (DPC) (Heritage NSW) for an area wide Aboriginal Heritage Impact Permit (AHIP) to impact these sites, which are currently protected under the *National Parks and Wildlife Act 1974* (NPW Act). **The AHIP should be for a term of 10 years.** The sub-surface test excavations have confirmed the tested sites are of low integrity and scientific significance.

Recommendation 4: Curation of collected artefacts

A total of 16 artefacts were excavated during the test excavation program. A long term management strategy of Aboriginal heritage items should be developed in consultation with RAPs and in accordance with Requirement 26 of the Code. This may involve the reburial of artefacts within the study area at a location which will not be impacted on by the future development works. In the event an appropriate reburial location cannot be found, a care and control agreement should be determined in consultation with the RAPs to ensure all parties as satisfied as to the long term care of the Aboriginal artefacts.

Recommendation 5: Cultural Heritage Management Plan

A Cultural Heritage Management Plan (CHMP) should also be prepared outlining requirements for management of existing sites and unexpected finds, site inductions and reporting processes during bulk earthworks and construction phases of development to ensure no Aboriginal sites are impacted during later stages of the project.

Recommendation 6: Stop work provision for any potential heritage sites identified during construction

All Aboriginal places and objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act). This protection extends to Aboriginal objects and places that have not been identified but might be unearthed during construction.

Historical archaeological sites are protected under the relic's provisions (s139 – 146) of the *Heritage Act 1977* (Heritage Act). Should any historical archaeological sites be identified during any phase of the proposed development, all works must cease in the vicinity of the find and the project archaeologist and White Constructions notified. Should the archaeological nature of the find be confirmed, the Heritage NSW will require notification.

Recommendation 7: Stop work provision for any potential discovery of human remains

If any suspected human remains are discovered during any activity works, all activity in the vicinity must cease immediately. The remains must be left in place and protected from harm or damage. The following contingency plan describes the immediate actions that must be taken in instances where human remains or suspected human remains are discovered. Any such discovery at the study area must follow these steps:

1. Discovery: If suspected human remains are discovered all activity in the vicinity must stop to ensure minimal damage is caused to the remains; and the remains must be left in place, and protected from harm or damage.
2. Notification: Once suspected human skeletal remains have been found, the Coroner's Office and the NSW Police must be notified immediately. Following this, and if the human remains are likely to be Aboriginal in origin, the find will be reported to the Aboriginal parties and Heritage NSW. If the find is likely to be non-Aboriginal in origin and more than 100 years in age, the heritage division of NSW will be notified of the find under S146 of the Heritage Act.

1 Introduction

1.1 Project background

Biosis has been commissioned by Unicomb Development Services Pty Ltd on behalf of White Constructions Pty Ltd to undertake an ACHA to support a Planning Proposal for a proposed re-zoning and subdivision of Lot 1 DP 707300, Lot 5 DP 740252, part Lot 101 DP 1077617 part Lot 102 DP 1077617, Lot 8 DP 258605, part Lot 102 DP 1077617 and Lot 8 DP 258605, South Kiama, NSW (Figure 1).

Biosis was originally engaged in 2017 to complete an Aboriginal Due Diligence Assessment (ADDA) for Lot 1 DP707300, Lot 5 DP740252, Lot 101 DP1077617 and part of Lot 102 DP1077617. In 2020, Biosis was engaged to update the ADDA to include part Lot 102 DP 1077617 and Lot 8 DP 258605. The ADDA identified three areas of high archaeological potential, and as such recommended that an ACHA be prepared prior to any physical impacts occurring in the study area. This AR documents the findings of the archaeological investigations conducted as part of the ACHA. The AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

This investigation has been carried out under Part 6 of the 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.

It is stated in Section 1.2 of the Code that where the ACHA report concludes that the proposed activity will result in harm to Aboriginal objects or declared Aboriginal Places, an application for an AHIP will be required. This application must be supported by an ACHA report.

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 includes Lot 1 DP707300, Lot 5 DP740252 Lot 101 DP1077617, Lot 102 DP 1077617 and Lot 8 DP 258605 (Figure 1). It is bounded by residential properties to the west. The study area also lies west of and abuts the Kiama Bypass. It is bounded to the north by Saddleback Mountain Road, to the south by Weir Street except for part of Lot 102 DP1077617 and Lot 8 DP 258605 which is south of Weir Street, and to the west by a dry stone wall. The study area is approximately 2 kilometres south of Kiama, and approximately 37 kilometres south of the Wollongong central business district.

The study area (Figure 2) is within the:

- Kiama LGA.
- Parish of Kiama.
- County of Camden.

1.3 Planning approvals

The proposed development will be assessed against Section 3.33 (formerly Section 55) of the EP&A Act. Other relevant legislation and planning instruments that will inform this assessment include:

- *Environment Protection and Biodiversity Conservation Act 1999*.
- NPW Act.
- *National Parks and Wildlife Amendment Act 2010.*
- *Kiama Local Environment Plan 2011*.
- *Kiama Development Control Plan 2012*.

1.4 Objectives of the investigation

The objectives of the investigation can be summarised as follows:

- To identify and consult with any RAPs and the Illawarra LALC.
- To conduct additional background research in order to recognise any identifiable trends in site distribution and location.
- To search statutory and non-statutory registers and planning instruments to identify listed Aboriginal cultural heritage sites within the study area.
- To highlight environmental information considered relevant to past Aboriginal occupation of the locality and associated land use and the identification and integrity/preservation of Aboriginal sites.
- To summarise past Aboriginal occupation in the locality of the study area using ethnohistory and the archaeological record.
- To formulate a model to broadly predict the type and character of Aboriginal sites likely to exist throughout the study area, their location, frequency and integrity.
- To conduct a 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
Maggie Butcher BSc/Ba (Hons)	Maggie is an archaeologist with Biosis Sydney office. Maggie has over five years' experience as an archaeologist and has experience in conducting desktop assessments, archaeological survey and Aboriginal and historical excavation as well as consulting with Traditional Owners. She has also successfully managed a number of ACHAs to completion since her commencement at Biosis.	• Project management • Report writing • Test excavations
Anthea Vella B.Arch M.AHM	Anthea is an archaeologist with over two years' experience. Anthea has experience in conducting Aboriginal and historical heritage assessments, surveys and archaeological test excavations for a variety of projects throughout NSW. Anthea possesses specialist skills in analysing Ground Penetrating Radar data. Anthea has experience in undertaking desktop assessments, project management, and reporting.	• Background research
Mathew Smith BA, BSc (Hons)	Mathew joined Biosis in 2016 and is currently a Project Archaeologist in Wollongong, NSW. Since joining the company Mathew has worked on a number of Aboriginal cultural heritage projects in the Illawarra, Hunter, Greater Sydney, and Far West regions of NSW, where he has developed his skills in Aboriginal archaeology. As part of these projects Mathew has conducted desktop assessments, archaeological surveys and Aboriginal excavations, as well as writing the archaeological reports following these assessments. Mathew specialises in lithic identification and analysis, and has conducted lithic analysis of assemblages from the Illawarra, Sydney and Far West regions. Mathew is a member of the Australian Archaeology Association and the Australian Association of Consulting Archaeologists Inc.	• Test excavations
Matthew Tetlaw BA (hons)	Matthew is a heritage research assistant currently working from the Biosis Wollongong office. Matthew started at Biosis in 2019 after graduating with a bachelor of arts (honours) in 2018. Since starting at Biosis, Matthew has obtained extensive experience in background research, report writing, excavation and field surveys.	• Report writing • Test excavations

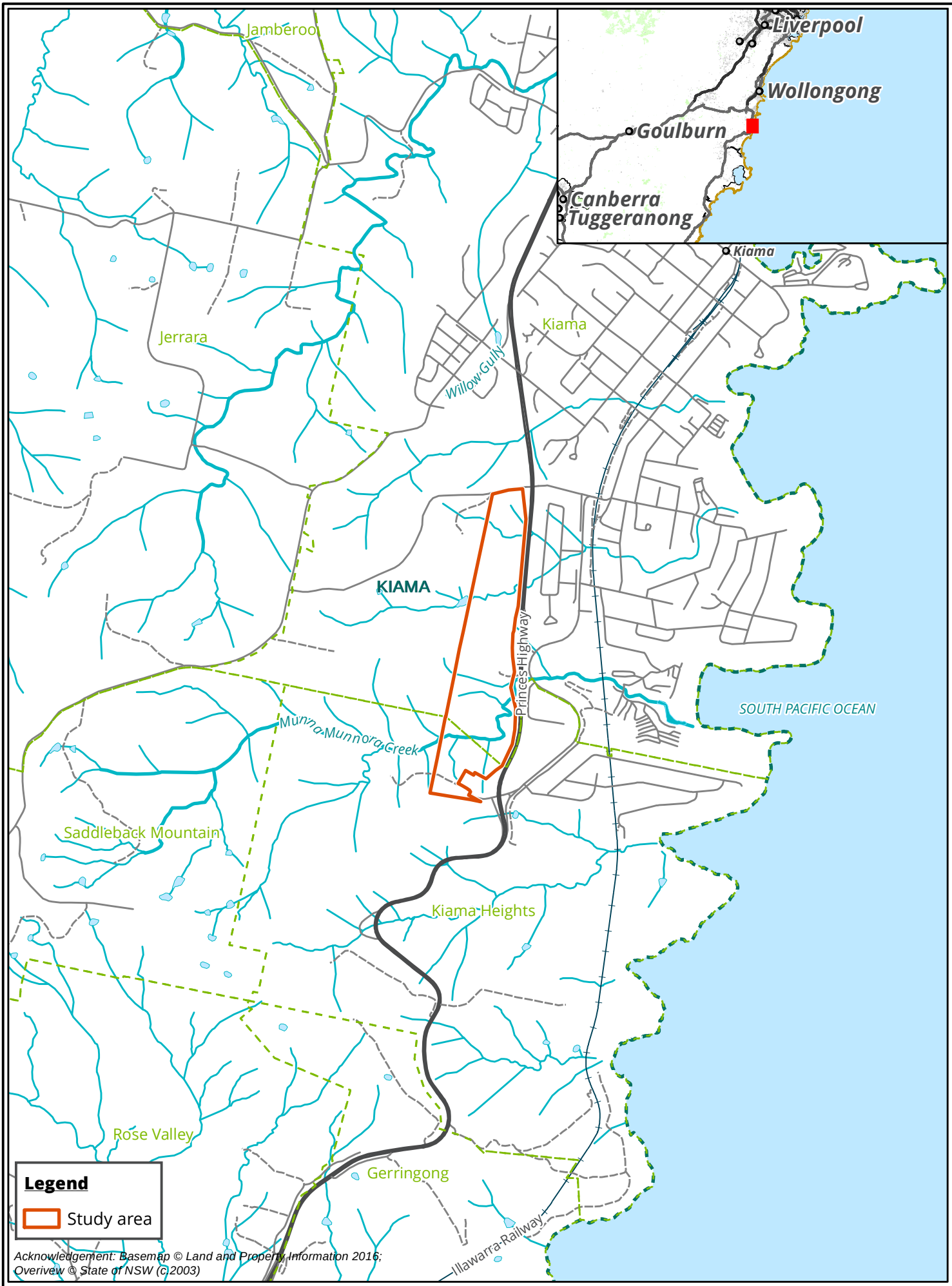

Figure 1 Location of the study area

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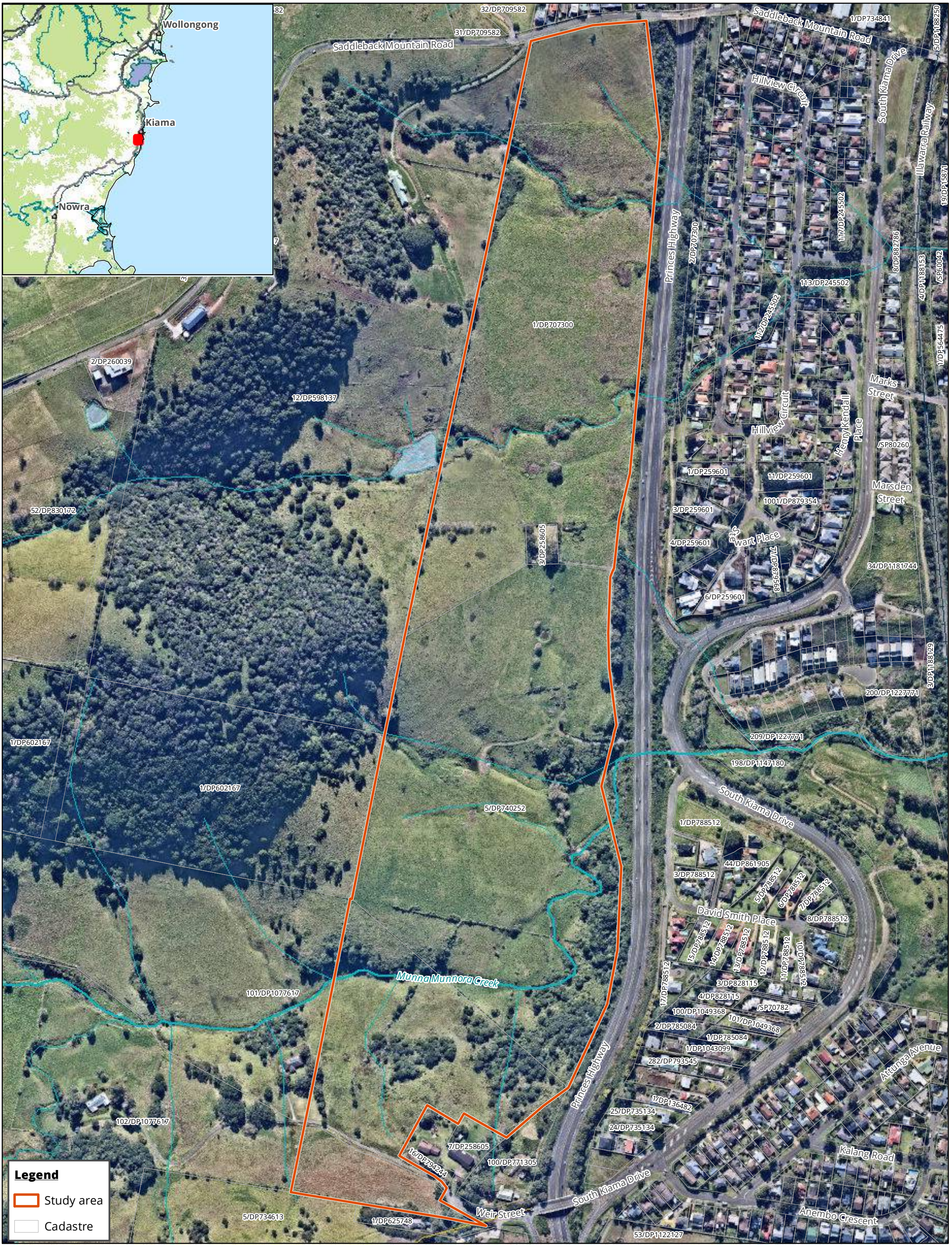

Figure 2 Study area detail

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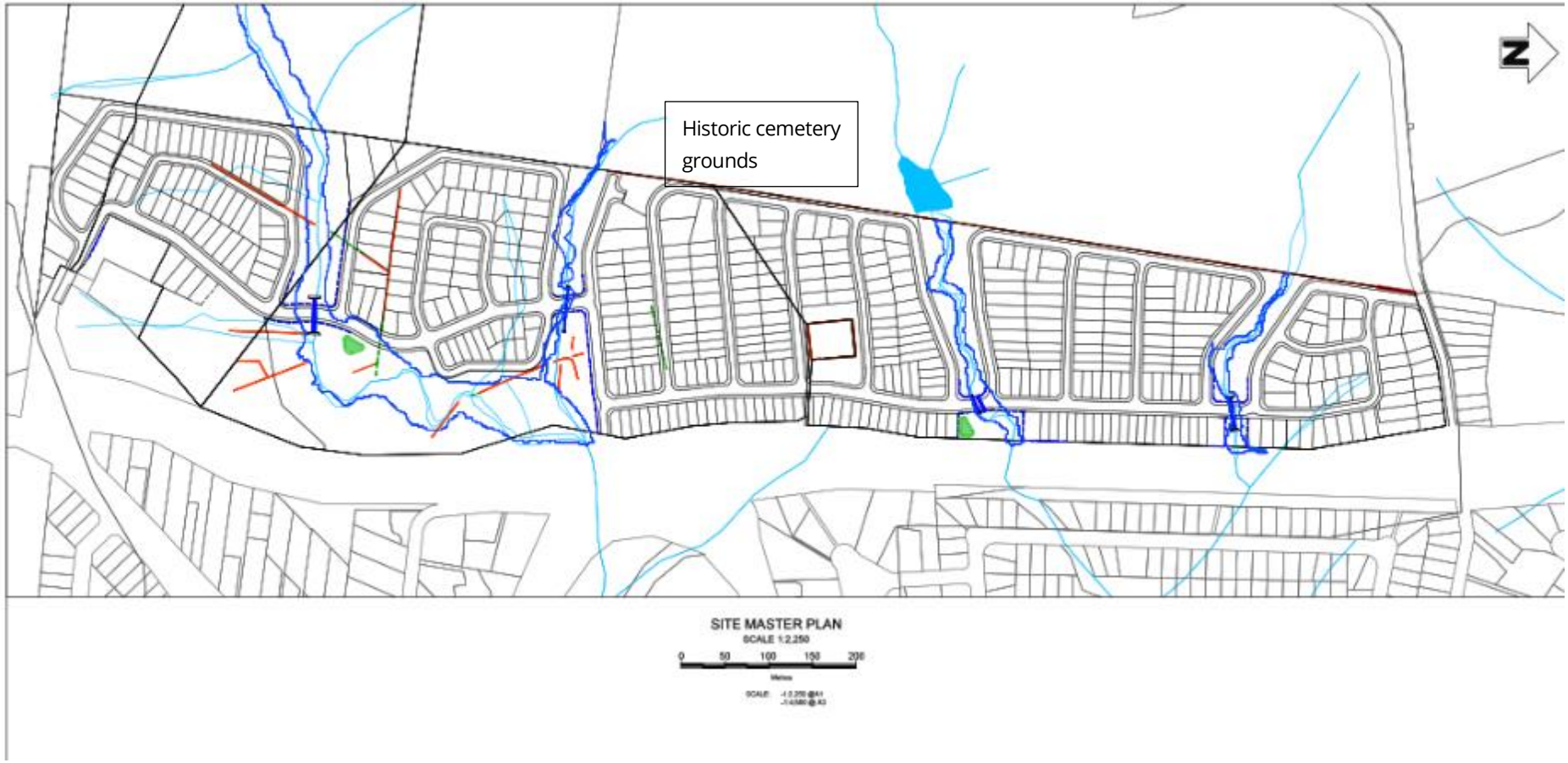
2 Proposed development

White Constructions Pty Ltd is preparing a planning proposal to rezone the study area from RU2 rural landscape to R2 low density residential and R5 large lot residential. A Master Plan of the potential subdivision has been prepared to demonstrate how the study area could be used (Figure 3), however it is subject to change.

The proposed works in their current design will involve the following:

- Subdivision of the land, totalling approximately 460 lots.
- Construction of dual occupancy residential houses throughout the subdivision complex.
- Construction of 17 roads traversing throughout the subdivision complex.
- Installation of services including, but not limited to, gas, electrical, water, sewerage, lighting and communications.
- Retention of native flora and creek lines, however landscaping and bush regeneration are proposed.

Figure 3 Proposed development



3 Desktop assessment

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

3.1 Landscape context

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

3.1.1 Topography, hydrology and geology

The study area lies in the Wollongong Coastal Plain physiographic region. The Coastal Plain is situated between the ocean and the Illawarra Escarpment. The Coastal Plain is characterised as a mosaic of foothills, ridges, spurs, hillocks and floodplains. Slopes in this region vary from very gently inclined to steep with the occasional low cliff. The Coastal Plain is dissected by easterly flowing streams at intervals that become more frequent further north (Fuller 1982, pp. 18). A number of small, non-perennial streams cross the study area, as well as the perennial Munna Munnora Creek and four of its tributaries in the southern portion of the study area (Figure 4).

The geology of the study area consists of the Blowhole Latite Member, a late Permian aged, mid grey latite deriving from a basaltic lava flow of the Gerringong Volcanics (Hazelton 1992) The Blowhole Latite Member in turn overlies the volcanoclastic sandstone of the Kiama Sandstone Member (Hazelton 1992). Also contained within the study area is the Broughton Formation geological unit consisting of sandstone, interbedded siltstone, pebble conglomerate, shelly fossils and varying levels of bioturbation. The study area is also positioned atop the Bombo Latite Member, a volcanic formation, and alluvial fan deposits associated with Munna Munnora Creek in the centre of the study area and an unnamed tributary in the north. This deposit consists of quartz-lithic sand, silt, gravel and clay (Figure 5).

3.1.2 Soil landscapes

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. Because they are defined by a combination of soils, topography, vegetation and weathering conditions, soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure. The study area is contained within two soil landscapes; the Kiama Soil Landscape covers majority of the study area, while the Wattamolla Road Soil Landscape is present within the far southern portion of the study area.

The Kiama Soil Landscape is an erosional soil landscape, characterised by rolling low hills with a relief of between 40 and 60 metres (Figure 5). Crests within this landscape are typically broad with long, moderately inclined convex slopes and gently inclined concave footslopes. Extensively scattered rock outcrops are present on upper slopes, and when coastal the landscape features steep coastal headlands with narrow rock platforms and occasional blowholes. The soils in the Kiama landscape

are characterised by deep (>150 centimetres) Krasnozems on crests and upper slopes, with up to 50 cm of friable clay loam overlying weak and heavy clays (Hazelton 1992). The characteristics of the Kiama soil landscape are outlined in Table 2.

Table 2 Kiama soil landscape characteristics (Hazelton 1992, pp. 52–54)

Soil Material	Description
Ka1	Friable brownish black sandy clay loam. Moderately pedal with rough-faced, porous peds. This material occurs as topsoil.
Ka2	Brown weakly pedal light clay. Weakly pedal with rough-faced, porous peds. This material occurs as subsoil.
Ka3	Dark red weakly pedal heavy clay. Weakly to moderately pedal with rough-faced, porous peds. This material occurs as subsoil.
Ka4	Bright yellowish brown moderately pedal light medium clay. Moderately pedal with rough face, porous peds. This material occurs as subsoil.

The Wattamolla Road Soil Landscape is also an erosional soil landscape, characterised by long, gently to moderately inclined side slopes and undulating to rolling hills, with local relief greater than 200 metres. Broad flat benches and crests recur throughout the landscape, with slope gradients typically between 5 and 15 %. Drainage lines are found to be incised with rock outcrop and scattered boulders, terracettes and slumping present on steeper slopes. Soils are moderately deep throughout the landscape, extending to a depth of approximately 50-100 centimetres, with upper slopes and benches containing red podzolic soils and mid and lower slopes containing yellow podzolic soils (Hazelton 1992). The characteristics of the Kiama soil landscape are outlined in Table 3.

Table 3 Wattamolla Road soil landscape characteristics (Hazelton 1992, pp. 52–54)

Soil Material	Description
wt1	Brownish black (5YR 3/1) to greyish brown (7.5YR 4/2) with occasional bleaching at depth. Moderately pedal structure with 2-5 mm polyhedral peds. This material occurs as topsoil.
wt2	Brown (7.5YR 4/3) to dull brown (7.5YR 4/6) silty loam with occasional bleach. Weakly pedal structure with greater than 2 mm polyhedral peds. This material occurs as topsoil.
wt3	Brown (7.5YR 4/3) to yellowish brown (10YR 5/4) light clay with red mottling throughout (approximately 50 %). Weakly to moderately pedal structure with 10-20 mm polyhedral to sub angular blocky peds. This material occurs as subsoil.
wt4	Dark reddish brown (5YR 3/4) light clay with strong pedal structure and 10-20 mm sub angular blocky peds. This material occurs as subsoil.
wt5	Brown (7.5YR 4/6) to yellowish brown (10YR 5/8) medium clay with red and grey mottling at depth (approximately 50 %). Strong pedal structure with 20-50 mm polyhedral to sub angular blocky peds. This material occurs as subsoil.

Since erosional soils are generally subject to movement, they typically result in poor preservation of the archaeological record, with sub-surface archaeological deposits unable to remain in situ. This postulates that the soil movements throughout the study area would have resulted in low artefact retention and sub-surface deposits.

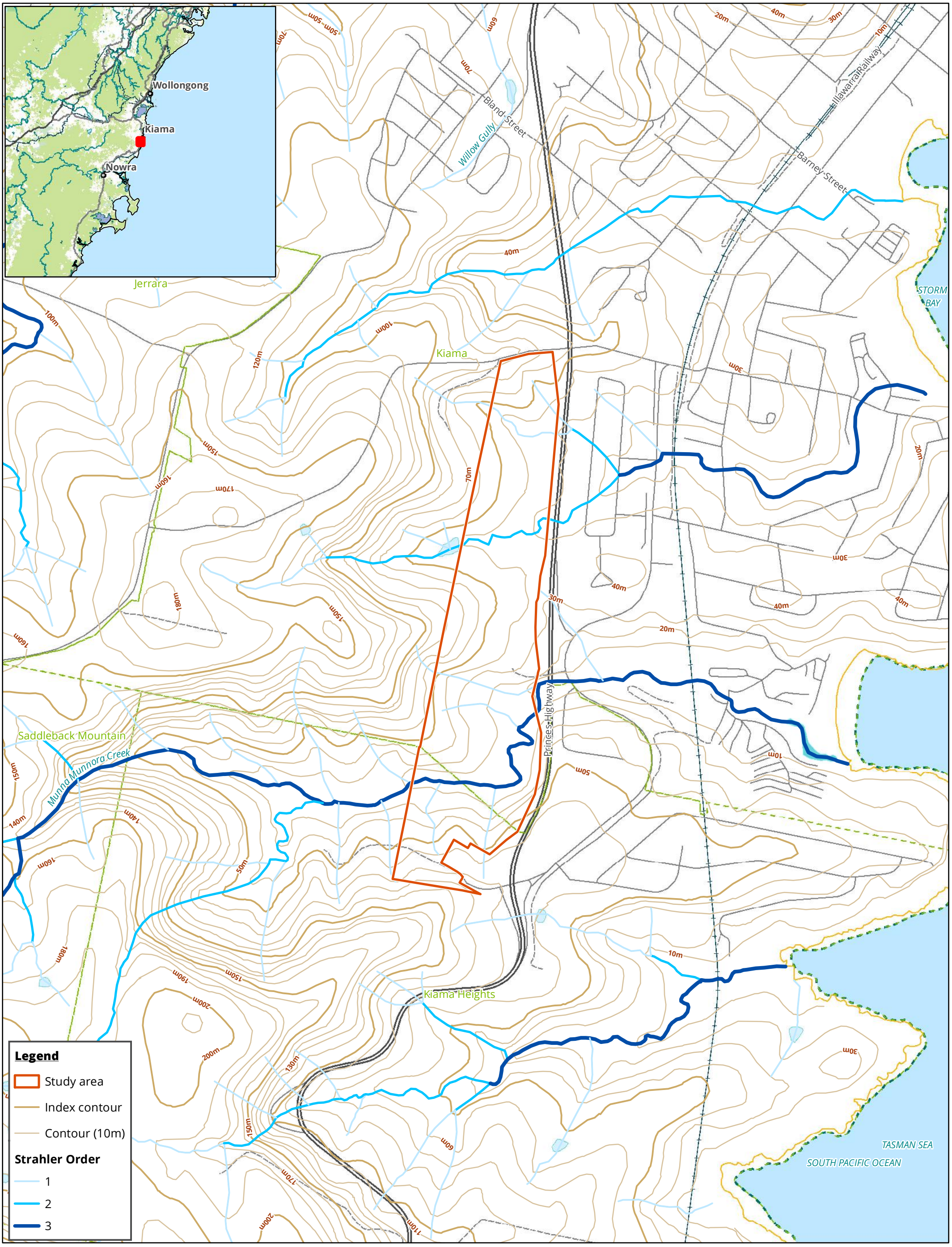


Figure 4 Hydrology associated with the study area

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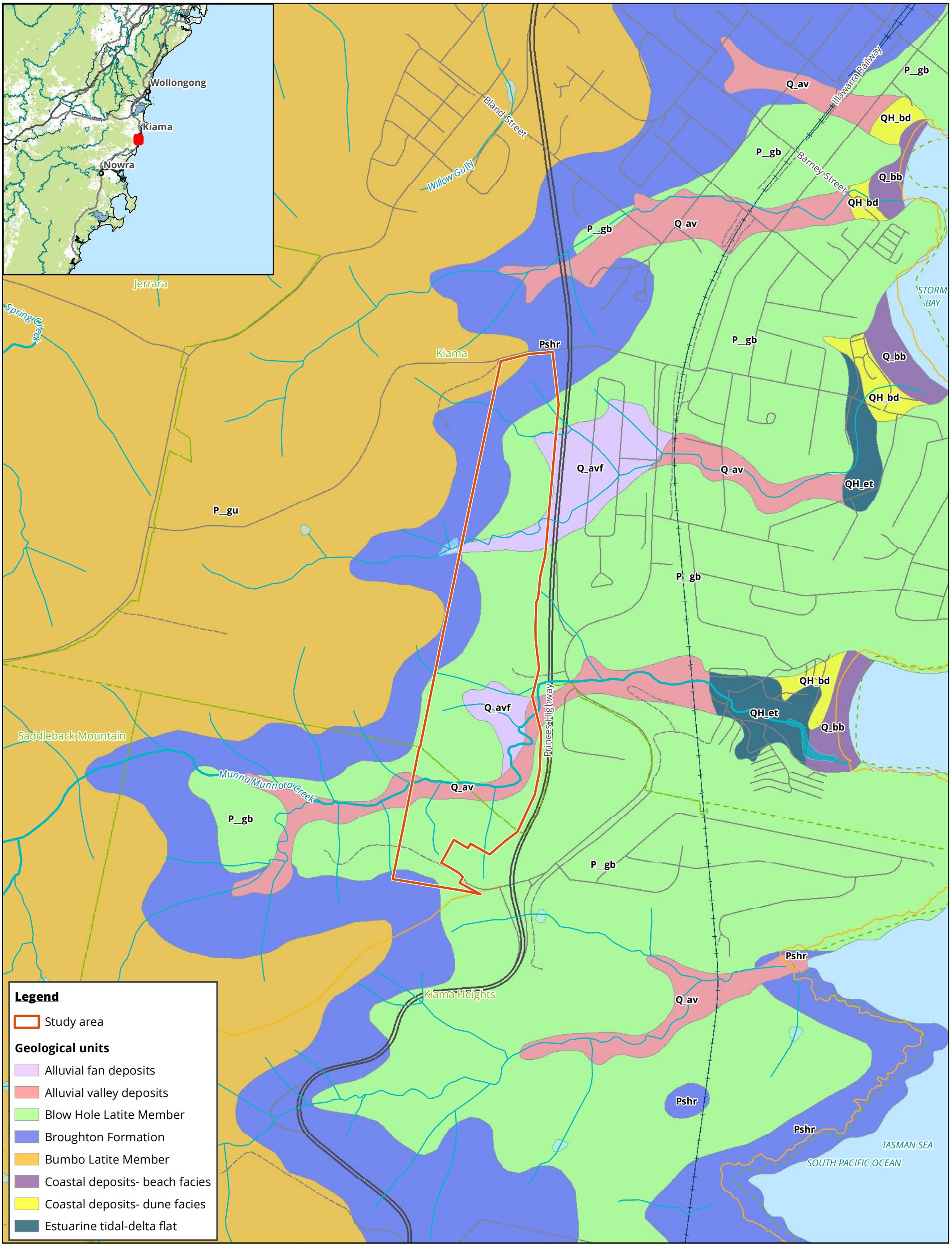

Figure 5 Geological formations associated with the study area

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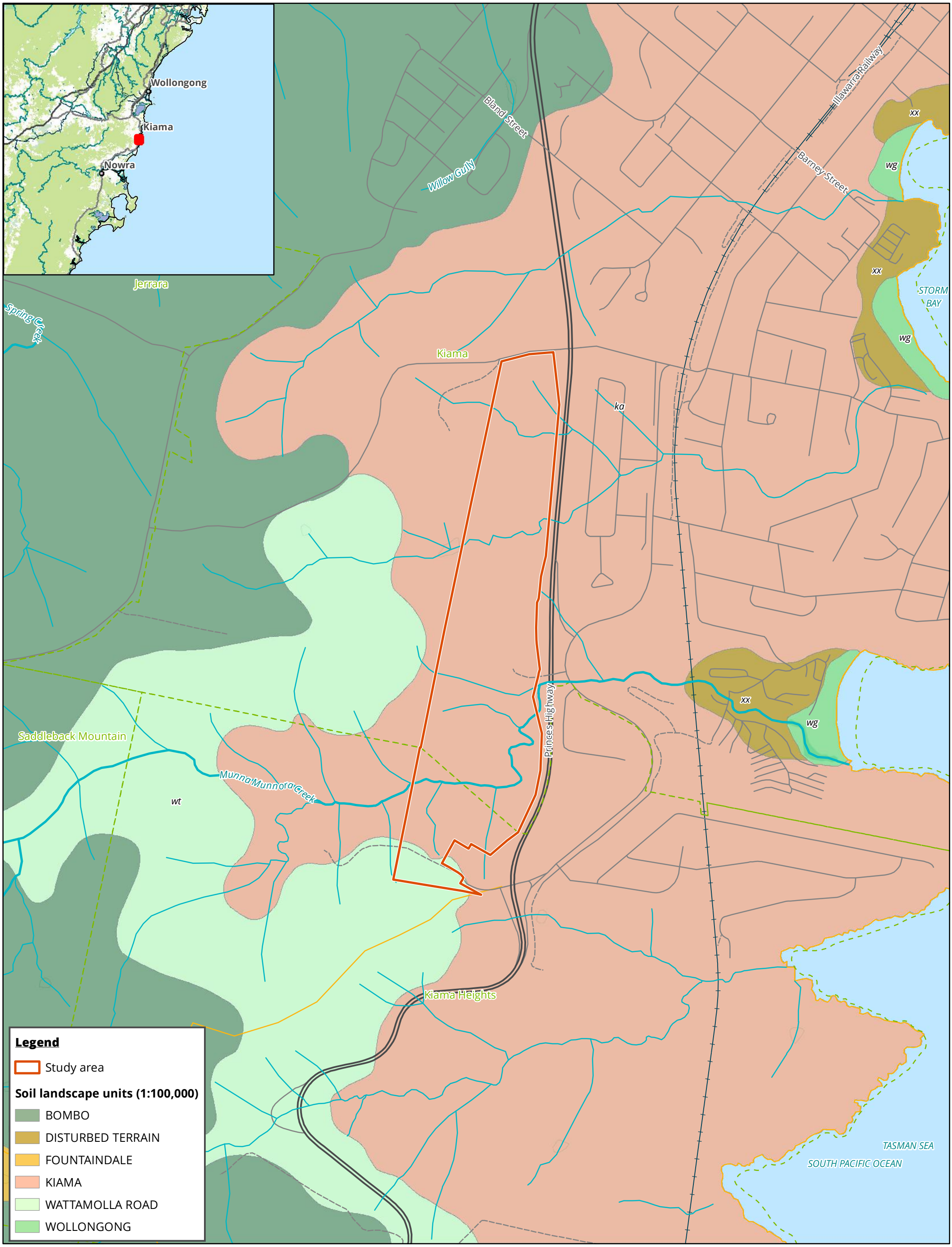

Figure 6 Soil landforms associated with the study area

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3.1.3 Landscape resources

The Coastal Plain of the Illawarra region provides a number of resources used by Aboriginal inhabitants. The geology of the region provides an abundant supply of raw materials. Many would have been available locally and also from trading with other groups (Donlon & Sefton 1988, pp. 23). Igneous material would have come from the south of the study area in areas like Gerringong (Donlon & Sefton 1988, pp. 55) due to its volcanic nature. Some of the other fined grain siliceous material may have come from the Cumberland Plain. Silcrete cobbles are known to have occurred along the Cumberland Plain (McDonald 1992), to the north of the study area. Elsewhere on the Plain, the potential raw materials for stone artefact making include silicified wood, tuff, mudstone, quartz, quartzite and basalt. River gravels and cobbles containing silcrete, chert, and other fine grained volcanic rocks were also used (Attenbrow 2010). While previous archaeological work within the region has not identified any specific stone sources, the presence of the volcanic Dapto Latite Member in the region may have provided a suitable source of raw material, providing lithic material for stone axes. Resources would have been accessible in the outcrops of siltstone, shale and tuffaceous sandstones of the Berry Siltstone formation.

The wider Illawarra region has undergone extensive clearing, but continues to support stands of closed forest. Traditional stories tell of the arrival of the Dharawal people at the mouth of Lake Illawarra, bringing with them the Cabbage Tree Palm *Livistona australis*, hence their namesake (Wesson 2009, pp. 5). Prior to clearing the coastal plain supported grassy woodland, swamps, grasslands and swamps. This region also supported rainforests on the escarpment (Wesson 2009). The abundance of water and vegetation within the study area would have supported an array of floral and faunal species, many of which would have been utilised according to seasonal availability. Aboriginal inhabitants of the region would have had access to a wide range of avian, terrestrial and aquatic fauna and repeated firing of the vegetation would have opened up the foliage allowing ease of access through and between different resource zones.

The Kiama soil landscape has been extensively cleared with few remaining stands of closed forest. This soil landscape would have supported Lillypilly *Acmena smithii*, Native Quince *Alectryon subcinereus*, Brush Bloodwood *Baloghia lucida*, Red-fruited Olive Plum *Cassine australis*, Brittlewood *Claoxylon australe*, Hairy Clerodendrum *Clerodendrum tomentosum*, Murrogun *Cryptocarya microneura*, Giant Stinging Tree *Dendrocnide excelsa*, Black Plum *Diospyros australis*, Sassafras *Doryphora sassafras*, Corkwood *Duboisia myoporoides*, Koda *Ehretia acuminata*, Moreton Bay Fig *Ficus macrophylla*, Cabbage Tree Palm *Livistona australis*, Large Mock Olive *Notelaea longi-folia*, and Snow-wood *Parachidendron pruinosum* (Hazelton 1992, pp. 52–53).

The Wattamolla soil landscape has also been cleared although scatters of tall open-forest remain. Common species to this landscape include Rough-barked apple *Angophora Floribunda*, Cabbage Gum *Eucalyptus amplifolia,* Brown Barrel *E. fastigata*, Mountain Grey Gum *E. cyellocarpa*, Forest Red Gum *E. tereticornis*, isolated Scribbly Gum *E. racemosa* and Bangalay *E. botryoides*

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 2010).

As well as being important food sources, animal products were also used for tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to have been used to make fastening cord, while 'bone points', which would have functioned as awls or piercers, are often an abundant part of the archaeological record. Animals such as Brush-tailed Possums were highly prized for their fur, with possum skin cloaks worn fastened over one shoulder

and under the other. Kangaroo teeth were incorporated into decorative items, such as head bands (Attenbrow 2010).

3.1.4 Land use history

The study area has been subject to disturbances as a result of pastoral practices (clearing, cattle grazing) over the past 150 years. In addition to this, there have been a large number of dry stone walls constructed within the study area, as well as a historic cemetery utilised by Reverend Thomas Kendall as a non-denominational family burial ground in the central portion of the site (see Figure 3 and Photo 1 for the location of the cemetery). More information regarding this cemetery can be found in the section below. Furthermore, there is scattered residential development in the southern portion of the study area.

The southern portion of the study area is located within a 1,000 acre grant issued to William Montague Manning in 1839 called Bonaira (Photo 1).This land was originally a promise grant to James Farmer in 1825 who did not take up the land (Lindsay 1994, pp. 34). Before sailing to Australia in 1837, Manning was a lawyer in London. After his arrival in Sydney he was soon appointed magistrate and commissioner of the Courts of Request and later, Solicitor-General. He also acted on the Supreme Court bench and Attorney General in 1856.

In addition to Bonaira, Manning had acquired 1,200 aces in Mulgoa and 50 town allotments at Kiama (Rutledge 2020). With this land he became a partner in the Twofold Bay Pastoral Association, which was later dissolved in 1860 and financed the Maizena Co. at Merimbula. After this he became the director of the Moruya Silver Mining Company between 1866 and 1867, and the Australian Joint Stock Bank in 1868 to 1870. In 1865 Manning invited the Duke of Edinburgh to picnic at his home when the Duke was shot and Manning dived for the shooter's pistol saving his life. In 1876 Manning then became a puisne judge of the Supreme Court, resigning in 1887 and was reappointed to the Legislative Council. He also became the Chancellor of the University of Sydney in 1878 where he gained the admission of women to all university privileges equal to men (Rutledge 2020).

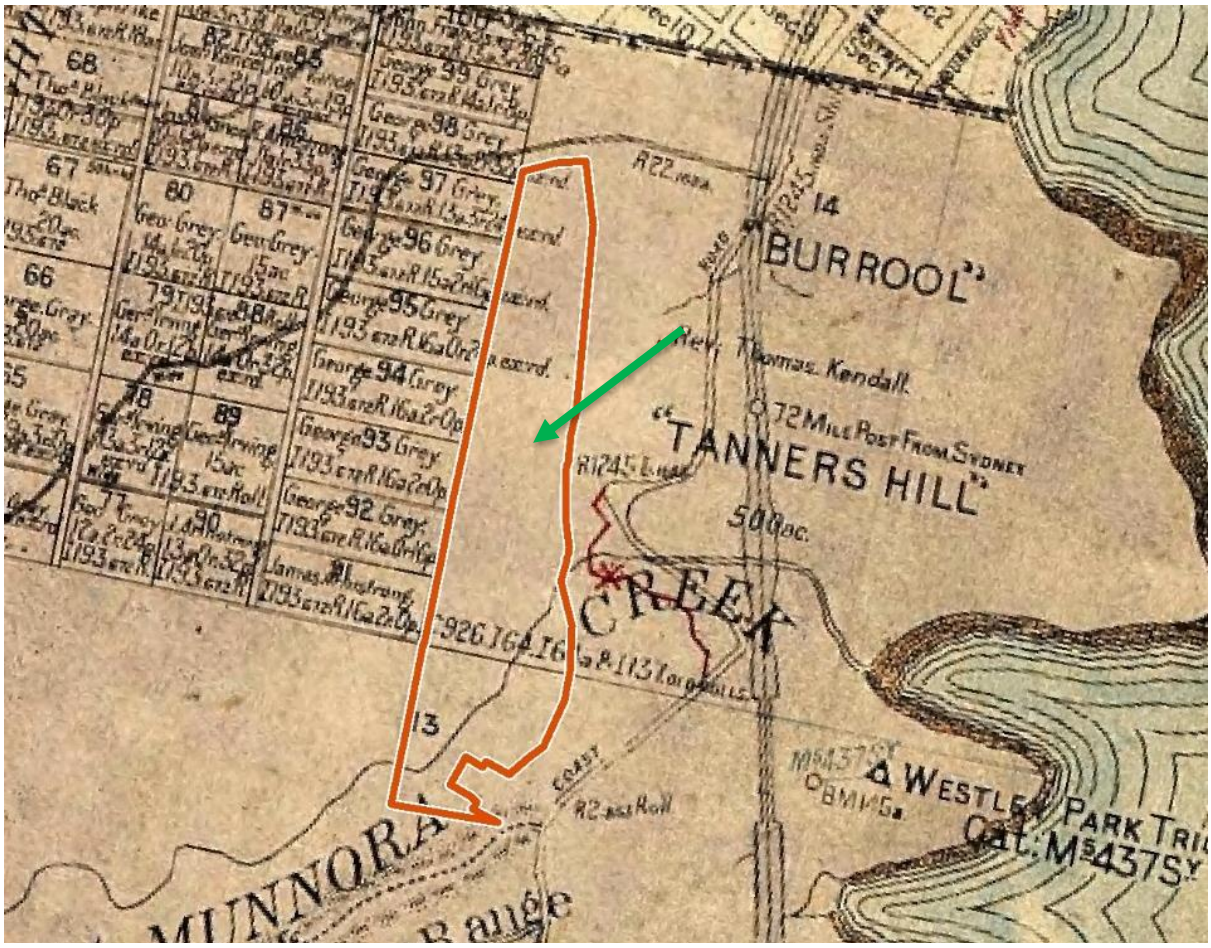


Photo 1 An extract from the 1897 Kiama Parish map showing the extent of Burrool and Tanners Hill, with the approximate study area highlighted in red. The approximate location of the cemetary is marked with a green arrow (Source: NSW Department of Lands)

The colonial government encouraged settlers to clear and cultivate land, and from the 1840s to 1860s provided incentives to grantees by providing them with 30 acre (12 hectares) lots of uncleared land, rent free, under a five to seven year lease, under the condition that it be cleared and developed (Latona Masterman & Associates 1987, 13). By the 1860s the use of the scheme had declined, at which point much of the region had undergone extensive clearing. The *Burroul Estate* was cleared and fenced in the summer of 1831 in preparation for planting corn, but the land was later used for dairying ('A South Coast Pioneer. T. S. Kendall, of "Barroul"', 1927). To the north of the study area, the town of Kiama was subdivided and lots sold beginning in 1840 (Bayley 1976, 27). This includes Bonaira, which was divided into smaller farms in 1844 (Young 1973). Thomas Surfleet formally took ownership of *the Burroul Estate* in 1843 ('A South Coast Pioneer. T. S. Kendall, of "Barroul"', 1927).

An 1857 survey map for Saddleback Mountain Road, which marks the northern perimeter of the study area, names Thomas Kendall as the owner of all 500 acres; the land surrounding the road is recorded as cleared clover paddocks, implying the land continued to be used for dairying at this date (Photo 2).

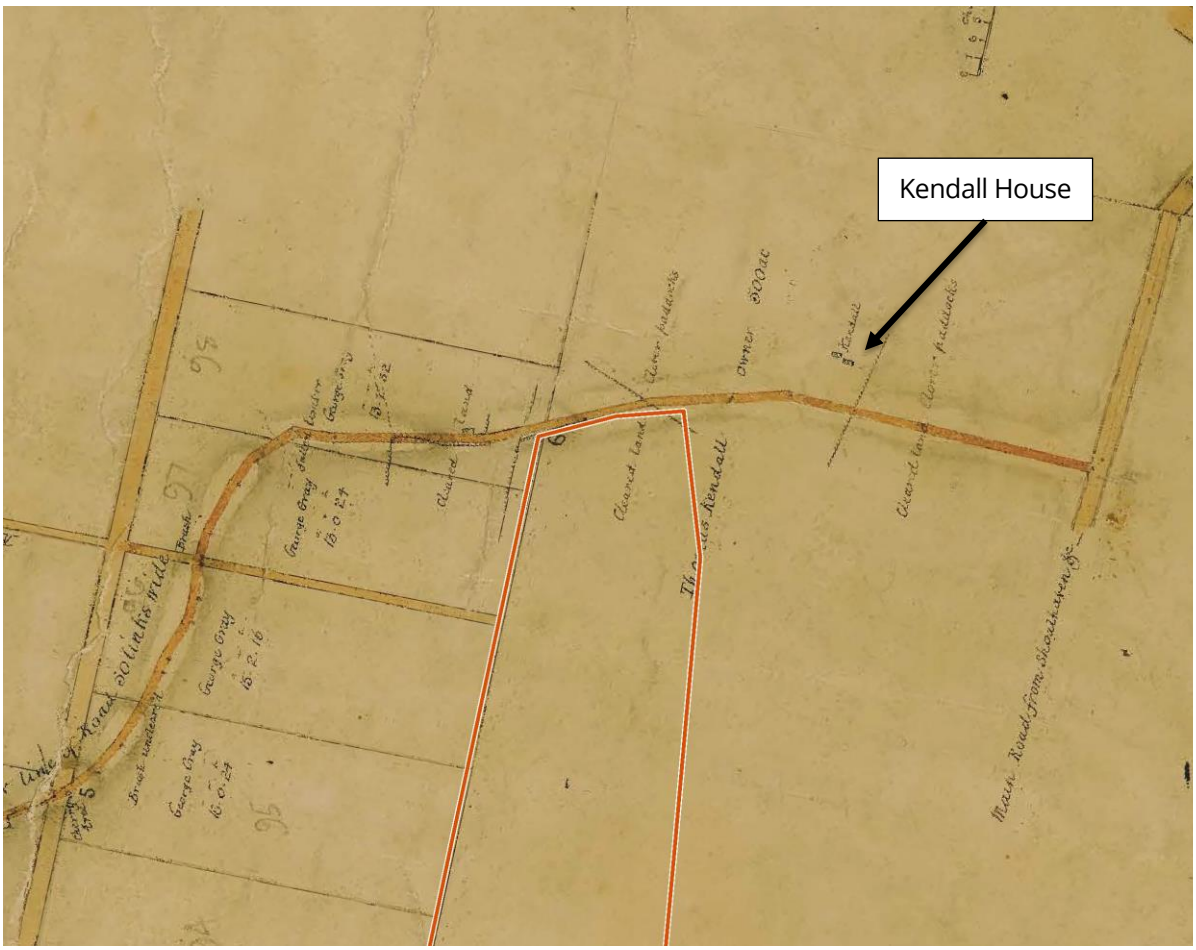


Photo 2 Extract from an 1857 plan of Saddleback Mountain Road, with approximate location of the study area shown in red (Source: NSW Department of Lands, reference 22-1603)

The Kendall family remain closely associated with the study area, with Kendalls Cemetery located at its centre, which the Kiama Heritage Inventory notes was established as a non-denominational family burial ground. No grave or memorial is known for Reverend Thomas Kendall, who drowned in 1832, but his wife Jane (nee Quickfall) is buried within Kendalls Cemetery. Jane significantly outlived her husband, passing away at the age of 84 in 1866; she is the only member of the first generation of the Kendall family to be interred in the family cemetery (Binney 1990). The earliest date of death recorded on the memorial features within the cemetery is 1853, commemorating the death of Caroline Elizabeth Perry, wife to Samuel Augustus Perry, Deputy Surveyor General (Australian Cemeteries Index n.d.). This suggests that the cemetery was likely established around this time, and continued to be used into the 1940s.

The northern portion of the study area, *Burroul Estate,* remained largely in the hands of the Kendall family until 1920, with descendants of the Kendall family still controlling portions of the estate beyond this date ('A South Coast Pioneer. T. S. Kendall, of "Barroul"', 1927). The southern portion of the study area, Bonaira was purchased by David Weir in 1909. The study area has retained it's primarily agricultural use since this initial clearing. Both properties remained with the Weir and Kendall families before passing into the control of the Kiama Dairy and Pastoral Co. Pty Ltd. in 1979 and farmers Alexander and Dianne Rendel in 1987 under primary application. Several easements for services were also made throughout the course of the 20th century (NSW Department of Lands Vol.1395 Fol.204, Vol.13951 Fol. 205, Vol.13951 Fol.206, Vol.13951 Fol. 207. Primary Application 54228, Primary Application 61263). Regarding the development of the study area, aerial imagery

from 1949 (Figure 7) and 1970 (Figure 8) show the continued agricultural use of the study area, with paddock boundaries consistent with the location of mapped stone walls within the study area. No structures are present within the study area on these aerials.

Legend

Study area

Figure 7 1949 aerial photograph of Kiama with the study area shown (Source: NSW LPI, 2017)

Biosis Pty Ltd

Matter: 33490
Date: 05 November 2020,
Checked by: AV, Drawn by: LH, Last edited by: lharley
Location:P:\33400s\33490\Mapping\
33490_F7_1949Aerial

0 40 80 120 160 200

Metres
Scale 1:4,500 @ A3
Coordinate System: GDA 1994 NSW Lambert

N

Figure 8 1970 aerial photograph of Kiama with the study area shown (Source: NSW LPI, 2017)

Biosis Pty Ltd

Acknowledgements: Imagery (c) Nearmap 2017
Topography (c) NSW Land and Planning Information 2012

Matter: 31559
Date: 05 November 2020,
Checked by: JC, Drawn by: LW, Last edited by: lharley
Location:P:\33400s\33490\Mapping\
33490_F8_1970Aerial

0 40 80 120 160 200
Metres
Scale 1:4,500 @ A3
Coordinate System: GDA 1994 NSW Lambert

N

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 majority of NSW south coast Aboriginal sites date to the last 6,000 years when the sea-level stabilised following the end of the last Ice Age. Prior to this, sea levels were lower and the coast was located much further off shore, about 14 kilometres to the east of its current position. Coastal sites older than 6,000 years are rare, as most would have been inundated by the rising sea. Pleistocene-age Aboriginal sites on the south coast include a rock shelter at Burrill lake (located approximately 110 kilometres south of the study area) which has been dated to 20,830±810 BP (ANU-138) (Lampert 1971, pp. 122) and a coastal midden at Bass Point dated to 17,010±650 BP (ANU-536) (Bowdler 1970, pp. 254).

3.2.1 Regional overview

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

Silcox (1990) completed an archaeological assessment of Aboriginal and historical sites on the proposed north Kiama by-pass between Dunmore and Bombo, NSW. The assessment consisted of an archaeological survey to identify and assess the significance of any Aboriginal or European sites that would be affected by the corridor of the north Kiama by-pass. The survey identified four Aboriginal sites, three of which had been previously identified (AHIMS 52-5-0253, 52-5-0251 and 52-5-0072) and one new site. AHIMS 52-5-0253, located on a terrace landform, consisted of 15 artefacts located in a spoil heap from an animal burial, AHIMS 52-5-0251 located on a ridge crest, contained five artefacts and two shell fragments, while 52-5-0072, located on a river bank, was recorded but not described in the report. The new site (KB1) consisted of a sparse scatter of shell fragments and two stone artefacts that covered an area of 10 metres by 10 metres. The site was located on the eastern side of a sand mine directly opposite AHIMS 52-5-0072. The survey also resulted in the identification of two PADs (KBx and KBy). KBx consisted of a terrace surface in the vicinity of AHIMS 52-5-0253, while KBy involved a low ridge further south. Due to poor surface visibility no artefacts were evident and the existence of the campsites could only be established through test excavation. Silcox recommended that no further archaeological investigations were needed for AHIMS 52-5-0251, an AHIP for a consent to destroy be obtained for KB1, and limited test excavations be carried out at the campsite locations.

Hamm (1993) undertook an archaeological assessment for an optical fibre route from Kiama to Jamberoo, NSW. The survey was carried out on the 17 September 1993 with Mr Jim Davis of the Illawarra Local Aboriginal Land Council. No Aboriginal sites were located along the proposed route. It was recommended that Telecom Australia proceed with their project, with no further archaeological investigation. Two creek crossings at Spring Creek and Jerrara Creek, however, were recommended to be monitored.

Navin Officer Heritage Consultants (2005) conducted an archaeological assessment of the proposed Gerroa Sand Mine Extension area. The surface survey of the area identified one new Aboriginal archaeological site (52-2-0452) and a number of surface expressions of shell midden material. Those areas that remain undisturbed were considered to be of moderate to high archaeological

significance, including previously identified conservation areas A and B. Further archaeological investigations were recommended.

Navin Officer Heritage Consultants (2006) were commissioned to undertake a salvage program for the Gerringong Gerroa Sewerage Scheme. The salvage covered areas of identified Aboriginal archaeological potential, to determine the presence and extent of cultural material. The excavations resulted in the identification of five areas that contained cultural material, comprising pieces of shell and stone tools. It was recommended that these areas are salvaged prior to the commencement of sand extraction.

Biosis (2009) completed an Aboriginal Cultural Heritage Management Plan for the Gerroa sand mine extension. It was developed in consultation with the Jerrinja Local Aboriginal Land Council. The initial and subsequent archaeological investigations undertaken identified a total of five Aboriginal archaeological sites within the proposed sand mine extension area. The proposed mine extension area will impact upon these Aboriginal archaeological sites; therefore a process was devised for the ongoing management of recorded Aboriginal archaeological sites, and identified areas of conservation within the proposed sand mine extension area. This included the conservation of cultural material and the salvage excavation of cultural material and potential archaeological deposits.

3.2.2 Local overview

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

Navin (1998) conducted an archaeological survey of approximately 15 hectares of land located 1.5 kilometres inland from the coastline at Kiama, at the foothills of the Illawarra Range. The study area consisted of a descending ridgeline from Saddleback Mountain on a southwest-northeast orientation, which formed the watershed between Spring Creek and the coastal catchment of the immediate Kiama hinterland. The gradients within the study area were relatively low and were situated on spur and ridgeline crests, and upper slopes. The survey resulted in the location of one isolated find, a single stone artefact, and one area of archaeological potential.

Saunders (2004) was commissioned to undertake an archaeological assessment for a residential development at Cedar Grove Estate, Jamberoo Road, Kiama as part of a development application. The assessment included background research and a field survey; however no Aboriginal archaeological sites, European historical sites or areas of Aboriginal archaeological potential were located within the study area.

Mary Dallas Consulting Archaeologists (2007b) completed Aboriginal test excavations following a previous assessment carried out by Austral Archaeology in 2006 which identified two PADs. The subject land itself was defined by the Kiama soil landscape. Dallas (2007b, pp. 13) suggested the soil was acidic and would not preserve organic archaeological material as well as highly erosional. The study area was located at 60–70 South Kiama Drive, approximately 200 metres to the east of the current study area. The PADs were initially identified on the basis of their undisturbed nature and proximity to Munna Munnora Creek. The excavations recovered one isolated artefact from each PAD and both PADs were no longer considered to retain any further archaeological potential.

Biosis (2010) was commissioned to complete an ADDA for 60-70 South Kiama Drive, located approximately 200 metres east of the current study area. This area consisted of steep slopes, rolling low hills, broad crests and flat alluvial plains associated with creeklines. Biosis (2010) assessed the study area as holding low archaeological potential due to shallow deposits on these slopes and crests

as well as their erosional nature. Two isolated artefacts were identified by Marry Dallas Consulting Archaeologists (MDCA) in 2007 (2007b) (Biosis Pty Ltd 2010, pp. 4), South Kiama Drive PAD 1 (AHIMS 52-5-0469) on a creekbed landform and South Kiama Drive PAD 2 (AHIMS 52-5-0470), on a sloping landform (Figure 2). These sites were considered to represent lost or discarded cultural material not associated with long term occupation or tool production.

Biosis (2018a) was commissioned by Kiama Municipal Council to undertake an Aboriginal assessment for the proposed redevelopment of the Kiama Harbour side and Blowhole precinct, Kiama NSW. There was one registered AHIMS site within the study area, KBH PAD1 (52-5-0843). This site consists of an area of PAD. The survey was conducted on 13 January 2017 and included a single headland landform. The background research prior to the field investigation found a moderate archaeological potential for this landform, with only the Kiama soil landscape present. Biosis (2018a, pp. 9–10) suggested the depth of this soil landscape would support the possibility of archaeological deposit despite its erosional nature.. The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed low. This was attributed to grass cover restricting Ground Surface Visibility (GSV) combined with a low amount of exposures. No other Aboriginal sites or areas of (archaeological) sensitivity were identified during the survey. 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 area of PAD. Eleven test pits were excavated across the extent of the PAD. No artefacts were recovered from any of the 11 test pits. A scientific assessment of the study area was undertaken. From this it has been concluded that KBH PAD1 is of low scientific significance, due to the site containing no cultural materials and evidence of some disturbance.

Biosis (2018b) undertook an ADDA for the proposed Backsaddle Planning Proposal, Kiama NSW, 1.2 kilometres north-west. The visual inspection consisted of a systematic survey targeting all landforms within the study area to identify and record any Aboriginal archaeological sites visible on the surface or areas of Aboriginal archaeological potential. Large steep hillslopes and ridge crests were the dominant landforms in the area. These landforms were considered to be of low archaeological potential because of their shallow soil deposit and erosional nature. GSV of the study area was low at approximately 10% due to extensive grass coverage present across the study area. No new Aboriginal objects or sites were located during the site inspection. The results of the site inspection indicated that the study area contained low archaeological potential.

Biosis (2019) conducted an archaeological report for the Minnamurra Boardwalk at Minnamurra located approximately 5 kilometres south east of the study area. The survey identified four areas of PAD despite poor ground surface visibility. Test excavations resulted in the recording of 24 artefacts. From MBW PAD1, 11 artefacts were identified in two test pits that displayed mottled clay fill with rubbish, gravel, and glass fragments. No natural soil profiles were present. Modification and disturbance created by the development of Gainsborough Estate at Kiama Downs meant that the artefacts have been displaced and were redeposited with the clay fill. At MBW PAD 2, 12 artefacts were identified in two test pits with the majority being located within sandy contexts. Both test pits displayed disturbance in the top 100 to 200 millimetres but beneath this, deposits were minimally disturbed. At MBW PAD 3, one artefact was identified in one test pit along with one highly disturbed midden, which was located just outside of MBW PAD 3. No artefacts were discovered in MBW PAD 4. Shell was recovered from nine test pits, while animal bone was recovered three test pits. The excavated faunal assemblage was represented mostly by Sydney Rock Oyster, Mud Whelk, and Sydney Cockle with small inclusions of fish, mammal and avian bone. The majority of shell material was weathered and fragmentary and is indicative of exposure to weathering prior to burial.

3.2.3 AHIMS site analysis

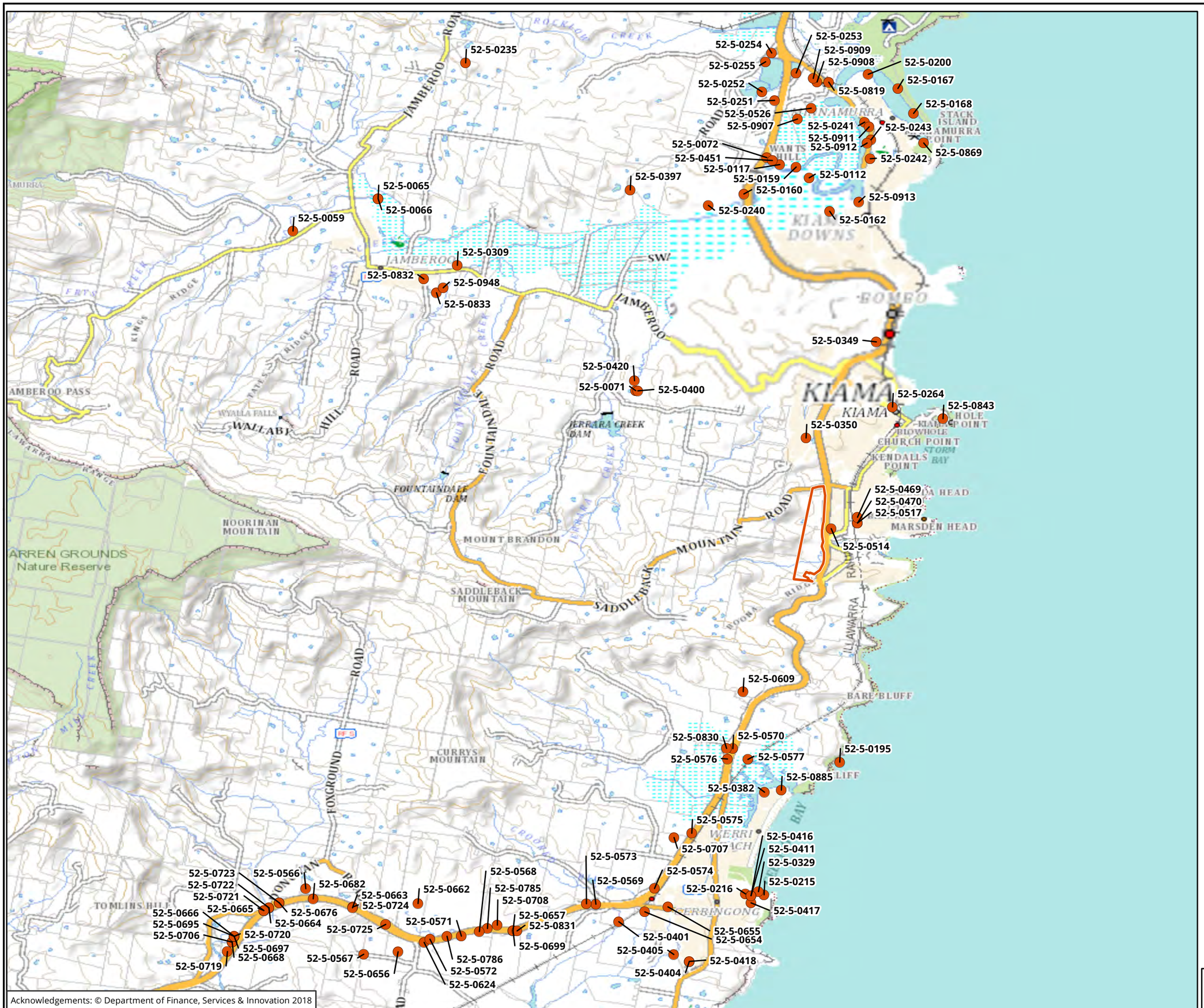
A search of the AHIMS database (Client Service ID: 520824) identified 104 Aboriginal archaeological sites within a 16 kilometre search area, centred on the study area (Table 4). None of these registered sites are located within the study area (Figure 9). There is one site within 120 metres of the study area, AHIMS 52-5-0514 (Kiama Ramps PAD2) that was recorded by Jim Wheeler. This site card and related report is not available on the AHIMS database. AHIMS search results are provided in Appendix 1. Table 4 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 upon 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 156 results presented here, compared to the 104 sites identified in AHIMS.

Table 4 AHIMS site type frequency

Site type	Number of occurrences	Frequency (%)
Artefact	66	42.31
PAD	47	30.13
Shell	18	11.54
Midden	15	9.62
Grinding Groove	2	1.28
Modified Tree (Carved or Scarred)	2	1.28
Conflict	2	1.28
Burial	2	1.28
Stone arrangement	1	0.64
Art (Pigment or Engraved)	1	0.64
Total	**156**	**100**

A simple analysis of the Aboriginal cultural heritage sites registered within the 16 kilometre buffer of the study area indicates that artefacts are the most common site type with 42.31% (n=66). This was followed by PAD with 30.13% (n=47), and shell with 11.54% (n=18). Middens were represented by 9.62% of the total site types (n=15). Grinding groove, modified tree, conflict, and burial consisted of 1.28% each (n=2 each). Stone arrangement and art were represented by 0.64% each (n=1 each).



Acknowledgements: © Department of Finance, Services & Innovation 2018

Legend

- Study area
- AHIMS Records

Figure 9 AHIMS records near the study area

NOT TO BE MADE PUBLIC

0 600 1,200 1,800 2,400 3,000

Metres

Scale: 1:60,000 @ A3

Coordinate System: GCS GDA 1994

Biosis Pty Ltd

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

Matter:
Date: 20 July 2020,
Checked by: lharley, Generated by: lharley
Location:P:\33400s\33490\Mapping\33490_F9_AHIMS.mxd

3.3 Discussion

The coastal plain of the Illawarra region generally provides a number of resources that could have been used by Aboriginal inhabitants. Lithic resources would have been accessible in the outcrops of siltstone, shale, chert, and tuffaceous sandstones that are located further inland. These resources would be used by Aboriginal people for a variety of purposes dependent on the particular task involved, and they would often need to be modified into tools for the desired objective. The presence of Munna Munnora Creek and a number of other ephemeral drainage lines within the study area suggest that water, flora and faunal resources would have been readily available for Aboriginal people to exploit. Both the Kiama and Wattamolla Road soil landscapes are classified as erosional landscapes, however the depth of the Kiama soil landscape may aid in the preservation of archaeological deposits. The combination of deep soil deposits throughout the Kiama soil landscape and the favorable environmental conditions, such as availability of resources, seen throughout the study area, increases the potential for Aboriginal artefacts to exist, despite the poor preservation standards caused by soil movement and erodibility. Nearby test excavations at 60-70 South Kiama Drive, Kiama have indicated the presence of isolated artefacts within areas of PAD (Mary Dallas Consulting Archaeologists 2007a).

3.3.1 Predictive statements

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

These statements are based on:

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

Table 5 indicates the site types most likely to be encountered across the present study area. The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 5 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked Stone Artefact Scatters and Isolated Artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	High: A large number of stone artefact sites have been previously recorded in the region on level, well-drained topographies, particularly in close proximity to reliable sources of fresh water. Due to the presence of permanent fresh water resources, the potential for artefacts to be present within the study area is assessed as high.

Site type	Site description	Potential
PADs	Potential sub-surface deposits of cultural material.	High: PADs are the second most common site type in the vicinity of the study area and have been previously recorded in the region across a wide range of landforms and in association with Munna Munnora Creek. PADs are likely to be present within areas adjacent to water courses or on high level ground in undisturbed landforms.
Shell Middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Low: Shell midden sites have been recorded within the Kiama area however, there is a low potential for middens to be present in the study area. The majority of the study area is represented by steep slopes and deeply incised drainage lines. Munna Munnora Creek is also prone to flooding indicating areas close to the creekline would have been subject to frequent inundation reducing potential for midden sites to be preserved if present.
Scarred Trees	Trees with cultural modifications.	Moderate: Scarred trees occur within the vicinity of the study area in areas of remnant vegetation. Due to extensive vegetation clearance only a small number of mature native trees have survived within southern half of the study area.
Quarries	Raw stone material procurement sites.	Low: There is no record of any quarries being within or surrounding the study area.
Grinding Grooves	Grooves created in stone platforms through ground stone tool manufacture.	Low: Horizontal sandstone rock outcrops suitable for grinding grooves are unlikely to occur within the study area. The majority of the study area is defined by the Blowhole Latite Member which contains latite stone. Sandstone geology is only supported in the western border of the study area atop steep crests and slopes. These landforms are not conducive to the creation of grinding grooves.
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

Site type	Site description	Potential
		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 unlikely to be present within 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.

4 Archaeological survey

An archaeological survey of the study area was undertaken on 6 July 2017 by Alexander Beben (Principal Archaeologist) and James Cole (Archaeologist), and by Samantha Keats (Consultant Archaeologist) on 29 January 2020, covering part Lot 102 DP 1077617 and Lot 8 DP 258605 only. A survey of the entire study area was also undertaken on 4 September 2020 by Mathew Smith (Project Archaeologist) and Tracy Henry (representative of ILALC). The survey sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological survey objectives

The objectives of the survey were to:

- Undertake a systematic survey of the study area targeting areas with the potential for Aboriginal heritage.
- Identify and record Aboriginal archaeological sites visible on the ground surface.
- Identify and record areas of PADs.

4.2 Archaeological survey methodology

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

4.2.1 Sampling strategy

Predictive modelling for the study area has indicated that particular landform types may have higher potential for the retention of Aboriginal heritage than others. All survey efforts targeted the following landforms within the study area:

- Raised terraces.
- Lower slopes.
- Floodplains and along creeklines.

4.2.2 Survey methods

The archaeological survey was conducted on foot with a field team of two members on the first field investigation (2017), one member on the second investigation (January 2020), and two members on the third investigation (September 2020). Recording during the surveys 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, GSV and the recording of soil information for each survey unit were possible. Any potential Aboriginal objects observed during the survey were documented and photographed. The location of Aboriginal cultural heritage and points marking the boundary of the landform elements were recorded using a hand-held Global Positioning System (GPS) and the Map Grid of Australia (MGA) (94) coordinate system.

4.3 Archaeological survey results

Each survey involved completing a number of meandering transects across the extent of the study area. Transects were undertaken on foot and followed 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. The surveys focused on specific landform types, with the investigation targeting any areas containing raised terraces, lower slopes and/or floodplains, while also targeting areas of higher exposure and GSV. Three PADs were identified in the study area as a result of these surveys. The results from each survey have been summarised in Table 7 below.

4.3.1 2017 archaeological survey

The overall visibility within the study area was low, owing to dense grass cover across the vast majority of the study area (Photo 3). This lack of surface visibility reduced the potential for the identification of surface artefacts to effectively nil. As such the survey focussed on the identification of more prominent site types, such as modified trees and PADs. Areas of exposure within the study area were primarily associated with surface disturbances, such as vehicle tracks and informal pathways (Photo 4).

Photo 3 Typical vegetation coverage within the study area view south

The entire study area has been cleared and has been used for pastoral purposes over much of the last 150 years. There is some scattered residential development in the southern portion of the study area, and a cemetery near its centre, but apart from this the study area is relatively undisturbed (Photo 4).

Overall, the study area is contained within a system of rolling to steep hills with moderate to steep slopes (Photo 5). There are a number of lower order drainage channels cutting through it, as well as one higher order perennial creekline in its southern portion. Based on observations made during the survey, it is considered that the areas of highest archaeological potential within the study area are likely to be associated with raised, relatively flat locations in close proximity to more reliable sources of water. A total of three areas of archaeological potential were identified in the study area as a result of this assessment.

Photo 4 Isolated exposure associated with cattle movement view west

Photo 5 General topography within the study area view east

PAD 1

PAD 1 was identified across a lower slope adjacent to the confluence of two lower order creeklines. This area has been subject to minimal disturbance, having been cleared and containing one informal vehicle track (Photo 6). Given its proximity to fresh water supplies and its relative lack of disturbance, it is considered that this area has the potential to contain intact sub-surface archaeological deposits.

Photo 6 PAD 1 view south-east (2 metre scale)

PAD 2

PAD 2 was identified across a lower slope surrounded by lower lying, boggy areas and lower order creek lines. This area has been subject to minimal disturbance, having been cleared and containing one informal vehicle track (Photo 7). Given its proximity to fresh water supplies and its relative lack of disturbance, it is considered that this area has the potential to contain intact sub-surface archaeological deposits.

Photo 7 PAD 2 view west (2 metre scale)

PAD 3

PAD 3 was identified across a raised lower slope adjacent to the banks of the Munna Munnora Creek. This area has been subject to minimal disturbance, however it is bisected by an existing dry stone wall (Photo 8). Given its proximity to fresh water supplies and its relative lack of disturbance, it is considered that this area has the potential to contain intact sub-surface archaeological deposits.

Photo 8 PAD 3 view north (2 metre scale)

4.3.2 Additional visual inspection by Biosis (2020)

An additional visual inspection was completed by Samantha Keats (Consultant Archaeologist) on 29 January 2020, covering part Lot 102 DP 1077617 and Lot 8 DP 258605 only. The additional survey area was largely consistent with the remainder of the study area, being dominated by dense grass cover affording very low visibility. The survey area was located across a moderate to steep slope (Photo 9), with a narrow drainage channel present toward the western boundary, running north into the study area. No Aboriginal objects or additional areas of PAD were identified during the survey.

Overall visibility within the additional survey area was extremely low, tending to be less than 5%, with the ground surface only visible in areas of disturbance around fence lines and areas of cattle movement (Photo 10).

Photo 9 Typical grass cover and landform within the study area (view north-west)

Photo 10 Area of exposure associated with disturbance (view north-east)

Based on the results of the January 2020 visual inspection, the Aboriginal site prediction statements for site types considered to have a moderate or high potential to occur have been revised. This revised assessment, and the rationale for making this assessment are provided in Table 6.

Table 6 Revised Aboriginal site prediction statements

Site type	Revised potential
Flaked Stone Artefact Scatters and Isolated Artefacts	High: There is a high potential for Artefact sites to be present within the study area, however the vast majority of the study area was heavily grassed, lowering the overall effectiveness of the survey for identifying this site type. If stone artefacts are located within the study area, they are more likely to be identified as part of a sub-surface archaeological deposit, most likely contained within lower slope landforms.
PADs	High: Three PADs were identified during the archaeological survey.
Scarred Trees	Low: No scarred trees were identified during the survey, and given the extensive land clearance which has occurred within the study area, it is considered that there is a low potential for them to be present.
Shell Middens	Low: The site inspection included areas which were considered based on the background research to have the potential to contain shell midden sites. No middens were identified, and it is considered that there is a low potential for them to occur within the study area. This can be attributed to the location of the study area, the available local resources and the soil types found within the study area. As shell middens are typically located within sandy soils and in close proximity to shell resources (i.e. beach fronts), the loamy clay deposits found throughout the study area and proximity to creeklines would not be suitable for middens.

4.3.3 Additional visual inspection with RAP representative (2020)

An additional visual inspection was completed by Mathew Smith (Archaeologist) and RAP representative Tracy Henry on 4 September 2020. The additional survey was largely consistent with the previous additional inspection. The study area was dominated by dense grass cover affording very low visibility. Some exposures were present in rock outcroppings and in areas of animal disturbance. The survey area was located across the entire study area, consisting of moderate to steep slopes (Photo 11, Photo 12), with a narrow drainage channel present toward the western boundary, running north into the study area. No additional Aboriginal objects or areas of PAD were identified during the survey.

Overall visibility during the additional survey was extremely low, tending to be less than 5%, with the ground surface only visible in areas of disturbance around fence lines and areas of cattle movement (Photo 4).

Photo 11 Typical example of grass cover within the study area view south

Photo 12 Exposures created from erosion on shallow rock outcropping and animal tracks

Table 7 Survey coverage

Survey date	Survey unit	Landform	Survey unit area (m²)	Visibility (%)	Exposure (%)	Effective coverage area (m²)	Effective coverage (%)
2017	1	Slope, Lower slope, Floodplain	403725.99	5 %	5 %	1009.31	0.25 %
2020	2	Slope, Lower slope, Floodplain	13021.39	5 %	5 %	32.55	0.25 %
2020	3	Slope, Lower slope, Floodplain	416097.35	5 %	5 %	1040.24	0.25 %

Table 8 Landform summary

Landform	Landform area (m²)	Area effectively surveyed (m²)	Visibility (%)	Exposure (%)	Landform effectively surveyed (%)	No. of Aboriginal sites
Lower slope	189439.5	473.59	5%	5%	0.25%	3
Slope	181478.7	453.69	5%	5%	0.25%	0
Floodplain	27283.76	68.21	5%	5%	0.25%	1

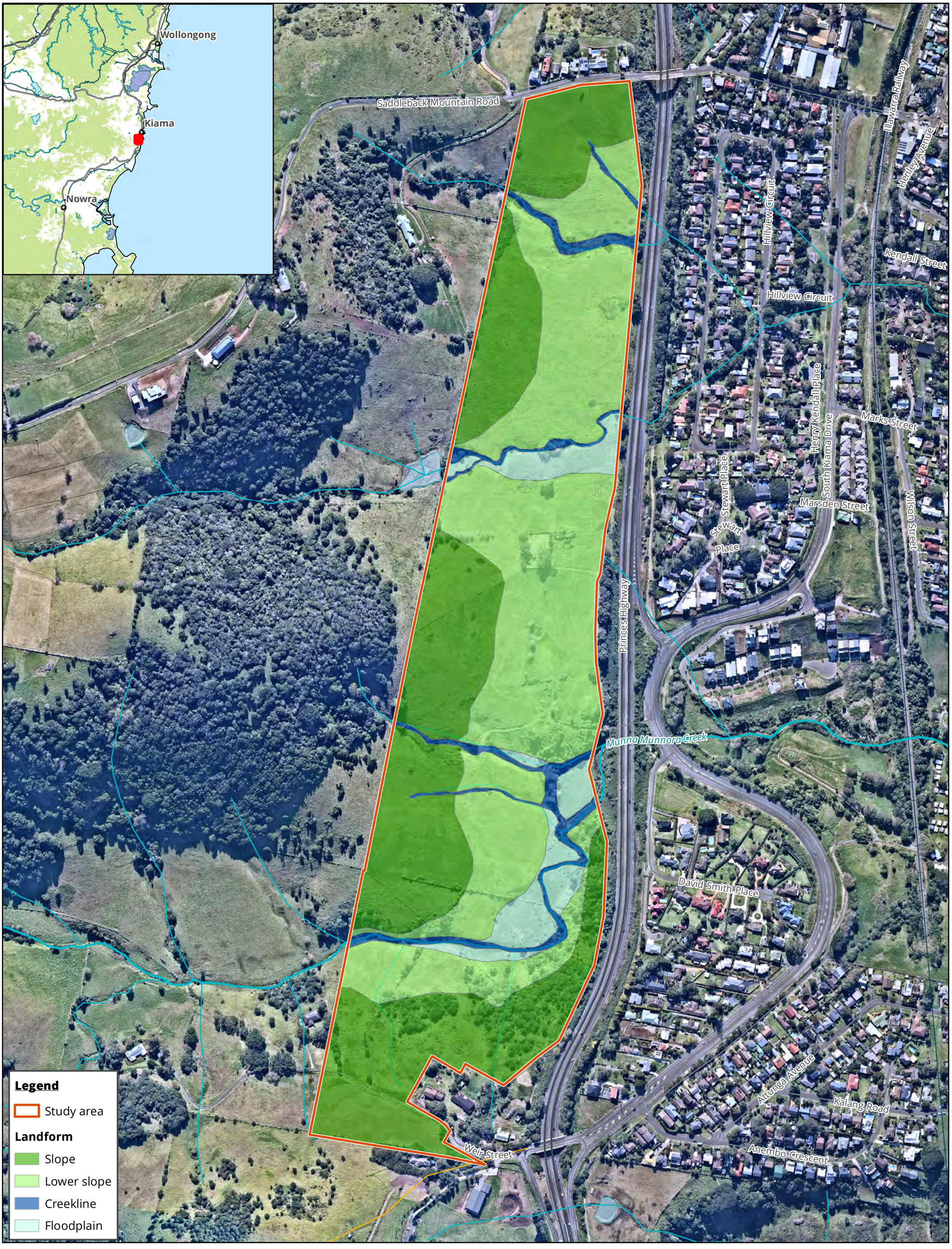


Figure 10 Landforms within the study area

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Matter: 33490
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Metres
Scale 1:5,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

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Figure 11 Areas of archaeological potential within the study area

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4.4 Discussion of archaeological survey results

The entire study area has been cleared and used for pastoral purposes over much of the last 150 years. There is some scattered residential development in the southern portion of the study area, and a cemetery near its centre, but apart from this the study area is relatively undisturbed.

There are a number of lower-order drainage channels cutting through the study area, as well as one higher order perennial creekline in its southern portion. Based on observations made during the archaeological survey, it is considered that the areas of highest archaeological potential within the study area are likely to be associated with raised, relatively flat locations in close proximity to more reliable sources of water, or lower slope landforms. A total of three areas of archaeological potential were identified in the study area as a result of this assessment (Figure 10). The three areas of PAD identified within the study area were associated with either a raised terrace or lower slope landform within the southern portion of the study area and are in close proximity to creeklines.

The additional field investigations did not identify any new Aboriginal sites, objects, or areas of PAD. Given the steep nature of the landform within the southern and western portions of the study area, it is considered unlikely that this area would have been utilised extensively by Aboriginal people (Figure 10). It is highly likely that the local area has been utilised by Aboriginal people in the past, but that this occupation would have been focused on lower, flatter locations in close proximity to sources of water, or use of ridgelines for traversing the area.

5 Test excavation

Following the results of the survey, a test excavation program was undertaken to characterise the extent, nature and archaeological (scientific) value of Aboriginal cultural heritage within the study area. Testing focused on the three areas of PAD identified in the ADDA, and at the request of the RAPs on site, two other areas were sampled. The sampling strategy, methodology and results of the test excavation program are discussed below.

5.1 Test excavation objectives

The principle aims of the test excavations are to identify and understand the nature, extent and significance of any areas of potential archaeological deposit within the study area. This will further our knowledge of Aboriginal archaeological site patterning within the region and enable the predictive model to be further tested and refined.

The aims of the testing program were to:

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

5.2 Test excavation methodology

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

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

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

- If the depth of deposit prevents reaching sterile deposits within the 50 by 50 centimetre test pit, additional 50 by 50 centimetre test pits may be excavated adjacent to the original test pit (for example expanding the test pit to 50 by 100 centimetres) to reach the sterile deposits.
- Test pits may be combined and excavated as necessary in 50 by 50 centimetre units for the purposes of further understanding site characteristics. Note that under the code, the maximum area that can be excavated in any one continuous area is three metres squared (3m²).
- The Code dictates that the maximum surface area of all test excavation units must be no greater than 0.5% of the PAD or area being investigated.
- All excavated soil was sieved in 5 millimetre sieves. Dry sieving was undertaken for the purposes of these test excavations.
- All cultural material was collected, bagged and clearly labelled. Artefacts will be temporarily stored in the Biosis Sydney office for analysis (at 14/17-27 Power Avenue, Alexandria NSW 2015).
- For each test pit that was excavated, the following documentation was taken:
  - Unique test pit identification number.
  - GPS coordinate of each test pit.
  - Munsell soil colour and texture.
  - Amount and location of cultural material within the deposit.
  - Nature of disturbance where present.
  - Stratigraphy.
  - Archaeological features (if present).
  - Photographic records.
  - Spit records.
- Test excavation units were backfilled as soon as practicable.
- An AHIMS Site Impact Recording form was completed and submitted to the AHIMS Registrar for any sites impacted during test excavations.
- In the event that suspected human remains are identified works will immediately cease and NSW Police and Heritage NSW will be notified.
- Test excavations ceased when enough information* had been recovered to adequately characterise the objects present with regard to their nature and significance.

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

5.3 Test excavation results

This section presents the results of test excavations conducted from 28 September to 2 October 2020. Test excavations were carried out by a team of three Biosis archaeologists and three representatives of the RAPs.

A total of 33 test pits were excavated within three areas of PAD and two other areas (Area 4 and Area 5) within the study area at the request of the RAP representatives (Figure 12). Individual test pit and soil analysis results

are provided in Appendix 2. Results by area are shown in Table 9. Twenty six test pits were located within the three areas of high potential as identified by Biosis (2017). At the request of the RAPs, seven additional test pits were also located within Areas 4 and 5. Area 4 was identified as a flat area located on a floodplain next to Munna Munnora Creek, while Area 5 was identified as a mid to lower slope landform to the north of the other PAD areas. A total of 16 artefacts were identified across all three PAD areas and the additional investigation areas (Areas 4 and 5). Three artefacts were found within PAD 1, one in PAD 2, three in PAD 3, two in Area 4 and seven in Area 5 (Figure 13 and Table 9). Artefact density per excavation unit varied from a maximum of three to zero.

Overall, the soils from the three PAD areas and Area 5 were consistent, with the top layer of soil containing brownish-black loamy sandy clay which became increasingly more consistent with browny red sandy clay deeper in the test pits. Excavations ceased when a cultural sterile deposit such as clay was reached. Cobbles of Bombo latite were present in all contexts and became increasingly larger in the deeper deposits. These soil profiles are considered to be consistent with Kiama soil landscape characteristics (Hazelton 1992, pp. 52–54). Area 4, located in a floodplain landform was considerably more silty and contained significantly less, and smaller pieces of rubble. With regards to human agents of disturbance such as clearing, or pastoral activities within the study area, little evidence of disturbance as a result of these activities was identified and low levels of bioturbation were recorded.

A detailed discussion of results is outlined in Sections 5.3.1, 5.3.2, 5.3.3, 5.3.4 and 5.3.5.

Table 9 Test excavation results by area

Area	Landform	PAD area (m^2)	Area tested (m^2)	PAD effectively tested (%)	No. of sites	No. of artefacts
PAD 1	Lower slope	1,769	2	0.11%	1	3
PAD 2	Lower slope	1,399	1.5	0.11%	1	1
PAD 3	Lower slope	3,136	3	0.10%	1	3
Area 4	Flat	-	0.5		1	2
Area 5	Lower slope	-	1		1	7

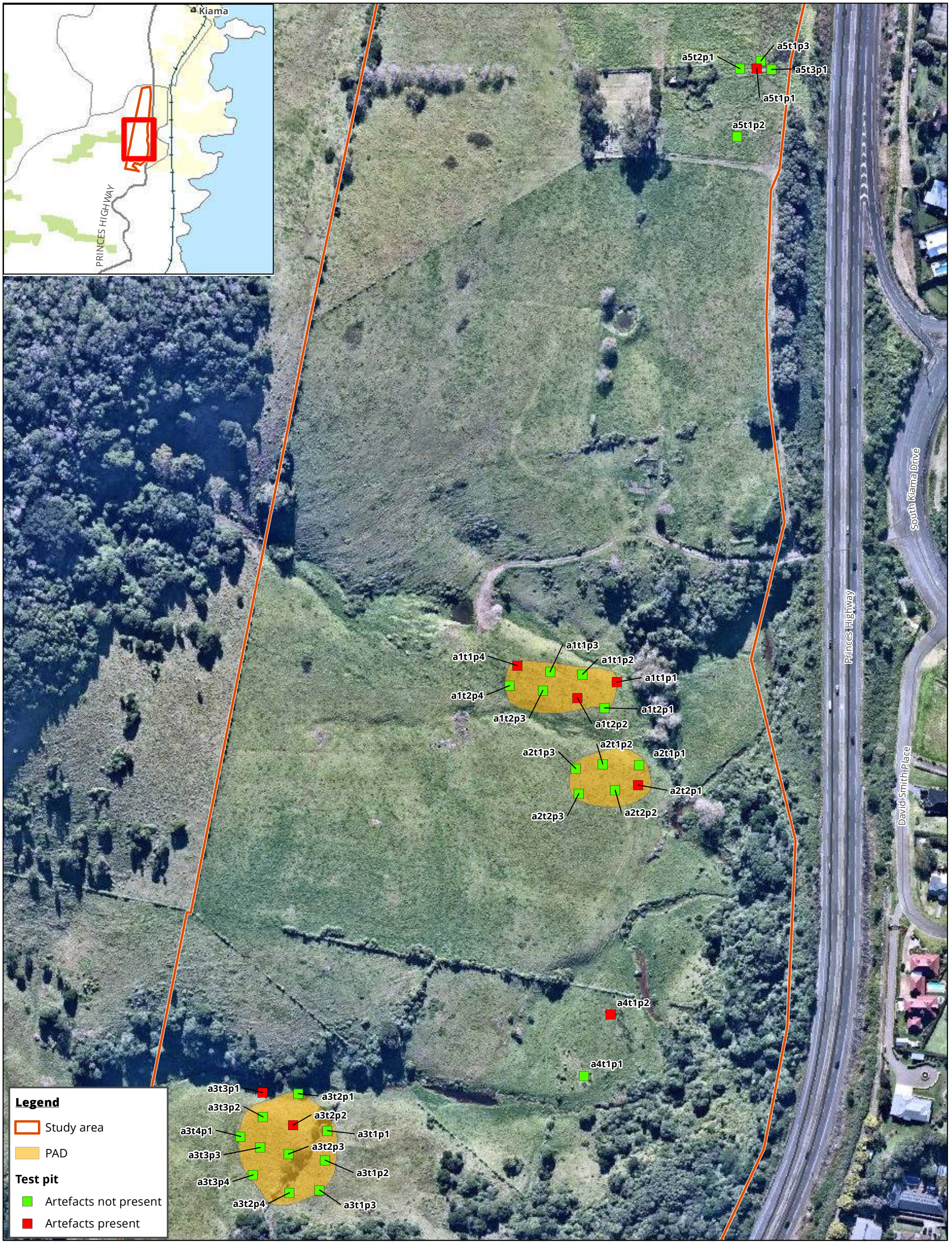

Figure 12 Test pit locations

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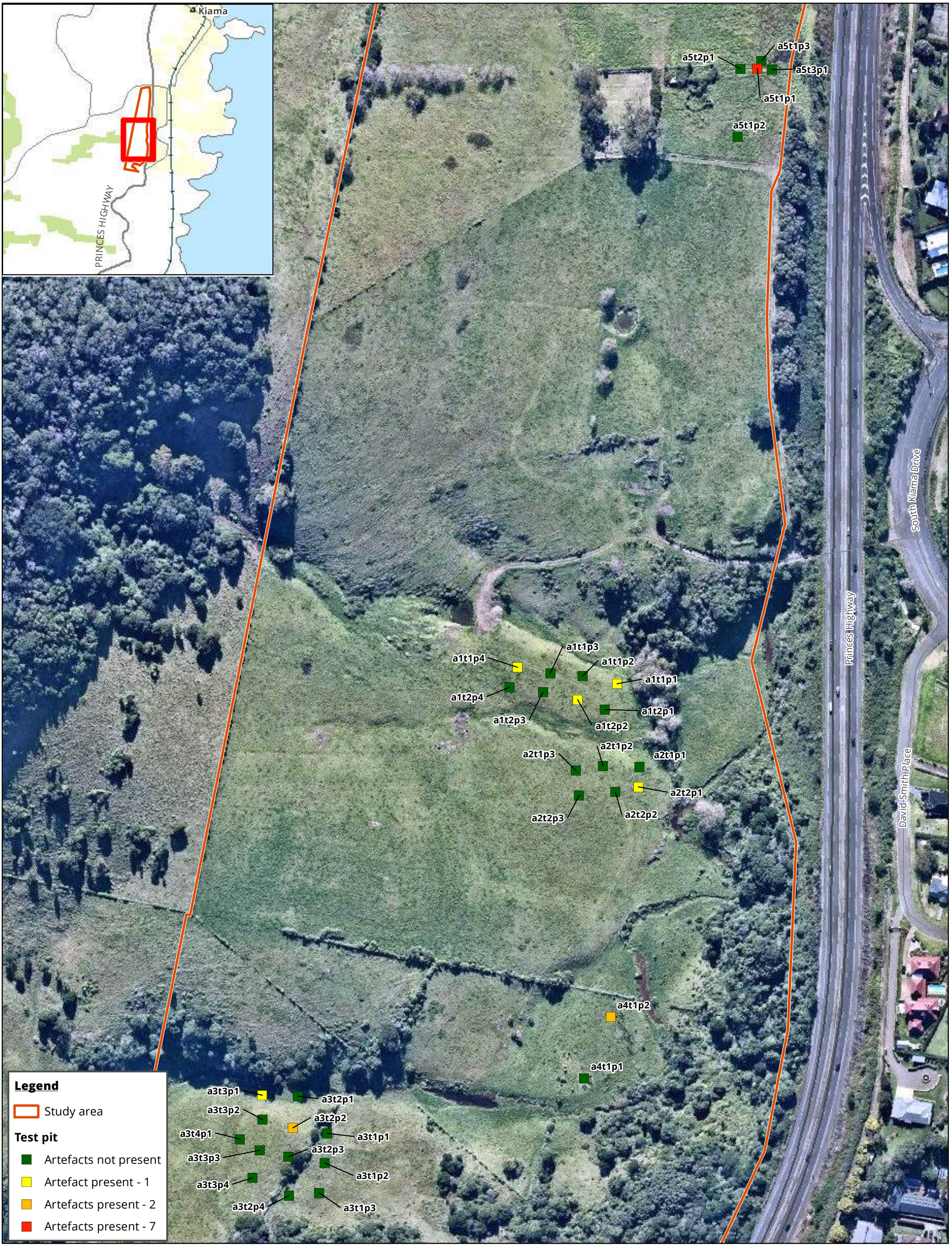

Figure 13 Artefact densities

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33490_F13_Artefacts

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Metres
Scale 1:2,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

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5.3.1 PAD 1

PAD 1 (Photo 13) was excavated across a relatively flat to gentle mid to low slope landform located overlooking Munna Munnora Creek. Eight test pits were excavated across two transects in the PAD. The test pits were located 20 metres apart, with the transects located 15 metres apart due to the limited width of the flat area of slope most likely to contain Aboriginal deposits. A total of three artefacts were recovered from the excavated test pits. Test pits T1P1, T1P4 and T2P2 each contained one artefact. These artefacts were all found in spit 2 (100-200mm) and comprised a quartz angular fragment, chert proximal flake and silcrete proximal flake. No artefacts were identified in test pits T1T2, T1T3, T2P1, T2P3 and T2P4. Typical stratigraphic profiles and section drawings of PAD 1 can be seen in Photo 14, Photo 15, Photo 16 and Photo 17.

Soil stratigraphy was consistent in all test pits across PAD 1. Four soil profiles were identified and excavations stopped where the culturally sterile layer, clay, was reached.

Soils in context 1 ranged from soft dark reddish brown (5YR 3/3) loam to soft moderate reddish brown (5YR 4/3) clayey sand, soft moderate reddish brown (5YR 4/3) clayey loam and moderately compacted reddish brown (5YR 5/3) loamy sand. Inclusions featured rootlets and gravels (<10 centimetres). The depth of context 1 ranges from 90 millimetres to 340 millimetres (Spit 1- 4).

Soils in context 2 ranged from soft reddish brown (5YR 4/3) clayey sand, moderately compacted reddish brown (5YR 4/3) loamy sand, moderately compacted dark yellowish brown (7.5YR 4/6) clayey loam and soft dark reddish brown (5YR 3/4) loamy clay. This context normally contained small (<10cm) latite gravel pieces and the clay content gradually increased with depth. T1P4 featured clay nodules. The depth of context 2 ranges from 90 millimetres to 450 millimetres (spit 1- 4).

Soils in context 3 were moderately compacted soft reddish brown (5YR 4/3) sandy clay or clay, soft dark reddish brown (5YR 3/4) clay, moderately compacted dark yellowish brown (7.5YR 4/6) loamy clay and moderately compacted reddish brown (5YR 4/3) clayey loam. Only T2P1 contained large rounded to sub-angular latite cobbles (100mm in size (30%) inclusions. The depth of context 3 ranged from 300 millimetres to 520 millimetres (spit 3 – 5).

Context 4 was recorded in one test pit, T2P1. Soils were moderately compacted dark yellowish brown (7.5YR 4/6) clay which contained large rounded to sub-angular latite cobbles (30% at 100mm in size). This context was excavated from 490 to 500 millimetres (spit 5) and sieved to ensure the clay did not contain artefacts. Context 4 was deemed to be the natural B horizon and was considered culturally sterile. Context 4 was present in all other test pits however as it was deemed sterile, excavation ceased at this depth and it was not recorded in the other test pits.

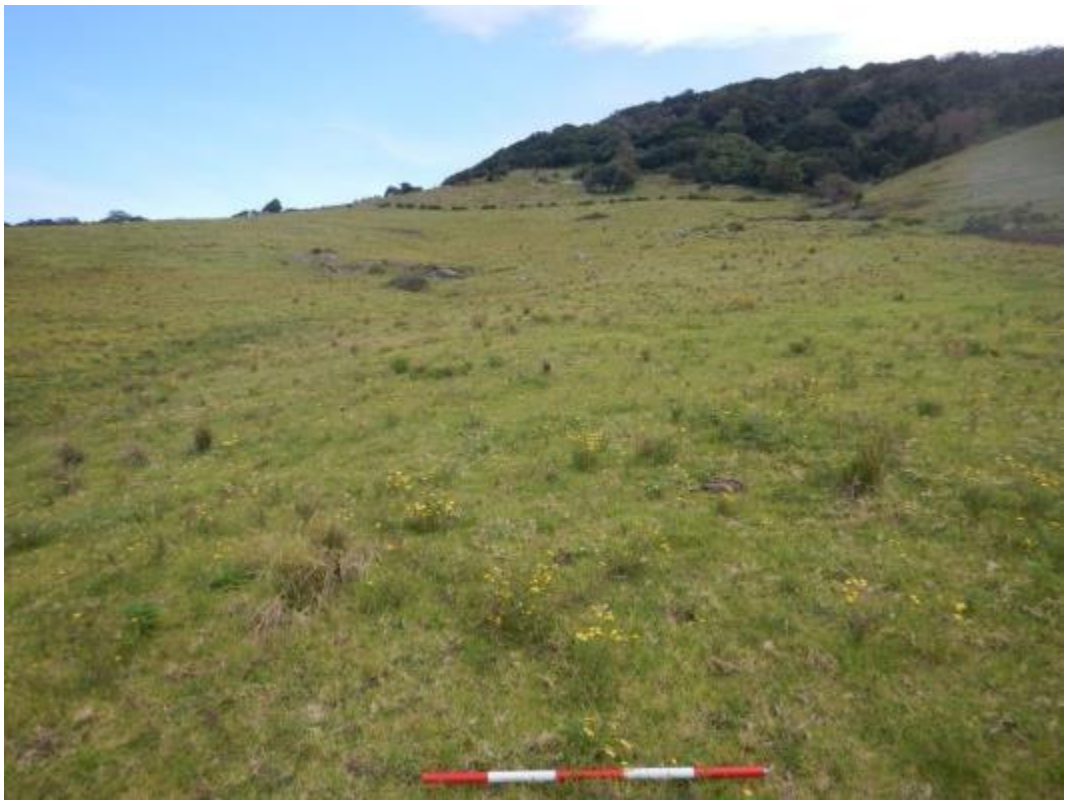

Photo 13 PAD 1 overview, view west

Photo 14 PAD 1 transect 1 test pit 1 stratigraphic profile

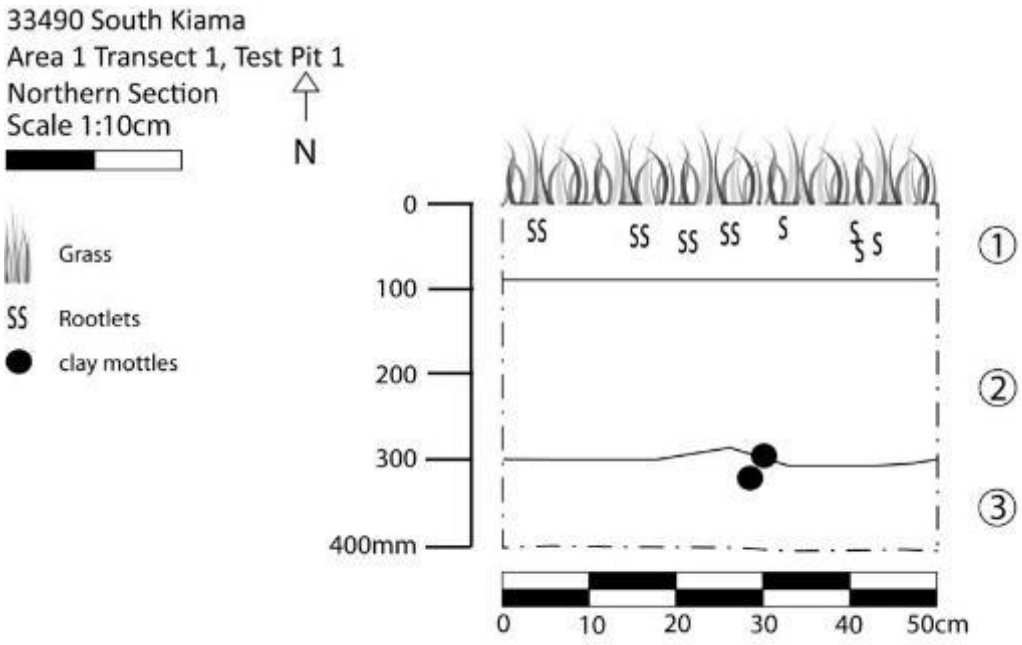

Photo 15 PAD 1 transect 1 test pit 1 section drawing

Photo 16 PAD 1 transect 2 test pit 3 stratigraphic profile

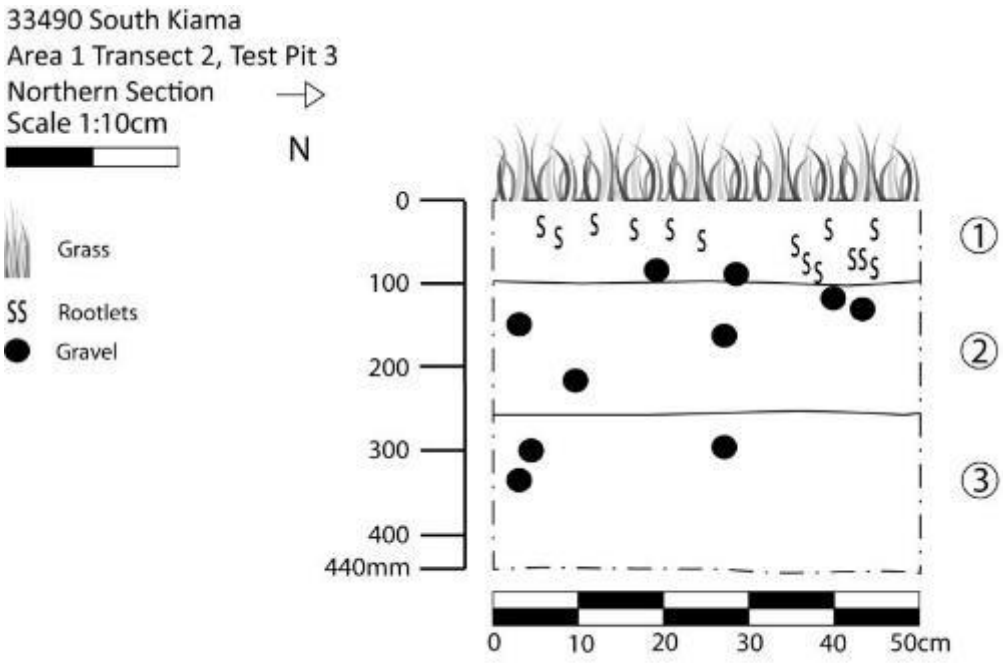

Photo 17 PAD 1 transect 2 test pit 3 section drawing

5.3.2 PAD 2

PAD 2 (Photo 18) was excavated across a mid to lower slope landform within an area of high potential. Six test pits were excavated across two transects, focusing on the flattest areas of slope in proximity to Munna Munnora Creek as this was the area most likely to contain Aboriginal deposits. The test pits were located 20 metres apart, while the transects were located 15 metres apart. One artefact was identified from the excavated test pit T2P1. This artefact was found in spit 2 (100-200mm) and comprised a chert left longitudinally split flake. No artefacts were identified in test pits T1P1, T1P2, T1P3, T2P2, T2P3. Typical stratigraphic profiles and section drawings of PAD 2 can be seen in Photo 19, Photo 20, Photo 21 and Photo 22.

Soil stratigraphy was consistent in all test pits across PAD 2. Three soil profiles were identified before excavations stopped at the clay layer.

Soils in context 1 ranged from soft olive brown (10YR 4/4) sandy loam to soft dark yellowish brown (7.5YR 4/6) silty loam, soft dark reddish grey (5YR 4/2) sandy loam and moderately compacted dark yellowish brown (10YR 6/3) loamy clay. All test pits contained rootlets. T1P3 contained a latite boulder and gravel (5-200 milllimetres). The depth of context 1 ranged from 100 millimetres to 240 millimetres (Spit 1-3).

Soils in context 2 ranged from moderately compacted reddish brown (5YR 4/3) loamy clay, moderately compacted dark yellowish brown (7.5YR 4/6) loamy clay, moderately compacted dark reddish grey (5YR 4/2) sandy clay, moderately compacted reddish brown (5YR 5/3) loamy clay, soft dark yellowish brown (7.5YR 4/4) silty loam and moderately compacted dark yellowish brown (10YR 6/3) loam clay. This context contains occasional rootlets, ironstone gravel (30 millimetres) and latite rocks (30 millimetres). The depth of context 2 ranges from 100 millimetres to 500 millimetres (Spit 2-4).

Soils in context 3 were moderately compacted brown (7.5YR 5/3) loamy clay, moderately compacted dark yellowish brown (10YR 6/3) clay. Context 3 contained angular latite rocks, up to 100mm in size. The depth of context 3 ranged from 300 to 600 millimetres (Spit 4-6).

Context 4 from PAD 1 was also present at the base of each test pit, as this was classified as natural clay excavations ceased at this point.

Photo 18 PAD 2 overview, view west

Photo 19 PAD 2 transect 1 test pit 1 stratigraphic profile

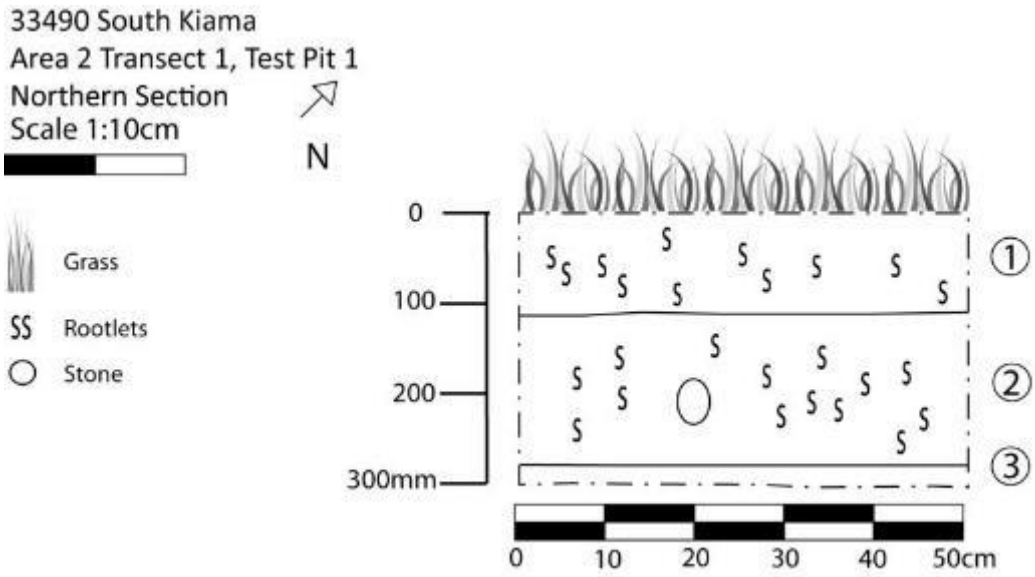

Photo 20 PAD 2 transect 1 test pit 1 section drawing

Photo 21 PAD 2 transect 1 test pit 3 stratigraphic profile

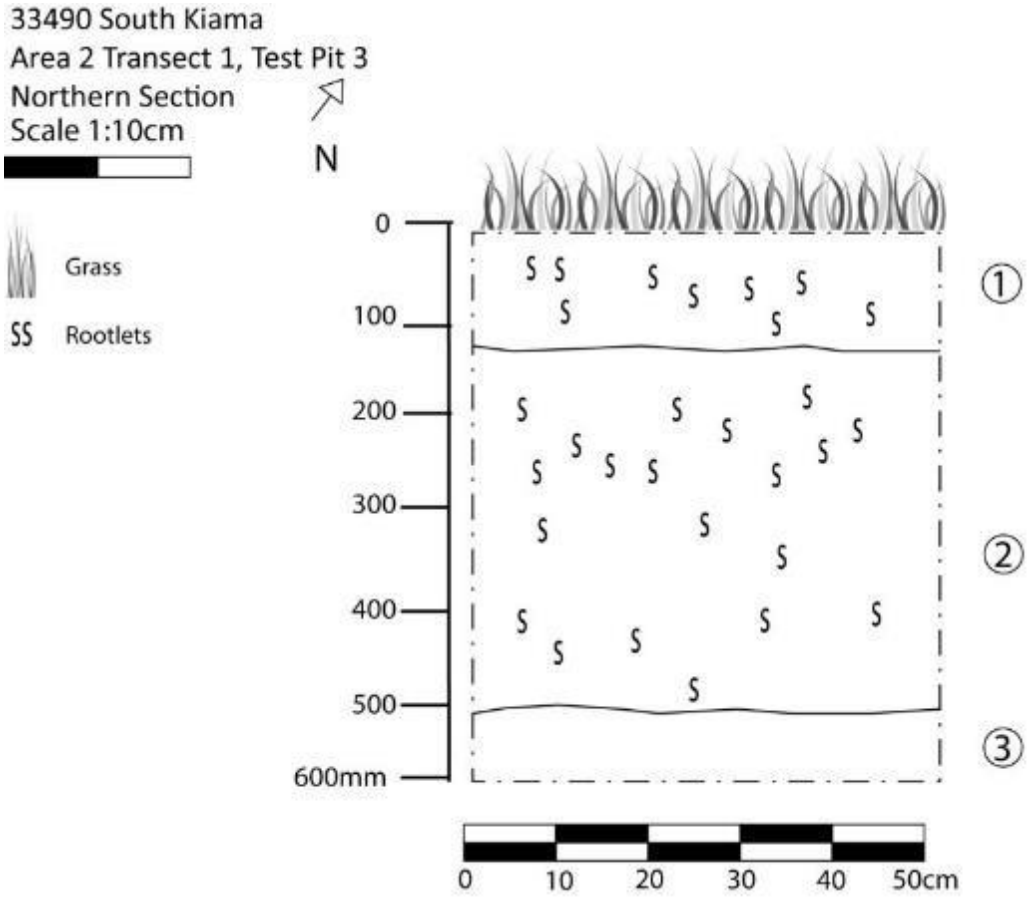

Photo 22 PAD 2 transect 1 test pit 3 section drawing

5.3.3 PAD 3

PAD 3 (Photo 23) was excavated across a mid to lower slope landform within an area of high potential. Twelve test pits were excavated across four transects on the flattest area of slope in close proximity to Munna Munnora Creek as this was the area most likely to contain Aboriginal deposits. The distance between test pits was 20 metres, while the distance between transects was 15 metres due to landform width contraints. Three artefacts were identified from the excavated test pits T2P2 and T3P1. These artefacts were found in spit 2 (100-200mm), spit 3 (200-300mm) and during wall cleaning. They comprised a mudstone angular fragment, chert angular fragment, and silcrete distal flake. No artefacts were identified in other test pits. Typical stratigraphic profiles and section drawings of PAD 3 can be seen in Photo 24, Photo 26 and Photo 27.

Soil stratigraphy was consistent in all test pits across PAD 3. Four soil profiles were identified and excavations stopped when the clay layer was reached.

Soils in context 1 ranged from soft dark reddish grey (5YR4/2) sandy loam to soft dark brown (7.5YR 3/3) silty loam and soft dark olive grey (2.5YR 3/2) silty loam. Rootlets, sparse latite boulders, and rubble (up to 100 millimetres) were included in this context. The depth of context 1 ranged from 80 millimetres to 240 millimetres (Spit 1-3).

Soils in context 2 ranged from moderately compacted dark reddish grey (5YR4/2) sandy loam, sandy clay to dark reddish brown (5YR 3/3) silty clay and sandy clay, Moderately compacted light brown (5YR 6/3) silty clay, moderately compacted dark olive (2.5YR 3/4) silty loam and moderately compacted dark reddish grey (5YR4/2) loamy sand. Inclusions in context 2 were gravel (30-200mm in size). The depth of context 2 ranged from 80 millimetres to 500 millimetres (Spit 1-5).

Soils in context 3 were moderately compacted dark reddish grey (5YR4/2) sandy clay, moderately compacted dark reddish brown (5YR 3/3) silty clay, moderately compacted light brown (5YR 6/3) clay, moderately compacted dark brown (5YR 3/3) clay. Context 3 included rootlets, 10-200mm gravel (15%) and clay. The depth ranged from 250 millimetres to 680 millimetres (Spit 3-7).

Soils in context 4 were moderately compacted dark brown (5YR 3/3), moderately compacted dark reddish brown (5YR3/3) clay. Context 4 included gravel (10-100mm in size, occupying 10% of the section).

While the majority of the test pits had similar stratigraphy across the PAD, T3P1 and T2P1 were located on the flat next to the creek line and revealed slightly different stratigraphy:

- T2P1, transitioned from a soft dark brown (7.5YR 3/3) silty loam in context 1 to a moderately compacted dark reddish brown (5YR 3/3) silty clay in contexts 2 and 3. Context 4 is a moderately compacted dark reddish brown (5YR 3/3) clay. The maximum depth was 580 millimetres.
- T3P1 transitioned from a soft dark olive grey (2.5YR 3/2) silty loam in context 1 and 2, to a moderately compacted light brown (5YR 6/3) and dark brown (5YR 3/3) clay in context 3 and 4. The maximum depth was 680 millimetres.

This additional 100 millimetres of clay in T3P1 is most likely due to its proximity to the creek and the alluvial deposits from regular flooding in this area. One artefact was recovered from T3P1 and no artefacts were recovered from T2P1.

Photo 23 PAD 3 overview

Photo 24 PAD3 Transect 2 Pit 1 stratigraphic profile

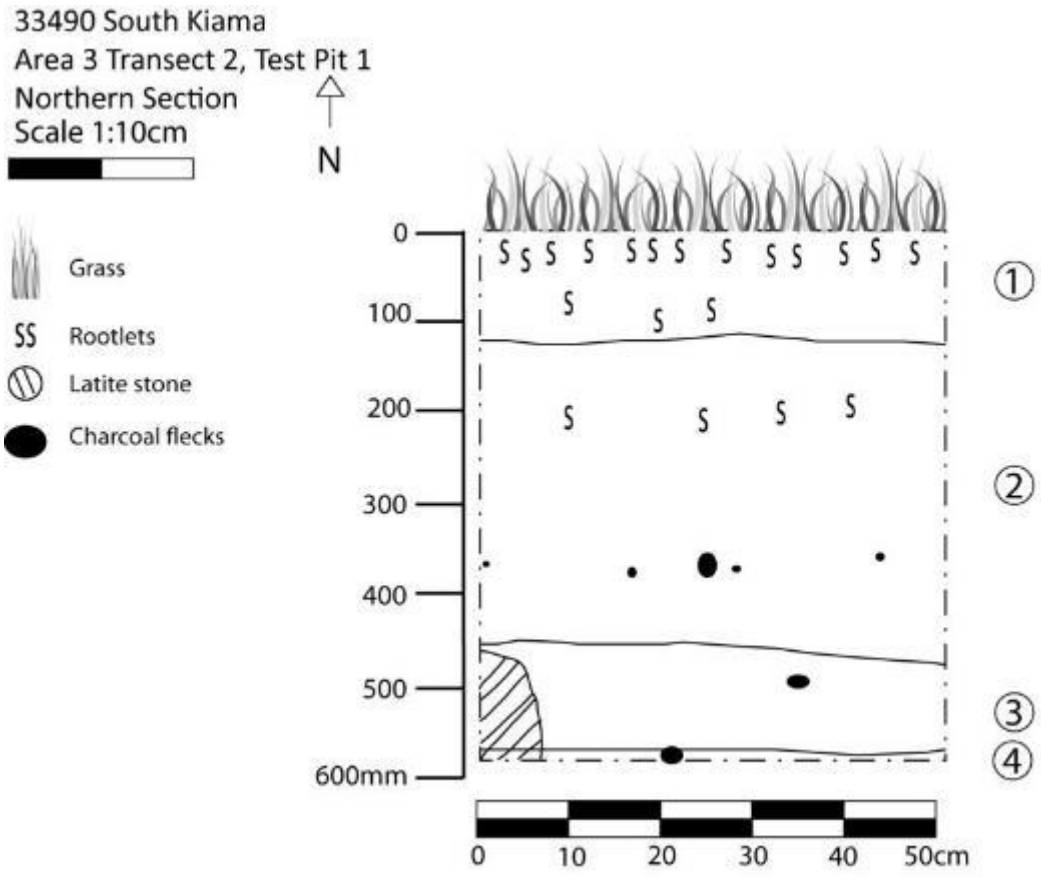

Photo 25 PAD3 Transect 2 Pit 1 section drawing

Photo 26 PAD 3 transect 3 pit 1 stratigraphic profile

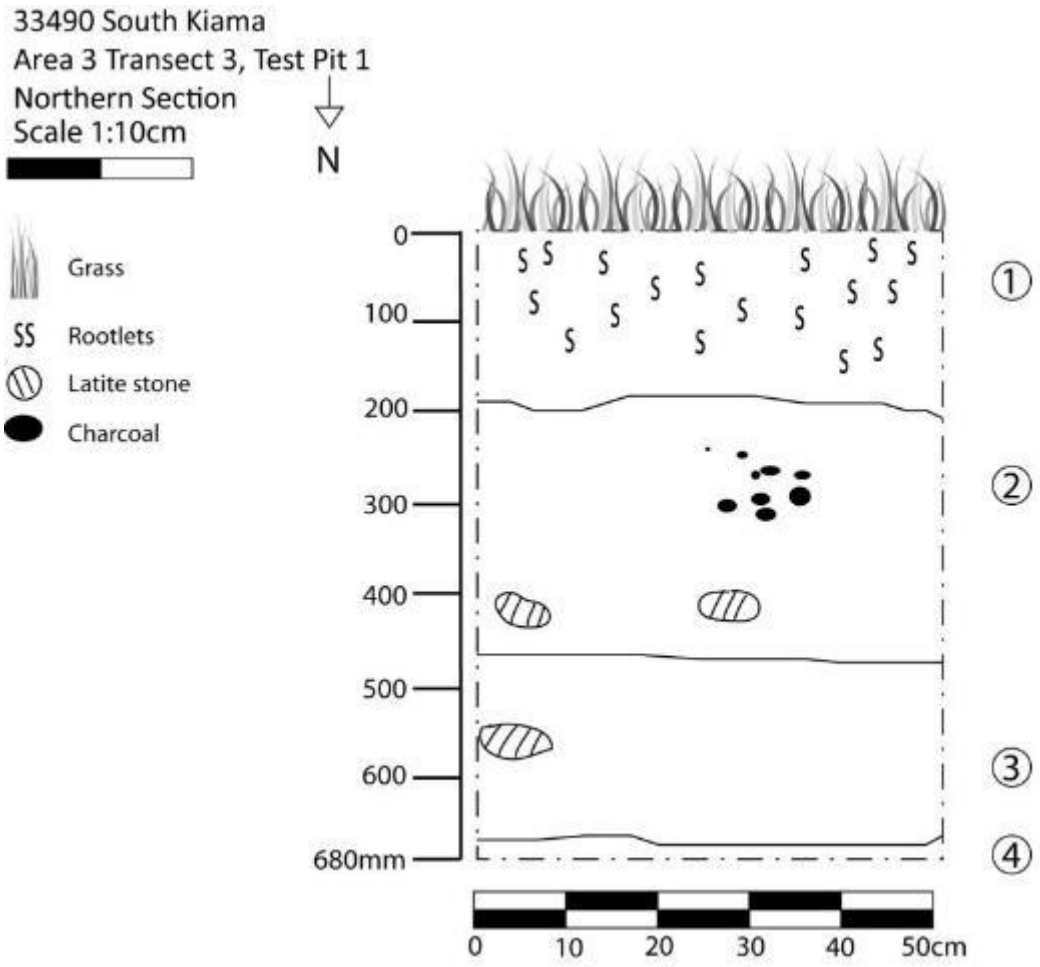

Photo 27 PAD 3 transect 3 pit 1 section drawing

5.3.4 Area 4

Area 4 (Photo 28) was excavated across a flat landform beside a creek line at the request of Aboriginal Parties. Two test pits were excavated across one transect in this landform, one in close proximity to the creek (T1P1) and one at the base of the hillslopes (T1P2). The test pits were located 40 metres apart. Two artefacts were identified from the excavated test pit T1P2. These artefacts were found in spit 2 (100-200mm) and comprised a chert complete flake and a chert distal flake, potentially deposited at this location due to slope erosion. No artefacts were identified in T1P1. T1P1 can be seen in Photo 29 and Photo 30 while T1P2 can be seen in Photo 31 and Photo 32.

Soils in context 1 ranged from soft grey (7.5YR 6/1) silty sand in T1P1 to soft reddish brown (2.5YR 4/3) silty sand in T1P2. Rootlets were found in both test pits. The depth of context 1 in T1P1 was 50 millimetres (Spit 1) whereas in T1P2 the depth of context 1 was 150 millimetres (Spit 2).

Soils in context 2 ranged from soft grey (7.5YR 6/1) silty sand in T1P1 to soft reddish brown (2.5YR 4/3) silty loam. Very frequent pebbles measuring 5-25 centimetres and large cobbles measuring approximately 30 centimetres were present in T1P1 while smaller gravel of approximately 50 millimetres were present in T1P2. The depth of context 2 ranges from 730 millimetres in T1P1 (Spit 8) to 480 millimetres in T1P2 (Spit 5).

While T1P2 in Area 4 was similar in nature to the stratigraphy excavated in PAD3, T1P1 was very different to any other test pit which was excavated as part of this program of testing.

Context 2 of Area 4 T1P1 contained small and large rounded river cobbles and very little matrix. The deposit of context 2 was representative of a creek gravel bar or creek bed and highlights the natural movement of Munno Munnora Creek's alignment over time. As context 2 consisted of a creek gravel deposit it was considered to be culturally sterile and excavations were ceased at this location.

Photo 28 Area 4 overview, view south

Photo 29 Area 4 transect 1 pit 1 stratigraphic profile

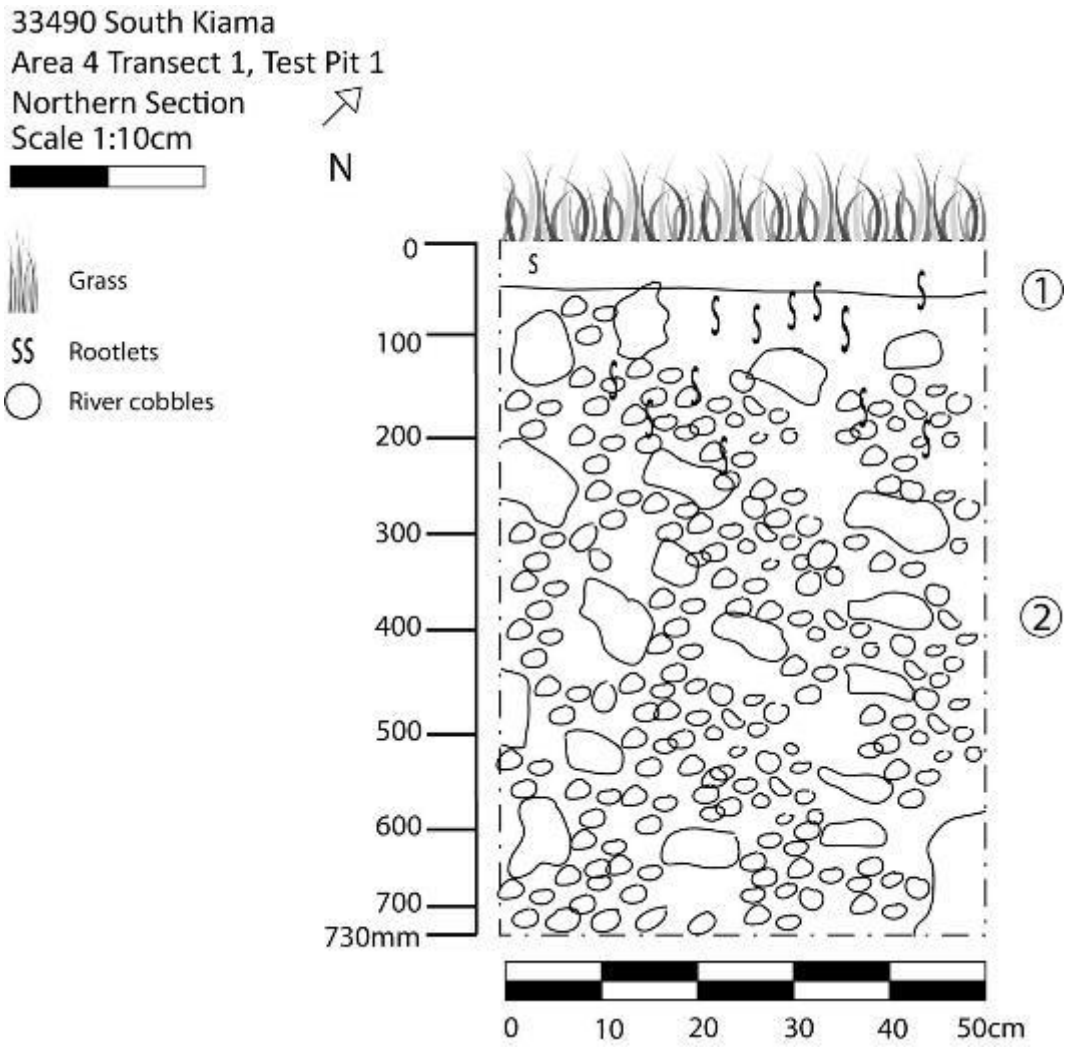

Photo 30 Area 4 transect 1 pit 1 section drawing

Photo 31 Area 4 transect 1 pit 2 stratigraphic profile

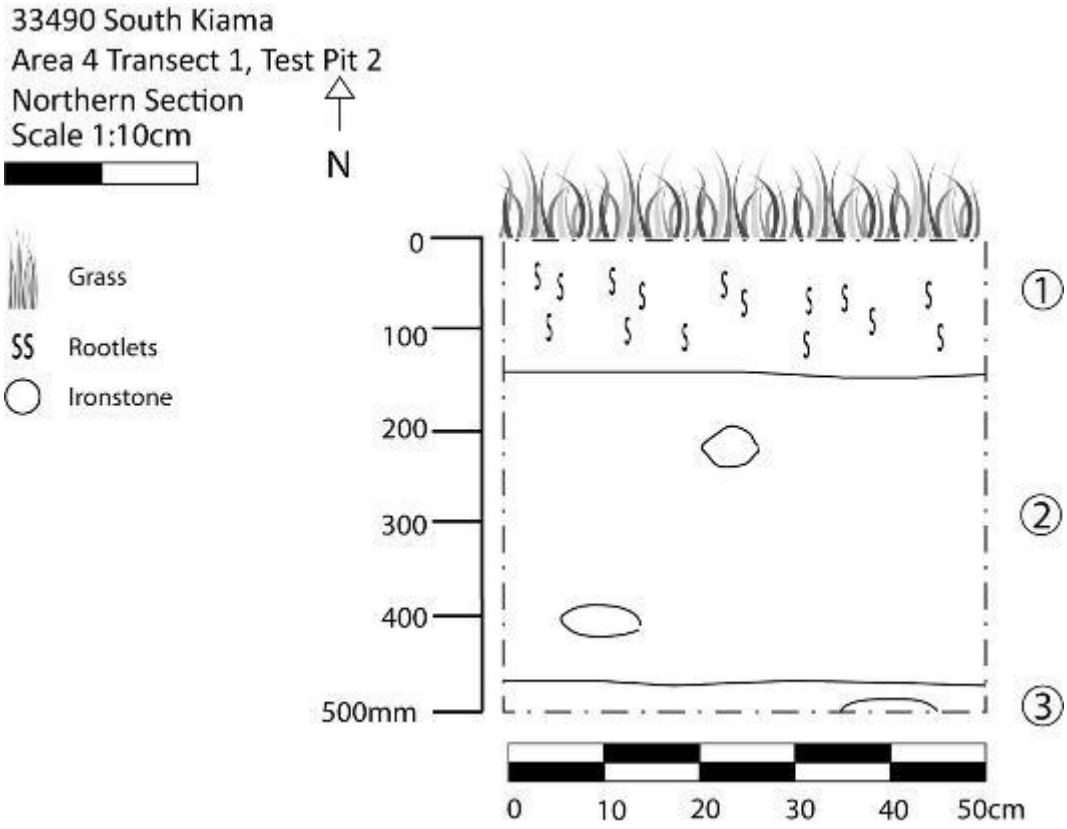

Photo 32 Area 4 transect 1 pit 2 section drawing

5.3.5 Area 5

Area 5 (Photo 33) was excavated across a flat mid to lower slope landform located above Munna Munnora Creek which provided views out to the Coast. This was undertaken at the request of Aboriginal representatives and five test pits were excavated across three transects. The initial two test pits of transect 1 were located 40 metres apart. A low density artefact deposit was encountered in T1P2, and in an attempt to define spatial extent of the site the subsequent test pits were excavated 5 metres to the north and 10 metres to the east and west. Seven artefacts were identified in T1P2. These artefacts were found in spit 1 (0-100mm), comprising a complete mudstone flake; in spit 2 (100-200mm), comprising a complete quartz flake and complete crystal quartz flake; in spit 3 (200-300mm) comprising a chert angular fragment; and in spit 5 (400-500mm), comprising a complete silcrete flake, a distal silcrete flake and a quartz angular fragment. No further artefacts were identified in T2P1, T1P3 and T3P1 suggesting this site represented an isolated low density deposit.. Typical stratigraphic profiles and section drawings of Area 5 can be seen in Photo 34 and Photo 35

Soil stratigraphy was consistent in all test pits across Area 5. Three soil profiles were identified before excavations stopped at the clay layer.

Soils in context 1 across Area 5 consisted of soft dark brown (7.5YYR 3/2) silty loam. Rootlets were found in all test pits. The depth of context 1 ranged from 110 millimetres to 150 millimetres (Spit 2).

Soils in context 2 ranged from hard very dark greyish brown (10YR 3/2) sandy clay to moderately compacted very dark greyish brown (10YR 3/2) silty sand. Context 2 included iron stone (approximately 20%) with sizes up to 20mm. The depth ranged from 230 millimetres to 390 millimetres (Spit 3-4).

Soils in context 3 were a hard to moderately compacted very dark grey (2.5YR 3/1) sandy clay to a hard very dark greyish brown (10YR 3/2) sandy clay and hard dark reddish brown (2.5Y 3/1) sandy clay. This context contained iron stone (10%) up to 25mm.

Photo 33 Area 5 overview, view east

Photo 34 Area 5 transect 1 pit 2 stratigraphic profile

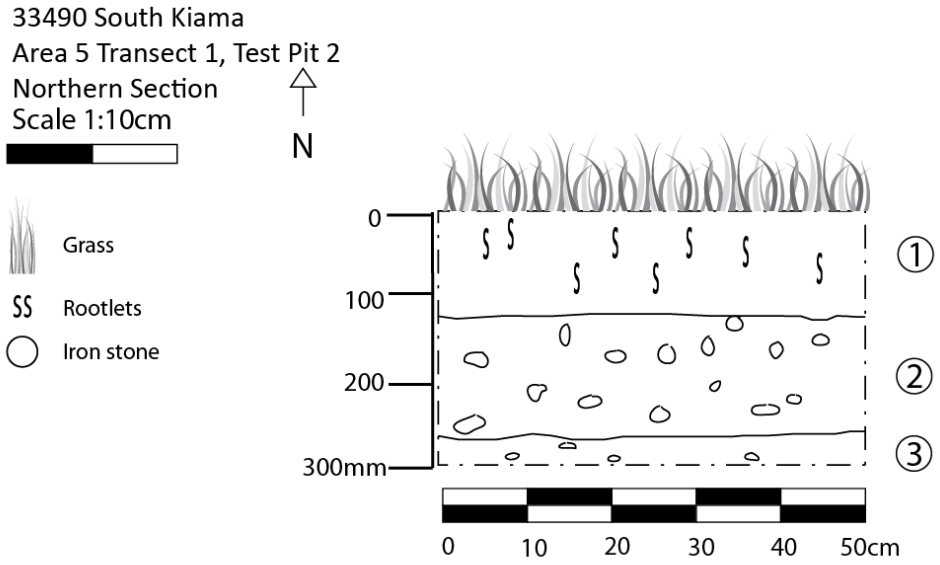

Photo 35 Area 5 transect 1 pit 2 section drawing

5.4 Artefact analysis

The following analysis has been undertaken for the sub-surface assemblage excavated across the extent of the study area across the 33 test pits. A total of 16 artefacts were identified and recorded during the test excavations.

The artefact analysis addresses a series of themes including:

- Spatial distribution.
- Stone raw material procurement.
- Stone reduction technology.

Stone artefacts collected from the excavations were labelled by spit and their test pit location recorded. The recording form utilized by Biosis prompts the user to record all relevant artefact attributes; this enabled a comprehensive typological, technological and metrical analysis of the assemblage to be undertaken. Analysis was undertaken using a standard set of digital Vernier calipers. All measurements were recorded in millimetres to two decimal places. Appendix 2 contains the detailed lithic recordings. Collected artefacts were recorded at their temporary storage location at the Biosis' Sydney office for analysis (at 14/17-27 Power Avenue, Alexandria NSW 2015), as per the test excavation methodology in Section 5.2 of this report.

Areas excavated

A total of 16 artefacts were recorded from the sub-surface excavations at PAD1, PAD2, PAD3, Area 4 and Area 5 across 33 excavated test pits (Table 10). The highest density of artefacts were recorded at Area 5, which contained seven artefacts out of one excavated test pit and accounted for 43.75% of the total sub-surface assemblage. PAD1 and PAD3 both contained the next highest concentration of artefacts at 18.75% (n=3) each. The other two areas, Area 4 and PAD 2 contained 12.5% (n=2) and 6.25% (n=1) respectively.

The five areas tested were spread across two types of landforms. PAD1, PAD2, PAD3 and Area 5 were located on a mid to low slope while Area 4 was located across a flat landform beside a creek line. It should be noted that the artefacts excavated from Area 4 were from T1P2, which had soil profiles similar to the other areas tested during this program. The test pit (T1P1) which exhibited alluvial depositional characteristics at a low point next to the creek line did not contain any artefacts.

Table 10 Concentrations of artefacts by area

Area	Count (n)	Percentage %
Area 5	7	43.75
PAD1	3	18.75
PAD3	3	18.75
Area 4	2	12.50
PAD2	1	6.25
Total	**16**	**100**

Assemblage composition

The assemblage recovered from the test excavations was dominated by complete flakes and angular fragments making up 31.25% (n=5) of the total assemblage each (Table 11 and Photo 36). Distal and proximal flakes were the third and fourth most common artefact types, representing 18.75% (n=3) and 12.5% (n=2) respectively. One left longitudinally split flake was also recorded representing 6.25% (n=1) of the assemblage. None of the artefacts had any evidence of retouch or usewear.

Table 11 Sub-surface assemblage artefact types

Artefact Type	Count (n)	Percentage (%)
Angular Fragment	5	31.25
Flake – Complete	5	31.25
Flake – Distal	3	18.75
Flake – Proximal	2	12.50
Flake – Left Longitudinal Split	1	6.25
Total	**16**	**100**

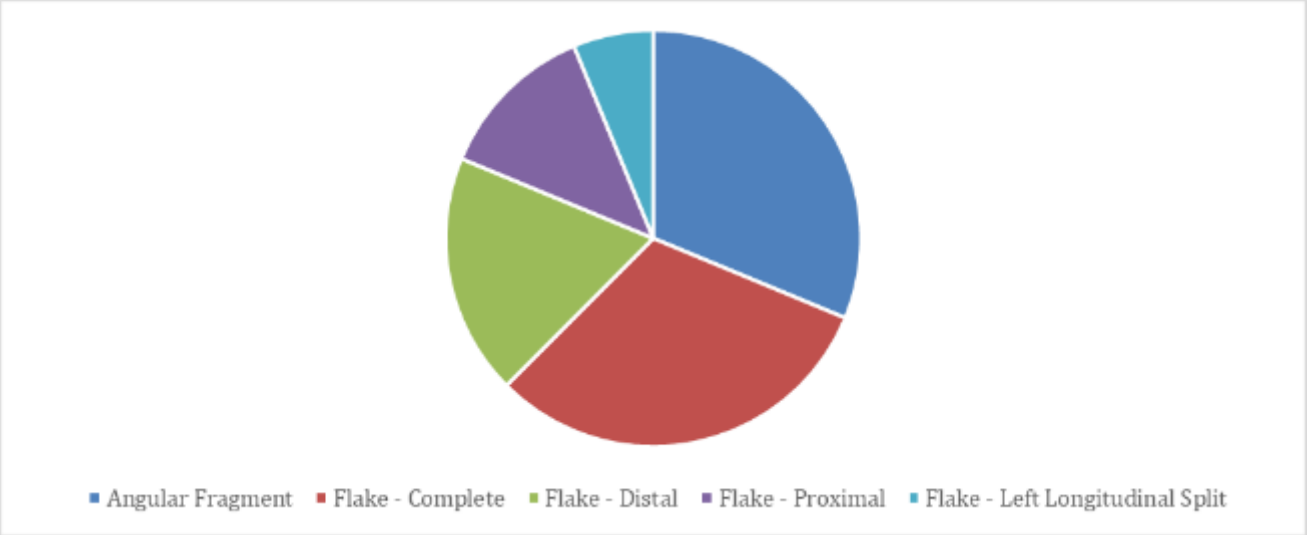

Photo 36 Artefact type of the assemblage

Vertical distribution and size

The vertical distribution of artefacts at a site can be a good indicator of occupation intensity as spits with higher artefact concentrations are likely to have seen longer or more intensive occupation than spits with smaller artefact concentrations. This analysis can also help identify variation in occupation over time, with multiple large and small clusters of artefacts at different depths indicating separate depositional periods and possibly indicating separate occupation events. The results of artefact concentrations by spit depth shows the highest concentration of artefacts was found between 100 and 200 millimetres (56.25%, n=9). Significantly lower artefact frequencies were found at other depths, the next highest was 400 to 500 millimetres (18.75%, n=3) and 200 to 300 millimetres (12.5%, n=2). No artefacts were identified between 400 to 500 millimetres. The concentrations of artefacts between spit 2 and 3 (100 to 300 millimetres) and in spit 5 (400 to 500

millimetres) may indicate two depositional events, however with such a small assemblage this cannot be confirmed with certainty.

Table 12 Concentrations of artefacts by depth

Spit Number	Count (n)	Percentage %
Spit 1 (0-100 millimetres)	1	6.25
Spit 2 (100-200 millimetres)	9	56.25
Spit 3 (200-300 millimetres)	2	12.50
Spit 4 (300-400 millimetres)	0	0.00
Spit 5 (400-500 millimetres)	3	18.75
Wall clean	1	6.25
Total	**16**	**100**

Artefact size in an assemblage can provide information about post depositional processes, raw material procurement and stone reduction. A useful guide to determining post-depositional processes such as trampling and bioturbation in a sub-surface assemblage is the measurement of mean length. If the mean length (i.e. the average size) of the artefacts decreases with depth, it is a good indicator that post-depositional processes have occurred and the stone artefacts have been displaced downwards in the soil (Richardson 1992). This is because small artefacts are more likely to be affected by size sorting and soil movement, for example larger numbers of smaller artefacts will move and be sorted to the base of an excavation, while larger artefacts are less likely to move through the soil profile (Baker 1978).

The sizes of artefacts in the overall assemblage shows that the majority of artefacts have an average length of less than 20 millimeters (Table 13). This indicates that the majority of artefacts in the assemblage are relatively small and there is no clear indication from the analysis of the assemblage that size sorting is evident.

Table 13 Average maximum length of artefacts by depth

Spit Number	Length (mm)
Spit 1 (0-100 millimetres)	33.35
Spit 2 (100-200 millimetres)	15.79
Spit 3 (200-300 millimetres)	18.21
Spit 4 (300-400 millimetres)	N/A
Spit 5 (400-500 millimetres)	15.50
Wall clean	23.59

Raw material procurement

Raw material types recorded in the sub-surface assemblage highlighted that chert was the most common material type representing 36.5% (n=6), followed by silcrete at 25% (n=4) and quartz at 18.75% (n=3) (Table 14 and Photo 37). Mudstone and crystal quartz were also present in low frequencies, occurring at 12.5% (n=2) and 6.3% (n=1) respectively.

Table 14 Raw material types in the assemblage

Raw material type	Count (n)	Percentage (%)
Chert	6	37.5
Silcrete	4	25.00
Quartz	3	18.75
Mudstone	2	12.50
Crystal Quartz	1	6.30
Total	**16**	**100**

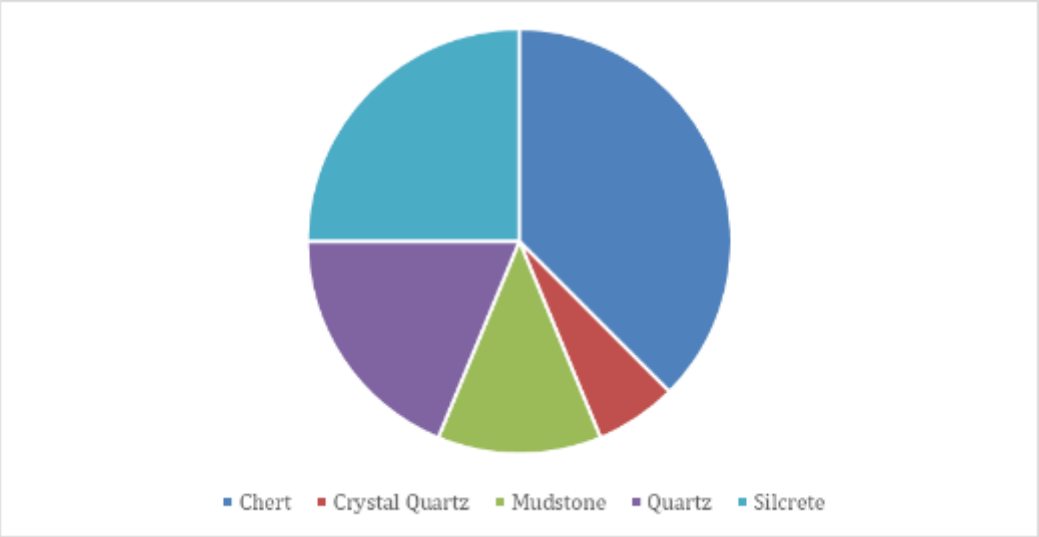

Photo 37 Artefact raw materials

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 can indicate 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, Orser & Schiffer 2004).

The analysis of the cortex on the recorded sub-surface artefacts is characteristic of highly reduced artefacts and indicates that reduction on site was undertaken a fair distance from the raw material source. The

majority of artefacts possessed no cortex, representing 87.5% (n=14) of the assemblage. The remaining 12.5% (n=2) possessed a cortex percentage of 1-25% (n=2) (Table 15).

Table 15 Percentage of cortex

Cortex %	Count (n)	Percentage (%)
0	14	87.50
1-25	2	12.50
26-50	0	0
51-75	0	0
76-100	0	0
Total	**16**	**100**

6 Results and discussion

6.1 Aboriginal sites identified

The results of the test excavation program identified four sub-surface artefact scatters across the tested areas. A summary of the Aboriginal sites identified from the testing program is provided below.

6.1.1 South Kiama-01 (AHIMS #52-5-0970)

Site location

South Kiama-01 is located approximately 125 metres west of the Princess Highway and 520 metres to the north of Weir Street within Lot 5 DP 740252 (Table 16 and Figure 14).

Table 16 Grid reference site South Kiama-01 (GDA94/MGA56) (approximate centre point of site)

Easting (mE)	Northing (mN)
302383	6159058

Site environment

South Kiama-01 is located on a mid to lower slope which is dissected by a drainage channel depression. It is located in the east of the study area and contains both PAD1 and PAD2 that were the subject of testing as part of this program. Munna Munnora Creek runs adjacent to the site approximately 115 metres to the east. Disturbances observed within the area are related to pastoral land use.

Site description

South Kiama-01 consists of a low density sub-surface archaeological deposit containing four artefacts, two of which are chert and one each of silcrete and quartz. The site covers an area of approximately 120 metres by 50 metres. Artefacts are spread over the site extent between 100-200 millimetres depth. Artefact types identified within this site extent include proximal flake fragments, a longitudinal flake fragment and an angular fragment. Proximal flake fragments were the most common artefact type.

Soils within South Kiama-01 varied from soft to moderately compacted reddish brown and yellowish silty loam, sand and clay content that are consistent with the Kiama soil landscape. The soil profile was consistent across the area, with the top of the test pits containing silty loam or clayey sand which had been disturbed by cattle and introduced grass and weeds. The soils became increasingly sandy and clayey until the clay natural B-horizon was reached at the base of the test pits. The majority of the pits contained latite cobbles which increased towards the base of the pits. Low levels of bioturbation were observed.

6.1.2 South Kiama-02 (AHIMS #52-5-0971)

Site location

South Kiama-02 is located approximately 300 metres west of the Princess Highway and 215 metres to the north of Weir Street within Lot 5 DP 740252 (Table 17 and Figure 14).

Table 17 Grid reference site South Kiama-02 (GDA94/MGA56) (approximate centre point of site)

Easting (mE)	Northing (mN)
302192	6158829

Site environment

South Kiama-02 is located on a mid to lower slope in the south west of the study area. It contains PAD3 that was the subject of testing as part of this program. Munna Munnora Creek runs directly adjacent to the site to the north. Disturbances observed within the area are related to pastoral land use.

Site description

South Kiama-02 consists of a low density sub-surface archaeological deposit containing three artefacts, one chert, one silcrete and one mudstone. The site covers an area of approximately 40 metres by 15 metres. Artefacts are spread over the site extent between 100-300 millimetres depth. Artefact types identified within this site extent include a distal flake and angular fragments. Angular fragments were the most common artefact type.

Soils within South Kiama-02 varied from soft silty loam to moderately compacted sandy clay. Colours varied from a dark olive grey to light brown. The two test pits that are contained within the site exhibited varied soil stratigraphy. As the site approaches the creek, soils become darker and siltier and continue to 680 millimetres before clay is reached. Moving to the west away from the creek, the soil exhibits a similar stratigraphy to South Kiama-01 and is consistent with the Kiama soil landscape. Sterile clay was identified at 500 millimetres. Latite rubble is in both test pits, but appears to increase in frequency towards the base of the pits, and increases in size moving towards the river. Low levels of bioturbation were observed.

6.1.3 South Kiama-03 (AHIMS #52-5-0972)

Site location

South Kiama-03 is located approximately 120 metres west of the Princess Highway and 350 metres to the north of Weir Street within Lot 5 DP 740252 (Table 18and Figure 14).

Table 18 Grid reference site South Kiama-03 (GDA94/MGA56) (approximate centre point of site)

Easting (mE)	Northing (mN)
302397	6158893

Site environment

South Kiama-03 is located on a flat landform in the south east of the study area. Munna Munnora Creek runs approximately 25 metres to the east of the site. Disturbances observed within the area are related to pastoral land use.

Site description

South Kiama-03 consists of a low density sub-surface archaeological deposit containing two artefacts, both which are made of chert. The site covers an area of approximately 5 metres by 5 metres. Artefacts are present between 100-200 millimetres. Artefact types identified within this site extent include a complete flake and a distal flake fragment.

Soils within South Kiama-03 consisted of soft reddish brown silty sand, soft dark reddish brown sandy loam and moderately compacted dark reddish brown silty clay before ending at clay. Small cobbles approximately 5 millimetres were present. The soil profiles are consistent with South Kiama-01 and the Kiama soil landscape. Low levels of bioturbation were observed.

6.1.4 South Kiama-04 (AHIMS #52-5-0973)

Site location

South Kiama-04 is located approximately 50 metres west of the Princess Highway and 670 metres to the south of Saddleback Mountain Road within Lot 5 DP 707300 (Table 19 and Figure 14).

Table 19 Grid reference site South Kiama-04 (GDA94/MGA56) (approximate centre point of site)

Easting (mE)	Northing (mN)
302448	6159456

Site environment

South Kiama-04 is located on a mid to lower slope in the centre east of the study area. A small first order creekline is located approximately 40 metres to the south east. Disturbances observed within the area are related to pastoral land use.

Site description

South Kiama-04 consists of a low density sub-surface archaeological deposit containing seven artefacts, two quartz, two silcrete, and one each of chert, crystal quartz and mudstone. The site covers an area of approximately 5 metres by 5 metres. Artefacts are present between 0-500 millimetres with the majority being present in spit five (400–500 millimetres). Artefact types identified within this site extent include complete flakes, angular fragments and a distal flake fragment. The most common type of artefact recovered were complete flakes.

Soils within South Kiama-04 consisted of soft dark brown silty loam and hard very dark grey sandy clay before ending at clay. Rootlets were present in the topsoil and rubble increased as the test pit got deeper. The size of the rubble ranged from 3 to 25 millimetres. The soil profiles are consistent with South Kiama-01 and the Kiama soil landscape. Low levels of bioturbation were observed.

Figure 14 Aboriginal sites located within the study area

Biosis Pty Ltd

Acknowledgements: Imagery © Nearmap 2020
Basemap © Land and Property Information 2016

Matter: 33490
Date: 05 November 2020,
Checked by: AV, Drawn by: LH, Last edited by: lharley
Location:P:\33400s\33490\Mapping\
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6.2 Discussion

The archaeological test excavation program undertaken for the ACHA identified four low density sub-surface scatters; South Kiama-01, South Kiama-02, South Kiama-03 and South Kiama-04. These contained a total of 16 artefacts, the highest density being from South Kiama-04 with a total of 7 artefacts (43.75%).

The study area is situated within the Kiama and Wattamolla Road soil landscapes, both of which are erosional soil landscapes. Test excavations were conducted within the Kiama soil landscape as the landform features assessed as having potential to contain sub-surface archaeological deposits (lower slopes and flats) were contained solely in this soil landscape within the study area. Soils within the Kiama landscape on lower slopes are characterised by up to 500 millimetres of friable brownish black sandy clay loam (Ka1) overlying less than 200 millimetres of light brown clay (Ka2) (Hazelton 1992, pp. 52–54). There is moderate sheet erosion where poor vegetation cover exists, and this combined with the sloped nature of the study area has resulted in soil movement down slopes. The majority of the test pits did not reach 500 millimetres before reaching clay which was consistent with Ka2. Some evidence of bioturbation such as insect activity and small vegetation root infiltration was observed within all test excavation units across the study area which is unlikely to have had an effect on the integrity of the archaeological deposit. The study area has been historically cleared of vegetation which may have disturbed or removed the top of Ka1, resulting in a decreased depth before the natural B-horizon (Ka2) was reached, this may also account for the fact that only one artefact was excavated in spit 1 (0-100 millimetres) within all 33 test pits.

The four sites identified by test excavations represent isolated or low density scatters, and given the low sample size as a result of the sporadic and low density deposits, the artefact analysis was unable to determine any firm patterns in raw material use or typology. The assemblage recovered from the test excavations was dominated by complete flakes (31.25%) and angular fragments (31.25%), which made up a total of 62.5% of the entire assemblage. Distal flake fragments, proximal flake fragments and longitudinally split fragments were also present. An analysis of the artefact assemblage did not identify any evidence of size sorting as a result of post-depositional disturbance. There was no retouching or usewear on any of the artefacts and only two artefacts possessed cortex. The analysis of the cortex on the recorded sub-surface artefacts also indicated that reduction activities were being undertaken a fair distance from the raw material sources. The predominant material in the assemblage was chert at 37.5%, followed by silcrete (25%) and quartz (18.75%). Mudstone and crystal quartz were also present.

A lack of archaeological testing and salvage projects in the area make it difficult to ascertain whether this is a typical assemblage for the local area. Excavations by Mary Dallas Consulting Archaeologists (MDCA) (2007b) of two areas of PAD located 200 metres to the east of the study area revealed two artefacts out of 14 test areas. These areas of PAD were also in close proximity to Munna Munnora Creek within the Kiama soil landscape. Topsoil in the areas excavated by MDCA was between 200 to 400 millimetres thick overlying clay subsoil with latite cobbles. This is the same profile as the Aboriginal sites which are located within the current study area. The two isolated artefacts were considered to represent lost or discarded cultural material not associated with long term occupation or tool production.

MDCA's assessment covered similar landforms, and soil profiles to the current assessment. The results of the current assessment are generally consistent with the results of the MDCA assessment, with low density sub-surface deposits identified within lower slope and flat landforms situated in the Kiama soil landscape.

Due to the small size of the assemblage recovered limited information can be obtained from South Kiama-01 to South Kiama-04 that can contribute to our understanding of Aboriginal occupation and land use within the area. The soil profiles indicate that the topsoil has been disturbed or removed by vegetation clearance, slope erosion and pastoral use of the study area; this is supported by the Mary Dallas excavations (2007b) located 200 metres to the east which exhibited the same soil profiles.

The limited amount of artefacts found by both the MDCA (2007b) and current excavations indicate that this area did not contain any long-term campsites and was instead used as resource gathering zone or travel route. Munna Munnora Creek leads from the Kiama hills, through the study area down, to East Beach thereby providing a direct path between the coastal resource zone and the resource zone of the undulating hill systems further inland. This conclusion is further supported when comparing excavations undertaken along the coast at Gerroa, Kiama and Dunmore which typically contained a large and varied amount of artefacts (Navin Officer Heritage Consultants Pty Ltd 2000) (Biosis Pty Ltd 2009) (Heritage Consulting Australia Pty Ltd 2014) demonstrating ongoing long-term, intense occupation of this portion of the coast by Aboriginal people.

The evidence collected as part of this assessment indicates that the study area was utilised primarily for resource gathering or transitory purposes and was not a foci for Aboriginal occupation. Four very low density sub-surface deposits were identified in the lower slope and floodplain/flat landforms in the study area. This assessment has found that there is the potential for very low density artefact scatters or isolated artefacts to be present throughout the lower slope and floodplain/flat landforms across the study area.

7 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.

7.1 Introduction to the assessment process

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

- **Historical significance** (evolution and association) refers to historic values and encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.
- **Aesthetic significance** (Scenic/architectural qualities, creative accomplishment) refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.
- **Social significance** (contemporary community esteem) refers to the spiritual, traditional, historical or contemporary associations and attachment that the place or area has for the present-day community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed. These aspects of heritage significance can only be determined through consultative processes with local communities.
- **Scientific significance** (Archaeological, industrial, educational, research potential and scientific significance values) refers to the importance of a landscape, area, place or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.

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

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

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

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

7.2 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, pp. 249, (NSW National Parks and Wildlife Service 1999, For this reason, the NPWS summarises the situation as 'while various criteria for archaeological significance assessment have been advanced over the years, most of them fall under the heading of archaeological research potential' (NSW National Parks and Wildlife Service 1999, p.26). The NPWS criteria for archaeological significance assessment are based largely on the ICOMOS Burra Charter.

Research potential

Research potential is assessed by examining site content and site condition. Site content refers to all cultural materials and organic remains associated with human activity at a site. Site content also refers to the site structure – the size of the site, the patterning of cultural materials within the site, the presence of any stratified deposits and the rarity of particular artefact types. As the site contents criterion is not applicable to scarred trees, the assessment of scarred trees is outlined separately below. Site condition refers to the degree of disturbance to the contents of a site at the time it was recorded. Table 20 and Table 21 outline the site content and site condition rating used for archaeological sites.

Table 20 Site contents ratings used for archaeological sites

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

Table 21 Site condition ratings used for archaeological sites

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

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

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

Representativeness

Representativeness refers to the regional distribution of a particular site type. Representativeness is assessed by whether the site is common, occasional, or rare in a given region. Assessments of representativeness are subjectively biased by current knowledge of the distribution and number of archaeological sites in a region. This varies from place to place depending on the extent of archaeological research. Consequently, a site that is assigned low significance values for contents and condition, but a high significance value for

representativeness, can only be regarded as significant in terms of knowledge of the regional archaeology. Any such site should be subject to re-assessment as more archaeological research is undertaken.

Assessment of representativeness also takes into account the contents and condition of a site. For example, in any region there may only be a limited number of sites of any type that have suffered minimal disturbance. Such sites would therefore be given a high significance rating for representativeness, although they may occur commonly within the region. Table 22 outlines the site representativeness ratings used for archaeological sites.

Table 22 Site representativeness ratings used for archaeological sites

Rating	Description
1	Common occurrence
2	Occasional occurrence
3	Rare occurrence

Overall scientific significance ratings for sites, based on a cumulative score for site contents, site integrity and representativeness are provided in Table 23.

Table 23 Scientific significance ratings used for archaeological sites

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

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

7.2.1 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 24 below.

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

Site name	Site content	Site condition	Representativeness	Scientific significance
South Kiama-01	1	1	1	3 – Low
South Kiama-02	1	1	1	3 – Low
South Kiama-03	1	1	1	3 – Low
South Kiama-04	1	1	1	3 – Low

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

Site name	Statement of significance
South Kiama-01 (AHIMS #52-5-0970)	South Kiama-01 is a low density sub-surface archaeological deposit located upon a mid to lower slope consisting of four artefacts of predominately chert material. The site extends across an area of 120 metres by 50 metres. The lower stratigraphy is considered *in situ*, however the topsoil has been partially removed and the higher levels of stratigraphy has been disturbed via human agents, namely vegetation removal and use of the land for agricultural purposes. There have been few excavations in the area on the same type of landform near the coastline in which to compare the frequency of the site, however transitory areas typically contain low density scatters. South Kiama-01 is considered to have low scientific research potential. The significance of this site has been assessed as low.
South Kiama-02 (AHIMS #52-5-0971)	South Kiama-02 is a low density sub-surface archaeological deposit located upon a mid to lower slope consisting of three artefacts of chert, silcrete and mudstone material. The site extends across an area of 40 metres by 15 metres. The lower stratigraphy is considered *in situ*, however the topsoil has been partially removed and the higher levels of stratigraphy has been disturbed via human agents, namely vegetation removal and use of the land for agricultural purposes. There have been few excavations in the area on the same type of landform near the coastline in which to compare the frequency of the site, however transitory areas typically contain low density scatters. South Kiama-02 is considered to have low scientific research potential. The significance of this site has been assessed as low.
South Kiama-03 (AHIMS #52-5-0972)	South Kiama-03 is a low density sub-surface archaeological deposit located upon a flat landform next to a creekline consisting of two artefacts of chert material. The site extends across an area of 5 metres by 5 metres. The lower stratigraphy is considered *in situ*, however the topsoil has been partially removed and the higher levels of stratigraphy has been disturbed via human agents, namely vegetation removal and use of the land for agricultural purposes. There have been few excavations in the area on the same type of landform near the coastline in which to compare the frequency of the site, however transitory areas typically contain low density scatters. South Kiama-03 is considered to have low scientific research potential. The significance of this site has been assessed as low.
South Kiama-04 (AHIMS #52-5-0973)	South Kiama-04 is a low density sub-surface archaeological deposit located upon a mid to lower slope consisting of seven artefacts of predominately quartz and silcrete material. The site extends across an area of 5 metres by 5 metres. The lower stratigraphy is considered *in situ*, however the topsoil has been partially removed and the higher levels of stratigraphy has been disturbed via human agents, namely vegetation removal and use of the land for agricultural purposes. There have been few excavations in the area on the same type of landform near the coastline in which to compare the frequency of the site, however transitory areas typically contain low density scatters. South Kiama-04 is considered to have low scientific research potential. The significance of this site has been assessed as low.

8 Impact assessment

As outlined in Section 2, the project consists of a planning proposal to rezone the study area from RU2 rural landscape to R2 low density residential and R5 large lot residential in preparation for a residential subdivision.

8.1 Predicted physical impacts

The current Master Plan shown in Figure 3 demonstrates how the study area could be used as a subdivision but this may be subject to change as the development is currently in the planning stage.

The current Master Plan shows several residential lots cutting through South Kiama-01, South Kiama-02 and South Kiama-04. It is expected that the following works will result in direct impacts to these Aboriginal deposits:

- Construction of dual occupancy residential houses throughout the subdivision complex.
- Construction of 17 roads traversing throughout the subdivision complex.
- Installation of services including, but not limited to, gas, electrical, water, sewerage, lighting and communications.

A summary of impacts is provided below in Table 26.

Table 26 Summary of potential archaeological impacts

AHIMS site no.	Site name	Significance	Type of harm	Degree of harm	Consequence of harm
52-5-0970	South Kiama-01	Low	Direct	Total	Total loss of value
52-5-0971	South Kiama-02	Low	Direct	Partial	Partial loss of value
52-5-0972	South Kiama-03	Low	None	None	No loss of value
52-5-0973	South Kiama-04	Low	Direct	Total	Total loss of value

8.2 Management and mitigation measures

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

Avoidance of identified Aboriginal sites

Avoidance of impacts to archaeological and cultural heritage sites through design of the development is the primary mitigation and management strategy, and should be implemented where practicable.

The Master Plan in its current design will impact Aboriginal sites South Kiama-01, South Kiama-02 and South Kiama-04 and the lower slope and flat landforms. The artefact scatters throughout the testing areas are low

density and have been assessed as possessing low scientific significance. It is expected that this trend would continue throughout the lower slope and flat landforms within the study area.

Where possible, should the Master Plan change, attempts should be made to avoid these areas as this will preserve these sites and any potential artefacts present for future generations in line with intergenerational equity and Environmentally Sustainable Development. Should avoidance not be possible, the mitigation measures below should be implemented.

Collection of archaeological information

As part of this assessment test excavations and community consultation have been undertaken to determine the archaeological and cultural significance of the study area. Test excavations identified four Aboriginal sites and the information obtained from specialist analysis of these sites has been incorporated into this report to characterize and present information on Aboriginal use of the area. This has allowed for future generations to access and build upon our knowledge of Aboriginal land use and technology in accordance with the principles of Intergenerational Equity.

AHIP application and Cultural Heritage Management Plan (CHMP)

The test excavation results have also indicated that low density surface artefact scatters are likely to be present on the gentle middle and lower hillslopes and alluvial flats associated with the perennial water source Munna Munnora Creek, as it was likely a travel route between the hill and coastal resource zones. It is possible that additional sporadic, isolated or low density artefact sites may be present across these landforms. As a result any development in the study area is likely to result in impacts to Aboriginal heritage, regardless of whether the development avoids South Kiama-01, South Kiama-02, South Kiama-03, and South Kiama-04; although any additional sites are unlikely to further contribute to our understanding of archaeological nature of the area. It is recommended that an AHIP to impact is obtained before works commence to South Kiama-01, South Kiama-02, South Kiama-03, South Kiama-04, and the lower slope and floodplain/flat landforms.

A CHMP should also be prepared outlining requirements for management of existing sites and unexpected finds, site inductions and reporting processes during bulk earthworks and construction phases of development to ensure no Aboriginal sites are impacted during later stages of the project.

N

SITE MASTER PLAN
SCALE 1:2,250
0 50 100 150 200
Metres

Legend

Study area

Aboriginal sites

South Kiama-01

South Kiama-02

South Kiama-03

South Kiama-04

Figure 15 Proposed impact footprint and Aboriginal archaeological sites within the study area

Biosis Pty Ltd

Acknowledgements: Imagery © Nearmap 2020
Basemap © Land and Property Information 2016

Matter: 33490
Date: 05 November 2020,
Checked by: AV, Drawn by: LH, Last edited by: lharley
Location:P:\33400s\33490\Mapping\
33490_F15_AboriginalSitesPropDev

0 50 100 150 200 250
Metres
Scale 1:5,000 @ A3
Coordinate System: GDA 1994 NSW Lambert

N

9 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: Continued consultation with the registered Aboriginal parties

It is recommended that White Constructions Pty Ltd continue to inform the RAPs about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project. This recommendation is in keeping with the consultation requirements.

Recommendation 2: Avoidance of Aboriginal sites and sensitive landforms

Four Aboriginal sites were identified within the study area, South Kiama-01, South Kiama-02, South Kiama-03 and South Kiama-04. The lower slope and floodplain/flat landforms within the study area were also identified as having potential to contain very low density artefact scatters or isolated artefacts. Any potential works should avoid and/or minimise impacts to these sites, however in the instance they cannot be avoided, Recommendations 3 to 7 should be implemented.

Recommendation 3: Application for an Aboriginal Heritage Impact Permit (AHIP)

If the Master Plan and subsequent development cannot avoid impacts to South Kiama-01, South Kiama-02, South Kiama-03 and South Kiama-04, and the lower slope and Floodplain/flat landforms, it is recommended that the proponent apply to Heritage NSW for an area wide AHIP to impact these sites, which are currently protected under the NPW Act. **The AHIP should be for a term of 10 years.** The sub-surface test excavations have confirmed the tested sites are of low integrity and scientific significance.

Recommendation 4: Curation of collected artefacts

A total of 16 artefacts were excavated during the test excavation program. A long term management strategy of Aboriginal heritage items should be developed in consultation with RAPs and in accordance with Requirement 26 of the Code. This may involve the reburial of artefacts within the study area at a location which will not be impacted on by the future development works. In the event an appropriate reburial location cannot be found, a care and control agreement should be determined in consultation with the RAPs to ensure all parties as satisfied as to the long term care of the Aboriginal artefacts.

Recommendation 5: Cultural Heritage Management Plan

A CHMP should also be prepared outlining requirements for management of existing sites and unexpected finds, site inductions and reporting processes during bulk earthworks and construction phases of development to ensure no Aboriginal sites are impacted during later stages of the project.

Recommendation 5: Stop work provision for any potential heritage sites identified during construction

All Aboriginal places and objects are protected under the NPW Act. This protection extends to Aboriginal objects and places that have not been identified but might be unearthed during construction.

Historical archaeological sites are protected under the relic's provisions (s139 – 146) of the Heritage Act. Should any historical archaeological sites be identified during any phase of the proposed development, all works must cease in the vicinity of the find and the project archaeologist and White Constructions notified. Should the archaeological nature of the find be confirmed, the Heritage NSW will require notification.

Recommendation 6: Stop work provision for any potential discovery of human remains

If any suspected human remains are discovered during any activity works, all activity in the vicinity must cease immediately. The remains must be left in place and protected from harm or damage. The following contingency plan describes the immediate actions that must be taken in instances where human remains or suspected human remains are discovered. Any such discovery at the study area must follow these steps:

1. Discovery: If suspected human remains are discovered all activity in the vicinity must stop to ensure minimal damage is caused to the remains; and the remains must be left in place, and protected from harm or damage.
2. Notification: Once suspected human skeletal remains have been found, the Coroner's Office and the NSW Police must be notified immediately. Following this, and if the human remains are likely to be Aboriginal in origin, the find will be reported to the Aboriginal parties and Heritage NSW. If the find is likely to be non-Aboriginal in origin and more than 100 years in age, the heritage division of NSW will be notified of the find under S146 of the Heritage Act.

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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 : 33490 AV

Client Service ID : 520824

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-5-0159	Tabbagong;Tabbagong 1;	AGD	56	301865	6165336	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Klim Gollan					**Permits**		
52-5-0160	Minnamurra;	AGD	56	301143	6164865	Open site	Valid	Shell : -, Artefact : -	Midden	1473,99329
	Contact	**Recorders**	ASRSYS					**Permits**		
52-5-0162	Minnamurra River;Gainsborough Estate;	AGD	56	302350	6164600	Open site	Valid	Shell : -, Artefact : -	Midden	99329
	Contact	**Recorders**	Rod Wellington					**Permits**		
52-5-0167	Minnamurra;Minnamurra Spit 2;	AGD	56	303260	6166700	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Rod Wellington					**Permits**		
52-5-0168	Minamurra;Minamurra Spit 1;	AGD	56	303490	6166280	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
52-5-0251	Dunmore 1	AGD	56	301540	6166460	Open site	Valid	Artefact : -	Open Camp Site	687,1662,2048
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer					**Permits**		
52-5-0252	Dunmore 2;	AGD	56	301360	6166600	Open site	Valid	Artefact : -	Open Camp Site	1662
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer					**Permits**		
52-5-0253	Dunmore 3	AGD	56	301830	6166930	Open site	Valid	Artefact : -	Open Camp Site	687,1662,2048
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer					**Permits**		
52-5-0254	Dunmore 4;	AGD	56	301480	6167260	Open site	Valid	Artefact : -	Open Camp Site	1662
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer					**Permits**	1519	
52-5-0255	Dunmore 5;	AGD	56	301400	6167110	Open site	Valid	Artefact : -	Open Camp Site	1662
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer					**Permits**	1519	
52-5-0264	Railway Parade;	AGD	56	303300	6161300	Open site	Valid	Shell : -, Artefact : -	Midden	99329
	Contact	**Recorders**	Rod Wellington					**Permits**	353	
52-5-0112	Minnamurra;	AGD	56	302052	6165157	Open site	Valid	Shell : -, Artefact : -	Midden	2048
	Contact	**Recorders**	Kate Sullivan					**Permits**		
52-5-0117	Minnamurra;AFT	GDA	56	301740	6165565	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Kate Sullivan,Mr.Matthew Kelleher,Kelleher Nightingale Consulting Pty Ltd (Generi					**Permits**		
52-5-0195	Werri Beach;Gerringong;	AGD	56	302690	6155270	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	A Anderson					**Permits**		
52-5-0215	Werri Beach Shell Midden;	AGD	56	301680	6153000	Open site	Valid	Shell : -, Artefact : -	Midden	348,98125,98546
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**		
52-5-0216	Werri Beach Open Camp Site;	AGD	56	301420	6153010	Open site	Valid	Artefact : -	Open Camp Site	348,98125,98546
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**	1286	
52-5-0059	Jamberoo;	AGD	56	294847	6164099	Open site	Valid	Stone Arrangement : -	Stone Arrangement	

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	C.S Vale					Permits		
52-5-0065	Minnamurra River;	AGD	56	296025	6164672	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	C.S Vale					Permits		
52-5-0071	Jerrara;Kiama;	AGD	56	299700	6161500	Open site	Valid	Modified Tree (Carved or Scarred) : -	Carved Tree	99329
	Contact	Recorders	David Bell					Permits		
52-5-0072	Minnamurra Glengowrie	AGD	56	301450	6165490	Open site	Valid	Shell : -, Artefact : -	Midden	687,1662,2048
	Contact	Recorders	R.L Black					Permits		
52-5-0235	Tabbogong;	AGD	56	297200	6167000	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	1330
	Contact	Recorders	Kerry Navin					Permits		
52-5-0240	Min 1;	AGD	56	300650	6164660	Open site	Valid	Shell : -, Artefact : -	Midden	1473,99329
	Contact	Recorders	Margrit Koettig					Permits		
52-5-0241	Minnamurra Site 1;	GDA	56	302910	6166310	Open site	Valid	Shell : -, Artefact : -	Midden	1525,104074,104075,104264,104265
	Contact	Recorders	I Lilley,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					Permits	4350,4551	
52-5-0242	Minammurra Site 2;	AGD	56	302900	6165500	Open site	Valid	Shell : -, Artefact : -	Midden	1525
	Contact	Recorders	I Lilley					Permits		
52-5-0243	Green Three"Minnamurra Golf Course";	AGD	56	302900	6165820	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	Recorders	Doctor.Johan Kamminga					Permits		
52-5-0309	EGP 3-33;Minnamurra River 1;Eastern Gas Pipline;	AGD	56	297160	6163570	Open site	Valid	Artefact : -	Open Camp Site	99329
	Contact	Recorders	Kerry Navin,Mr.Kelvin Officer					Permits		
52-5-0329	Werri South	AGD	56	301600	6153050	Open site	Valid	Artefact : -	Open Camp Site	98125
	Contact	Recorders	Doctor.Sue Feary,Mr.Douglas Williams					Permits		
52-5-0416	East Gerringong 1 (EG1)	AGD	56	301500	6152980	Open site	Valid	Artefact : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits	2103	
52-5-0417	PAD 1	AGD	56	301500	6152860	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits	1462,2103	
52-5-0418	Elambra IF1 Duplicate copy of 52-5-0404	AGD	56	300660	6151850	Open site	Valid	Artefact : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits	1466	
52-5-0397	TEST PITTING AREA 15	AGD	56	299550	6164900	Open site	Valid	Artefact : -		99329
	Contact	Recorders	Stuart Huys					Permits		

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-5-0400	TEST PITTING AREA 13	AGD	56	299730	6161500	Open site	Valid	Artefact : -		99329
Contact		Recorders	Stuart Huys					Permits		
52-5-0401	TEST PITTING AREA 10	AGD	56	299660	6152500	Open site	Valid	Artefact : -		102301
Contact		Recorders	Stuart Huys					Permits		
52-5-0411	East Gerringong 1	AGD	56	301500	6152980	Open site	Valid	Artefact : 4		98125
Contact		Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
52-5-0404	ELAMBRA ISOLATED FIND 1	AGD	56	300660	6151850	Open site	Valid	Artefact : -		
Contact		Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits	3239	
52-5-0405	ELAMBRA ISOLATED FIND 2	AGD	56	300440	6151960	Open site	Valid	Artefact : -		
Contact		Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
52-5-0885	Werri Street	GDA	56	301989	6154969	Open site	Valid	Burial : -		
Contact		Recorders	DPIE,Ms.Sarah Robertson					Permits		
52-5-0420	ILC1	AGD	56	299680	6161670	Open site	Valid	Artefact : 11		99329
Contact		Recorders	Mr.Sam Wickman					Permits		
52-5-0517	South Kiama Drive PAD2	AGD	56	302850	6159325	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
Contact	T Russell	Recorders	Austral Archaeology Pty Ltd					Permits		
52-5-0514	Kiama Ramps PAD2	AGD	56	302486	6159224	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
Contact		Recorders	Jim Wheeler					Permits	2655,2765	
52-5-0200	Minnamarra;S.R.A.;Albion Park;	AGD	56	302840	6166930	Open site	Valid	Shell : -, Artefact : -	Midden	
Contact		Recorders	A Anderson					Permits		
52-5-0066	Minnamurra River;	AGD	56	296025	6164672	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
Contact		Recorders	ASRSYS					Permits		
52-5-0624	PASA31 (G2B A12)	GDA	56	297051	6152280	Open site	Valid	Artefact : 16, Potential Archaeological Deposit (PAD) : 1		102301,102302,102303,102640
Contact		Recorders	Mr.Kelvin Officer,Navin Officer Heritage Consultants Pty Ltd					Permits	3233,3397	
52-5-0609	G2B A8 (Omega Lane)	GDA	56	301419	6156624	Open site	Valid	Artefact : 1		
Contact		Recorders	Mr.Kelvin Officer,Navin Officer Heritage Consultants Pty Ltd					Permits	3233	
52-5-0819	Riverside Drive 1	GDA	56	302395	6166973	Open site	Valid	Artefact : 1, Shell : 1		
Contact		Recorders	Mr.Neville Baker,Baker Archaeology Pty Ltd					Permits		

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-5-0832	Jamberoo PAD and AS 1	GDA	56	296800	6163516	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		104169,104170
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Miss.Shannon Smith					**Permits**	4608	
52-5-0526	Minnamurra River Shell Midden 1 (MR 1)	AGD	56	302054	6166338	Open site	Valid	Shell : -, Artefact : -		
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**	2920	
52-5-0668	G2B A30	GDA	56	294368	6152225	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		103057
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	3594	
52-5-0676	G2B A34	GDA	56	295010	6152904	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		103060
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	3594	
52-5-0654	PASA 48	GDA	56	300125	6152866	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102640
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Ms.Sam Harper					**Permits**	3539	
52-5-0655	PASA 49	GDA	56	300446	6152957	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102640,103135
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Ms.Sam Harper					**Permits**	3539,3632	
52-5-0656	G2B A38	GDA	56	296691	6152111	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Ms.Sam Harper					**Permits**		
52-5-0657	G2B 40 (PASA 50)	GDA	56	298290	6152506	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102640,103071,103135
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Ms.Sam Harper					**Permits**	3539,3632	
52-5-0695	G2BA13	GDA	56	294393	6152325	Open site	Partially Destroyed	Conflict : 1		103057
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	3594	
52-5-0682	PASA 42	GDA	56	295484	6152983	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : -		103060,103068
	Contact	**Recorders**	Miss.Deirdre Lewis-Cook					**Permits**	3594	
52-5-0707	PASA 54	GDA	56	300505	6154133	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Mr.Adrian Cressey					**Permits**	3397	
52-5-0708	PASA 55	GDA	56	298068	6152596	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Adrian Cressey					**Permits**	3397	
52-5-0706	PASA 23 (Foxground to Berry)	GDA	56	294368	6152225	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mrs.Nicola Hayes					**Permits**	3594	
52-5-0719	PASA 22	GDA	56	294306	6152065	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		103060
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0720	PASA 24	GDA	56	294393	6152325	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0721	PASA 25	GDA	56	294799	6152771	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		103060
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0722	PASA 26	GDA	56	294870	6152818	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		103060
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0723	PASA 27	GDA	56	295010	6152904	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		103060
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0724	PASA 28	GDA	56	296042	6152861	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		103060
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0725	PASA 29	GDA	56	296506	6152573	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		103060
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0662	G2B A36	GDA	56	296951	6152936	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		103057

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	3594	
52-5-0663	G2B A35	GDA	56	296035	6152845	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		103060
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	3594	
52-5-0664	G2B A33	GDA	56	294870	6152818	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		103057,103060
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	3594	
52-5-0665	G2B A32	GDA	56	294799	6152771	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		103057,103060
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	3594	
52-5-0666	G2B A31	GDA	56	294393	6152325	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		103057
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	3594	
52-5-0697	G2B A13	GDA	56	294393	6152325	Open site	Valid	Conflict : -		103057
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0699	G2B A40	GDA	56	298290	6152506	Open site	Valid	Artefact : 28, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Adrian Cressey					**Permits**		
52-5-0785	G2B A10	GDA	56	297932	6152535	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Adrian Cressey					**Permits**		
52-5-0786	G2B A11	GDA	56	297370	6152389	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Adrian Cressey					**Permits**		
52-5-0911	MBW PAD 3	GDA	56	302975	6166230	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		104264,104265
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**	4551	
52-5-0912	MBW PAD 2	GDA	56	302953	6165955	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		104264,104265
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**	4551	

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-5-0913	MBW PAD 1	GDA	56	302858	6164954	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		104264,104265
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**	4551	
52-5-0907	DLS Boral AFT 1	GDA	56	301970	6166341	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,Ms.Cristany Milicich,Mr.Matthew Kelleher,I					**Permits**		
52-5-0908	DLS Boral AFT 2	GDA	56	302231	6166976	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,Ms.Cristany Milicich					**Permits**		
52-5-0909	DLS Boral AFT 3	GDA	56	302177	6167036	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,Ms.Cristany Milicich					**Permits**		
52-5-0869	James Oates Reserve midden	GDA	56	303744	6165971	Open site	Valid	Shell : -		
	Contact	**Recorders**	Rod Wellington,NPWS - Narooma					**Permits**		
52-5-0350	WKIF1	AGD	56	302100	6160750	Open site	Valid	Artefact : -	Isolated Find	99329
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer					**Permits**		
52-5-0349	North Kiama Cemetery	AGD	56	303050	6162400	Open site	Valid	Burial : -	Burial/s	99329
	Contact	**Recorders**	Illawarra Mercury					**Permits**		
52-5-0382	SPS 685 Werri Creek	AGD	56	301650	6154740	Open site	Valid	Artefact : -		102301
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**		
52-5-0451	MR-IF-1, Kiama	AGD	56	301530	6165440	Open site	Valid	Artefact : 1		
	Contact T Russell	**Recorders**	Jim Kelton					**Permits**		
52-5-0470	South Kiama Drive PAD 2	AGD	56	302850	6159325	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact S Scanlon	**Recorders**	Austral Archaeology Pty Ltd					**Permits**	2584	
52-5-0469	South Kiama Drive PAD 1	AGD	56	302850	6159425	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Austral Archaeology Pty Ltd					**Permits**	2584	
52-5-0566	G2BA3	GDA	56	295376	6153152	Open site	Valid	Artefact : 4		
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0567	G2BA4	GDA	56	296210	6152060	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**		
52-5-0568	G2BA5	GDA	56	297820	6152480	Open site	Valid	Artefact : 2, Potential Archaeological Deposit (PAD) : 1		102301,102302,102640

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233,3397	
52-5-0569	G2BA6	GDA	56	299437	6152979	Open site	Valid	Artefact : 1		102301,102302,102640
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233,3397	
52-5-0570	G2BA7	GDA	56	301296	6155655	Open site	Valid	Artefact : 3, Potential Archaeological Deposit (PAD) : 1		102301,102302,102640
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233,3397	
52-5-0571	PASA 32	GDA	56	297568	6152400	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102301,102302,102640
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233,3397	
52-5-0572	PASA 33	GDA	56	297131	6152335	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102301,102302,102640,103060
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233,3397	
52-5-0573	PASA 34 & 35	GDA	56	299304	6152985	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102301,102302
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233	
52-5-0574	PASA 36	GDA	56	300250	6153265	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102301,102302
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233	
52-5-0575	PASA 37	GDA	56	300750	6154212	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102301,102302,102640
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233,3397	
52-5-0576	PASA 38	GDA	56	301223	6155480	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102301,102302
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233,3397	
52-5-0577	PASA 39	GDA	56	301508	6155480	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102301,102302,102640
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	3233,3397	
52-5-0843	KBH PAD1	GDA	56	304114	6161307	Open site	Valid	Potential Archaeological Deposit (PAD) : -		103851,103852
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Nicola Hayes					**Permits**	4170	

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 33490 AV

Client Service ID : 520824

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-5-0830	Gerringong Upgrade Return Location 1	GDA	56	301207	6155657	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Nicola Hayes					**Permits**		
52-5-0831	Gerringong Upgrade Return Location 2	GDA	56	298346	6152503	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Nicola Hayes					**Permits**		
52-5-0833	Jamberoo PAD and AS 2	GDA	56	296981	6163287	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		104169,104170
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Miss.Shannon Smith					**Permits**	4608	
52-5-0948	GVW-AS-001	GDA	56	297073	6163376	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Kayandel Archaeological Services,Ms.Natalie Stiles					**Permits**		

Report generated by AHIMS Web Service on 16/07/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 294350 - 310350, Northings : 6151400 - 6167400 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 104

Appendix 2 Test excavation results

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
Area 1 **Transect 1**									
1	28/09/2020	A1T1P1	1	0-90	5YR 4/3 reddish brown	Soft clayey sand	5	rootlets	
			2	90-300	5YR 4/3 reddish brown	Soft clayey sand	5	small <10cm gravel, sandstone	
			3	300-400	5YR 4/3 reddish brown	Moderately compacted sandy Clay	5		
2	28/09/2020	A1T1P2	1	0-300	5YR 4/3 reddish brown	Soft clayey loam	5	Rootlets	
			2	300-450	5YR 4/3 reddish brown	Soft clayey sand	5	small <10cm gravel, sandstone	Slightly more clayey than previous context
			3	450-520	5YR 4/3 reddish brown	Moderately compacted clay	5		
3	28/09/2020	A1T1P3	1	0-200	5YR 4/3 reddish brown	Soft clayey loam	5	Rootlets	

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
			2	200-450	5YR 4/3 reddish brown	Soft clayey sand	5	small <10cm gravel, sandstone	Slightly more clayey than previous context
			3	450-500	5YR 4/3 reddish brown	Moderately compacted clay	5		
			1	0-100	5YR 5/3 reddish brown	Moderately compacted loamy sand	5	Rootlets	
4	29/09/2020	A1T1P4	2	100-400	5YR 5/3 reddish brown	Moderately compacted loamy sand	5	Clay nodules	
			3	400-500	5YR 3/4 dark reddish brown	Soft clay	5	clay	
Transect 2									
			1	0-90	5YR 3/3 dark brown	Soft loam	6	grass roots	loose loam, lots of grass roots
1	28/09/2020	A1T2P1	2	90-400	7.5YR 4/6 dark yellowish brown	Moderately compacted clayey loam	6	some sub-angular latite present, small size 10mm, clay content increases with depth	

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
			3	400-490	7.5YR 4/6 dark yellowish brown	Moderately compacted loamy clay	6	large rounded to sub-angular latite cobbles up 100mm in size (30%)	
			4	490-500	7.5YR 4/6 dark yellowish brown	Moderately compacted clay	6	large rounded to sub-angular latite cobbles up 100mm in size (30%)	clay, stopped pit
2	28/09/2020	A1T2P2	1	0-90	5YR 4/3 reddish brown	Soft clayey loam	5	Rootlets	
			2	90-350	5YR 4/3 reddish brown	Soft clayey sand	5	small <10cm gravel, sandstone	Slightly more clayey than previous context
			3	350-450	5YR 4/3 reddish brown	Moderately compacted clay	5		
3	29/09/2020	A1T2P3	1	0-100	5YR 4/3 reddish brown	Soft clayey loam	5	Rootlets	
			2	100-250	5YR 4/3 reddish brown	Soft clayey sand	5	small <10cm gravel, sandstone	

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
			3	250-440	5YR 4/3 reddish brown	Moderately compacted clayey loam	5		
4	29/09/2020	A1T2P3	1	0-340	5YR 5/3 reddish brown	Moderately compacted silty sand	5	rootlet, gravels <10cm	
			2	340-440	5YR 3/4 dark reddish brown	Soft Loamy clay	5	clay	
Area 2 **Transect 1**									
1	29/09/2020	A2T1P1	1	0-100	10YR 4/4 olive brown	Soft sandy loam	7	rootlets	
			2	100-280	5YR 5/3 reddish brown	Moderately compacted loamy clay	6.5	rootlets, small (30mm) ironstone piece	
			3	280-300	7.5YR 5/3 brown	Moderately compacted loamy clay	7		
2	29/09/2020	A2T1P2	1	0-130	7.5YR 4/4 dark yellowish brown	Soft silty loam	5.5	Rootlets	Bioturbation

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
			2	130-280	10YR 6/3 dark yellowish brown	Moderately compacted loamy clay	6	rootlets, 50% latite sub-rounded to angular rocks up to 100mm size.	
			3	280-300	10YR 6/3 dark yellowish brown	Moderately compacted clay		angular latite rocks 50% in clay matrix, up to 100mm in size	
3	29/09/2020	A2T1P3	1	0-240	5YR 4/2 dark reddish grey	Soft sandy loam	5	rootlets, latite boulder, other stones /rubble 5-200mm	
			2	240-250	5YR 4/2 dark reddish grey	Moderately sandy clay	5	clay, frequent natural gravel (up to 200mm)	
Transect 2									
1	29/09/2020	A2T2P1	1	0-150	10YR 4/4 olive brown	Soft sandy loam	7	rootlets	
			2	150-500	5YR 5/3 reddish brown	Moderately compacted loamy clay	6.5	rootlets, small (30mm) ironstone piece	
			3	500-600	7.5YR 5/3 brown	Moderately compacted loamy clay	7	large ironstone pieces (over 30mm)	
2	29/09/2020	A2T2P2	1	0-110	10YR 6/3 dark yellowish brown	Moderately compacted loamy clay	6	Rootlets	

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
			2	110-300	7.5YR 4/4 dark yellowish brown	Soft silty loam	5.5		Bioturbation
			3	300-320	10YR 6/3 dark yellowish brown	Moderately compacted clay	6.5	5cm rocks in north-west corner	
3	29/09/2020	A2T2P3	1	0-100	7.5YR 4/4 dark yellowish brown	Soft silty loam	5.5	Rootlets	bioturbation
			2	100-320	10YR 6/3 dark yellowish brown	Moderately compacted loam clay	6	Rootlets to 200 millimetres	
Area 3 **Transect 1**									
1	1/10/2020	A3T1P1	1	0-100	5YR4/2 dark reddish grey	Soft sandy Loam	5	rootlets	
			2	100-230	5YR 4/2 dark reddish grey	Moderately compacted loamy sand	5	small gravel (approximately 30 mm)	
			3	230-250	5YR 4/2 dark reddish grey	Moderately compacted sandy Clay	5	clay, some gravel up to 100mm	

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
2	1/10/2020	A3T1P2	1	0-100	5YR 4/2 dark reddish grey	Soft sandy Loam	5	rootlets, some gravel	
			2	100-350	5YR 4/2 dark reddish grey	Moderately compacted loamy sand	5	frequent moderate sized gravel (approximately 50 mm)	
			3	350-400	5YR 4/2 dark reddish grey	Moderately compacted sandy Clay	5	clay	
3	1/10/2020	A3T1P3	1	0-240	5YR 4/2 dark reddish grey	Soft sandy loam	5	rootlets, latite boulder, other stones /gravel 5-200mm	
			2	240-250	5YR 4/2 dark reddish grey	Moderately compacted sandy clay	5	clay, frequent natural gravel (up to 200mm)	
Transect 2									
1	1/10/2020	A3T2P1	1	0-110	7.5YR 3/3 dark brown	Soft silty loam	6.5	Rootlets, small <10mm gravel 1%	
			2	110-450	5YR 3/3 dark reddish brown	Moderately compacted silty clay	7	rootlets, 10-100mm gravel 15%	
			3	450-580	5YR 3/3 dark reddish brown	Moderately compacted silty clay	7		

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
			4	580-580	5YR 3/3 dark reddish brown	Moderately compacted clay	7	10-100mm gravel 10%	Light clay. stopped at this context
2	1/10/2020	A3T1P2	1	0-150	5YR 4/2 dark reddish grey	Soft sandy loam	5	rootlets, some natural rubble average up to 50mm, one boulder 240mm	
			2	130-320	5YR 4/2 dark reddish grey	Moderately compacted sandy loam	5	frequent moderate sized gravel (approximately 5 cm)	
			3	320-500	5YR 4/2 dark reddish grey	Moderately compacted sandy clay	5	clay, natural rubble (5-100mm)	diffused into clay, stopped at this context
3	1/10/2020	A3T2P3	1	0-180	5YR 4/2 dark reddish grey	Soft sandy loam	5	rootlets, some natural rubble up tp 150mm	
			2	180-350	5YR 4/2 dark reddish grey	Moderately compacted loamy sand	5	frequent moderate sized gravel (approximately 5 cm)	
			3	350-480	5YR 4/2 dark reddish grey	Moderately compacted sandy clay	5	clay, natural gravel (5-100mm	
			4	480-500	5YR3/3 dark reddish brown	Moderately compacted clay	5	10-100mm gravel 10%	Light clay

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
4	1/10/2020	A3T2P4	1	0-240	5YR 4/2 dark reddish grey	Soft sandy loam	5	rootlets, latite boulders, gravel	
			2	240-250	5YR 4/2 dark reddish grey	Moderately compacted sandy clay	5	clay, natural ironstone 5-100mm	
Transect 3									
1	1/10/2020	A3T3P1	1	0-90	2.5YR 3/2 dark olive grey	Soft silty loam	6	rootlets, small <10mm gravel 1%	
			2	90-460	2.5YR 3/4 dark olive	Moderately compacted silty loam	6.5	rootlets, small <10mm gravel 1%	
			3	460-680	5YR 6/3 light brown	Moderately compacted clay	7	rootlets, 10-100mm gravel 15%	
			4	680-680	5YR 3/3 dark brown	Moderately compacted clay	7	10-100mm gravel 10%	Light clay
2	1/10/2020	A3T3P2	1	0-150	2.5YR 3/2 dark olive grey	Soft silty loam	6	rootlets, small <10mm gravel 1%	
			2	150-380	5YR 6/3 light brown	Moderately compacted silty clay	7	rootlets, 10-100mm gravel 15%	
			3	380-400	5YR 3/3 dark brown	Moderately compacted clay	7	10-100mm gravel 10%	

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
3	1/10/2020	A3T3P3	1	0-100	2.5YR 3/2 dark olive grey	Soft silty loam	6	rootlets, small <10mm gravel 1%	
			2	100-440	5YR 6/3 light brown	Moderately compacted silty clay	7	rootlets, 10-100mm gravel 15%	
			3	440-450	5YR 3/3 dark brown	Moderately compacted clay	7	10-100mm gravel 10%	Light clay
4	1/10/2020	A3T3P4	1	0-100	2.5YR 3/2 dark olive grey	Soft silty loam	6	rootlets, small <10mm gravel 1%	
			2	100-300	2.5YR 3/4 dark reddish brown	Moderately compacted silty clay	6.5	rootlets, small <50mm gravel 1%	
			3	300-360	5YR 6/3 light brown	Moderately compacted clay	7	rootlets, 10-100mm gravel 15%	
Transect 4									
1	1/10/2020	A3T4P1	1	0-80	2.5YR 3/2 dark olive grey	Soft silty loam	6	rootlets, small <10mm gravel 1%	
			2	80-300	2.5YR 3/4 dark reddish brown	Moderately compacted silty loam	6.5	rootlets, small <10mm gravel 1%	

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
			3	300-460	5YR 6/3 light brown	Moderately compacted silty clay	7	rootlets, 10-120mm gravel 15%	
Area 4 **Transect 1**									
1	2/10/2020	A4T1P1	1	0-50	7.5YR 6/1 grey	Soft silty sand	6	rootlets	thin surface layer
			2	50-730	7.5YR 6/1 grey	Soft silty sand	6	pebbles measuring 5-25cm few large boulders were approximately 30cm	River cobbles throughout context
2	2/10/2020	A4T1P1	1	0-150	2.5YR 4/3 reddish brown	Soft silty sand	6	rootlets	
			2	150-480	2.5YR 3/3 dark reddish brown	Soft Sandy loam	6	small 5cm rocks	compaction increases with depth
Area 5 **Transect 1**									
1	2/10/2020	A5T1P1	1	0-110	7.5YR 3/2 dark brown	Soft silty loam	6.5	rootlets	
			2	110-390	10YR 3/2 very dark greyish brown	Hard sandy clay	6	iron stone ~10% up to 20mm	

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
			3	390-450	2.5Y 3/1 very dark grey	Moderately compacted sandy clay	6	iron stone up to 25mm, ~5%	
2	2/10/2020	A5T1P1	1	0-120	7.5YR 3/2 dark brown	Soft silty loam	6.5	Rootlets	
			2	120-270	10YR 3/2 very dark greyish brown	Moderately compacted silty sand	6.5	iron stone frequent ~20% up to 20mm	clear horizon from 1, diffuse going into 3
			3	270-300	2.5Y 3/1 very dark grey	Hard sandy clay	6	iron stone up to 25mm, ~10&	gets more clayey the further down it goes, stopped at clay
3	2/10/2020	A5T1P3	1	0-150	7.5YR 3/2 dark brown	Soft silty loam	6.5	Rootlets	
			2	150-230	10YR 3/2 very dark greyish brown	Moderately compacted silty sand	6	iron stone frequent ~20% up to 20mm	clear horizon from 1, diffuse going into 3
			3	390-450	2.5Y 3/1 very dark grey	Hard sandy clay	6	iron stone up to 25mm, ~5%	gets more clayey the further down it goes, stopped at clay, uneven at base

Test Pit Number	Date excavated	Location	Context Layer	Context layer thickness (mm)	Munsell soil colour	Soil description	pH	Inclusions	Notes
Transect 2									
1	2/10/2020	A5T2P1	1	0-110	7.5YR 3/2 dark brown	Soft silty loam	6.5	Rootlets	
			2	110-290	10YR 3/2 very dark greyish brown	Moderately compacted silty sand	6.5	iron stone ~10% up to 20mm	
			3	290-390	10YR 3/2 very dark greyish brown	Hard sandy clay	6	iron stone up to 25mm, ~10&	gets more clayey the further down it goes, stopped at clay
Transect 3									
1	2/10/2020	A5T3P1	1	0-150	2.5Y 3/1 dark reddish brown	Soft silty loam	6.5	Rootlets	
			2	150-230	10YR 3/2 very dark greyish brown	Moderately compacted silty sand	6.5	iron stone ~10% up to 20mm	
			3	230-250	2.5Y 3/1 dark reddish brown	Hard sandy clay	6	iron stone up to 25mm, ~10	

ID No.	Area	Transect	Pit	Spit	Type	Raw material	Cortex (%)	Platform type	Platform width (mm)	Platform depth (mm)	Termination	Retouch type	Retouch location	Length (mm)	Width (mm)	Thickness (mm)	Tool type	Comments
1	1	1	1	2	Angular Fragment	Quartz	None					None	None					
2	1	1	4	2	Flake - Proximal	Chert	None	Flaked	12.02	7.82		None	None	26.91	17.44	5.36		
3	1	2	2	2	Flake - Proximal	Silcrete	None	Crushed				None	None	7.56	8.06	1.8		
4	2	2	1	2	Flake - Left Longitudinal Split	Chert	None	Crushed			Feather	None	None	8.82	5.17	1.33		
5	3	2	2	wall clean	Angular Fragment	Mudstone	1-32%					None	None					unsure if artefact
6	3	2	2	2	Angular Fragment	Chert	1-32%					None	None					
7	3	3	1	3	Flake - Distal	Silcrete	None				Feather	None	None	13.91	8.66	2.99		ochre also in this spit
8	4	1	2	2	Flake - Complete	Chert	None	Flaked	5.87	2.71	Feather	None	None	15.88	11.9	4.12		
9	4	1	2	2	Flake - Distal	Chert	None				Hinge	None	None	12.66	7.56	3.81		
10	5	1	1	1	Flake - Complete	Mudstone	None	Flaked	12.22	7.12	Feather	None	None	33.15	18.02	8.27		
11	5	1	1	2	Flake - Complete	Quartz	None	Crushed			Feather	None	None	12.51	11.52	2.28		
12	5	1	1	2	Flake - Complete	Crystal Quartz	None	Crushed			Feather	None	None	10.62	6.62	0.88		
13	5	1	1	3	Angular Fragment	Chert	None					None	None					
14	5	1	1	5	Flake - Complete	Silcrete	None	Flaked	3.89	0.52	Feather	None	None	6.71	13.83	1.78		

15	5	1	1	5	Flake - Distal	Silcrete	None				Feather	None	None	20.44	10.65	3.93		
16	5	1	1	5	Angular Fragment	Quartz	None					None	None					