Tallawarra Lands North Precinct: Archaeological report

FINAL REPORT

Prepared for Cardno on behalf of Bridgehill Group

24 June 2020

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Document information

Report to:	Cardno on behalf of Bridgehill Group
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Biosis project no.:	30437
File name:	30437.Tallawarra.North.AR.FIN01.20200624.docx

Citation: Biosis 2020. Tallawarra Lands North Precinct: Archaeological report. Report for Cardno. S Keats & M Smith, Biosis Pty Ltd, Wollongong. Project no 30437.

LGA:	Wollongong

Document control

Version	Internal reviewer	Date issued	Issued by
Draft 01	Amanda Markham	21/10/2019	Biosis
Final 01	Samantha Keats	22/11/2019	Biosis
Draft 02	Taryn Gooley	18/05/2020	Biosis
Final 02	Samantha Keats	23/06/2020	Biosis

Acknowledgements

Biosis gratefully acknowledges the contributions of the following people and organisations in preparing this report:

Registered Aboriginal Parties

- Illawarra Local Aboriginal Land Council (ILALC).
- Warra Bingi Nunda Gurri.
- Woronora Plateau Gundangara Elders Council.
- Guunamaa Dreaming and Sites Surveying.
- James Davis.
- Duncan Falk Consultancy.
- Gumaraa.
- Yerramurra (Murrin Clan/Peoples).
- Barraby Cultural Services.
- Yurrandaali Cultural Services.
- Yulay Cultural Services.
- Paul James McLeod.
- Murra Bidgee Mullangari Aboriginal Corporation.
- Muragadi.
- Leanne Tungai.
- South Coast Peoples.
- Tungai Tonghi.
- Shaun Carroll.

Government Departments

- Environment, Energy and Science Group (EES).
- National Native Title Tribunal (NNTT).
- Wollongong City Council (WCC).
- South East Local Land Services (LLS).
- Office of the Registrar Aboriginal Land Rights Act.

Client

- Cardno on behalf of Bridgehill Group.

Biosis

- Sonika Kumar, Lauren Harley, Lucy Wilson and Anne Murray for mapping.

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Glossary

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
Consultation requirements	Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
CBD	Central Business District
CHMP	Cultural Heritage Management Plan
DA	Determining Authority
DECCW	Department of Environment, Climate Change and Water
DP	Deposited Plan
EES	Environment, Energy and Science Group
EP&A Act	*Environmental Planning and Assessment Act 1979*
GDA	Geocentric Datum of Australia
GPS	Global Positioning System
GSV	Ground Surface Visibility
ILALC	Illawarra Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
MGA	Map Grid of Australia
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NTSCORP	Native Title Services Corporation
OEH	Office of Environment and Heritage (now EES)
PAD	Potential Archaeological Deposit
Study area	Defined as Lot 30 DP 1175058 and part Lot 31 DP 1175058
RAP	Registered Aboriginal Party
The code	Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW

Summary

Biosis Pty Ltd (Biosis) was commissioned by Cardno on behalf of Bridgehill Group to undertake an Aboriginal Cultural Heritage Assessment (ACHA) and archaeological report (AR) (this report) of a proposed development at Tallawarra (Northern Precinct), Yallah New South Wales (NSW). Bridgehill Group have acquired some of the Tallawarra Lands in the Northern and Central Precincts from Energy Australia, and intend to develop new residential communities on those lands.

The purpose of this assessment is to support a modification to the existing concept approval for the Tallawarra Lands Project (MP 09_0131 MOD 1) and to support an application for the proposed electrical transmission relocation in the Northern Precinct. The application for the development and the easement will require approvals under the *National Parks and Wildlife Act 1974* (NPW Act) in the form of an AHIP once the concept modification has been approved. The boundary of the study area has been modified since the previous assessment undertaken by Biosis (2017) to include the electrical transmission easement. An assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) (the due diligence code) has been undertaken for this additional area and is included in Appendix 7 of the ACHA.

This AR covers the Northern Precinct (the study area), and aims to determine whether the proposed modification will have any additional impacts on Aboriginal cultural values. The study area is located within the Tallawarra North Precinct, Yallah NSW. It includes Lot 30 DP 1175058 and part Lot 31 DP 1175058, and is approximately 12 kilometres south west of Wollongong central business district (CBD). It encompasses 45.06 hectares of private land and the adjacent road reserves.

This report has responded to Section 6.10.1 Aboriginal Cultural Heritage of the *Tallawarra Lands, Yallah: Request for Secretary's Environmental Assessment Requirements* (Urbis 2016) to:

- Confirm the location of archaeological sites relative to the proposed expanded areas.
- Consultation with relevant stakeholders prior to preparation of the EIS.
- Identify the nature and extent of impacts on Aboriginal and cultural heritage values across the project area.
- Provide the actions that will be taken to avoid or mitigate impacts of the project or Aboriginal cultural heritage values.

SEARs Item	Response
12. Aboriginal Cultural Heritage **Aboriginal Cultural Heritage Assessment in accordance with *the Guide to investigating Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW 2011) and *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW)**	This report has been conducted in accordance with the *Guide to Investigating Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). This report supports the Aboriginal cultural heritage assessment, which has been conducted in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW). Consultation with Registered Aboriginal Parties is currently underway.

There are 107 Aboriginal cultural heritage sites registered with the Aboriginal Heritage Information Management System (AHIMS) register in a three square kilometre area around the study area. Ten Aboriginal Heritage Information Management System (AHIMS) sites are located within the study area and one within 10 metres of the study area boundary.

A field investigation consisting of an archaeological survey was conducted on 29 June 2017. 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 combined with a low amount of exposures. No previously unrecorded Aboriginal cultural heritage sites were identified during the field investigation. One area of moderate archaeological sensitivity was identified. There is potential for development activities to impact Aboriginal sites and the area of archaeological sensitivity.

Test excavations were conducted between 2 and 18 March 2020. A total of 141 test pits were excavated within areas of moderate potential and within the vicinity of AHIMS 52-5-0223/Boomberry Point 1, AHIMS 52-5-0225/ Elizabeth Point, AHIMS 52-5-0643/Gilba Road 2 Fill 1 and AHIMS 52-5-0642/Gilba Road 1. A total of 17 artefacts were identified during the test excavations and a further seven Aboriginal sites identified, which includes AHIMS 52-5-0956/Tallawarra PAD 1, AHIMS 52-5-0955/Tallawarra PAD 2, AHIMS 52-5-0957/Gilba Road 3, AHIMS 52-5-0958/Gilba Road 4, AHIMS 52-5-0959/Gilba Road 5, AHIMS 52-5-0960/Gilba Road 6 and AHIMS 52-5-0954/Tallawarra IOS 1.

This assessment has concluded that the proposed modification and subsequent development will have impacts on 11 AHIMS sites within the study area.

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:
  - Ethos of the Australia International Council on Monuments and Sites (ICOMOS) Burra Charter
  - *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (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: Aboriginal Cultural Heritage Management Plan (CHMP)

An Aboriginal Cultural Heritage Management Plan (CHMP) should be developed in consultation with Registered Aboriginal Party (RAPs) and Environment, Energy and Science Group (EES). The CHMP will facilitate the implementation of the management and mitigation strategies for all sites located within the study area by clearly outlining Aboriginal site management requirements including the management of unexpected finds.

Recommendation 2: Application for an Aboriginal Heritage Impact Permit

Biosis understands that Department of Planning, Industry and Environment (DPIE) have requested a CHMP be developed for this project; however, prior to the construction stages it is recommended that the proponent apply to EES for an Aboriginal Heritage Impact Permit (AHIP) to destroy the listed Aboriginal sites within the study area which are currently protected under the NPW Act.

Recommendation 3: Continued consultation with the registered Aboriginal parties

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

Recommendation 4: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to disturb an Aboriginal site without a consent permit issued by the EES or the Department of Planning Infrastructure and Environment (DPIE). Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying the EES and RAPs.

Recommendation 5: Discovery of Aboriginal Ancestral Remains

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

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

1 Introduction

1.1 Project background

Biosis was commissioned by Cardno on behalf of Bridgehill Group to undertake an ACHA for the proposed Northern Precinct at Tallawarra, Yallah NSW. The purpose of this assessment is to support an application for the proposed electrical transmission relocation in the Northern Precinct and to modify the existing concept approval for the Tallawarra Lands Project (MP 09_0131 MOD 1) to allow an increased residential lot yield.

A previous Aboriginal archaeological assessment for the Tallawarra Lands Part 3A Concept Plan (MP 09_0131) was conducted by Biosis in 2010. The previous assessment consisted of an Aboriginal archaeological survey, Aboriginal community consultation, and Aboriginal archaeological test excavations (Biosis Research 2010). An impact assessment conducted as part of the 2010 assessment concluded that two Aboriginal archaeological sites, AHIMS 52-5-0223/Boomberry Point 1 and AHIMS 52-5-0225/ Elizabeth Point, would be impacted by the proposed development.

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.

The *Environmental Planning and Assessment Act 1979* (EP&A Act) includes provisions for local government authorities to consider environmental impacts in land-use planning and decision making. Each Local Government Area (LGA) is required to create and maintain a Local Environmental Plan (LEP) that includes Aboriginal and historical heritage items. Local Councils identify items that are of significance within their LGA, and these items are listed on heritage schedules in the local LEP and are protected under the EP&A Act and *Heritage Act 1977.*

1.2 Study area

The study area is located within the Tallawarra North Precinct, Yallah NSW. It includes Lot 30 DP 1175058 and part Lot 31 DP 1175058, and is approximately 12 kilometres south west of Wollongong CBD (Figure 1). The study area encompasses 45.06 hectares of private land and the adjacent road reserves (Figure 2).

The study area is within the:

- Wollongong LGA.
- Parish of Calderwood.
- County of Camden.

The study area is bounded by Lake Illawarra to the east, the suburb of Koonawarra to the north, Energy Australia Tallawarra Power Station to the south, and rural land to the west.

1.3 Planning approvals

The proposed modification will be assessed against Part 3A section 75W of the EP&A Act. The DA will be assessed under Part 4 of the EP&A Act.

Other relevant legislation and planning instruments that will inform this assessment include:

- Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999.*
- NPW Act.
- NSW *National Parks and Wildlife Amendment Act 2010.*
- Infrastructure State Environmental Planning Policy 2007.
- Wollongong Development Control Plan 2009.

1.4 Objectives of the investigation

The purpose of this assessment is to determine if the proposed modification will impact on any additional areas of archaeological sensitivity or Aboriginal sites or objects.

The objectives of the investigation can be summarised as follows:

- To conduct additional background research in order to recognise any identifiable trends in site distribution and location.
- To search statutory and non-statutory registers and planning instruments to identify listed Aboriginal cultural heritage sites within the study area.
- To highlight environmental information considered relevant to past Aboriginal occupation of the locality and associated land use and the identification and integrity/preservation of Aboriginal sites.
- To summarise past Aboriginal occupation in the locality of the study area using ethnohistory and the archaeological record.
- To formulate a model to broadly predict the type and character of Aboriginal sites likely to exist throughout the study area, their location, frequency and integrity.
- To conduct a field survey of the study area to locate unrecorded or previously recorded Aboriginal sites and to further assess the archaeological potential of the study area.
- To assess the significance of any known Aboriginal sites in consultation with the Aboriginal community.
- To identify the impacts of the proposed development on any known or potential Aboriginal sites within the study area.
- To recommend strategies for the management of Aboriginal cultural heritage within the context of the proposed development.

1.5 Investigators and contributors

The roles, previous experience and qualifications of the Biosis project team involved in the preparation of this archaeological report are described below in Table 1.

Table 1 Investigators and contributors

Name and qualifications	Experience summary	Project role
Taryn Gooley **BA /Sci (Hons) Archaeology**	Taryn is a consultant archaeologist with 10 years' experience across south eastern NSW and Western Australia. Taryn has experience in the successful	• Project director • Quality assurance

Name and qualifications	Experience summary	Project role
	completion of ACHA's archaeological surveys, test excavations, and salvage excavations, as well as Aboriginal community consultation. She is also accomplished in obtaining approvals under the NPW Act.	
Samantha Keats BA (Hons)	Samantha is a consultant archaeologist with Biosis Wollongong office. Samantha has over five years of experience as an archaeologist, with a particular research focus on rock art assemblages and ochre in the north-west Kimberley region of Australia. Samantha has experience in the successful completion of ACHA's, archaeological surveys, test excavations, and salvage excavations, as well as Aboriginal community consultation. She is also accomplished in obtaining approvals under the NPW Act.	• Project manager • Report writing • Background research • Aboriginal community consultation
Mathew Smith BA/BSc (Hons) Archaeology	Mathew is an archaeologist with Biosis Wollongong office. Mathew has over four years of experience as an archaeologist, and specialises in lithics analysis. In addition to this, Mathew has well developed skills in archaeological survey and test excavation, as well as Aboriginal community consultation and background research.	• Lithics analysis • Report writing

Figure 1 Location of the study area - Tallawarra North Precinct

Matter: 30437
Date: 21 October 2019,
Checked by: SJK, Drawn by: LW, Last edited by: amurray
Location:P:\30400s\30437\Mapping\

0 250 500 750 1,000
Metres
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Scale 1:25,000 @ A4, GDA 1994 NSW Lambert

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Legend

Study area

Figure 2 Study area detail

0 50 100 150 200

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

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30437_ACHA_AR_F2_StudyArea

2 Proposed development

The development of the Northern Precinct will comprise residential, open space and associated civil works (Figure 3). The modification to the concept approval seeks to increase the footprint and residential yield for the Northern Precinct from 310 lots to 403 lots. Currently approved components of the concept plan for the Northern Precinct include:

- Approximately 403 residential lots (22.3 hectares).
- Environmental management areas in the vicinity of Mount Brown.
- Open space areas on the foreshore of Lake Illawarra (87 hectares).
- The Northshore Precinct has existing vehicular access via Gilba Road.

The following amendments are proposed to the Concept Plan for the Northern Precinct:

- Reduce the existing transmission easement width to accommodate a 15 metre wide corridor for underground transmission lines beneath a proposed road.
- Expand the R2 zone (for low density residential land) south east into the E1 Public Recreation lands.
- Expand the R2 Zone (for low density residential use) south into the E3 Environmental Management up to the ridge.
- The composition of lots has been altered from the Concept Plan, with a new indicative layout that includes lots down to 300m2 and 12.5 metres frontages, where suited to the topography of the site.

Legend

Study area

Proposed development

Figure 3 Proposed development

0 50 100 150 200

Metres

Scale: 1:4,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

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3 Desktop assessment

The desktop assessment involves researching and reviewing existing archaeological studies and reports relevant to the study area and Lake Illawarra 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 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 Geology, topography and hydrology

The Illawarra region forms part of the Sydney Basin; a geological basin filled with near horizontal sandstones and shales of Permian to Triassic age overlying older basement rocks of the Lachlan Fold Belt. The Illawarra subregion of the Sydney Basin is characterised by Permian siltstones, shale, sandstones and interbedded volcanics on and below the coastal escarpment. The geology of the region provides useful stone resources for toolmaking, included volcanic rocks useful for manufacture of edge ground axes. The study area is dominated by the Broughton Formation geological unit (Figure 4).

The study area is situated on the Coastal Plain on the edge of Lake Illawarra and the Escarpment (Figure 6). This physiographic unit has formed from the gradual recession westward of the Plateau (Bowman 1971). The Coastal Plain is characterised as a mosaic of foothills, ridges, spurs, hillocks and floodplains with slopes varying from very gently inclined to steep with the occasional low cliff. It is dissected by easterly flowing streams at intervals that become more frequent towards the north (Fuller 1982, p.18). The Coastal Plain is widest at the points where the Macquarie Rivulet has entrenched into the Plateau at Macquarie Pass and where other waterways that provide the catchment area of Lake Illawarra, such as Duck and Wollingurry Creek systems, have carved into the Escarpment (Bowman 1971).

Situated on the western shore of Lake Illawarra, the study area extends from Koonawarra to Yallah bays (from north to south). Lake Illawarra was formed from the drowning of the Macquarie Rivulet valley during the raising of Holocene sea levels (6-7,000 years ago); the estuary was subsequently formed behind the large sand barrier that now forms the Windang Peninsula. Lake Illawarra is the largest estuarine lagoon on the South Coast of NSW, covering an area of 33 square kilometres and extending over nine kilometres in length and five kilometres in width. It receives salt water from the Pacific Ocean and fresh water from the Illawarra Escarpment (Roy 1984). Lake Illawarra is classified as an early Intermediate Barrier Estuary or an estuarine lagoon. Barrier estuaries are characterised by 'narrow elongated entrance channels with broad tidal and back barrier sand flats' (Roy 1984, p.5).

The proximity to Lake Illawarra would have provided abundant food resources and is likely to result in the presence of Aboriginal sites, such as middens, in the vicinity of the study area.

3.1.2 Climate

The climate within the study area is generally temperate with a maritime influence. Summers in the coastal regions are generally warm, while winters are mild. In the escarpment areas to the west, winters are cold. Moderate to high temperatures, high humidity, onshore winds and peak rainfall characterise summer and autumn (Hazelton 1992). One third of the mean annual rainfall occurs between January and March, with a secondary rainfall peak in June. Winter winds are predominantly westerly, producing drier, cooler conditions.

3.1.3 Soil landscapes

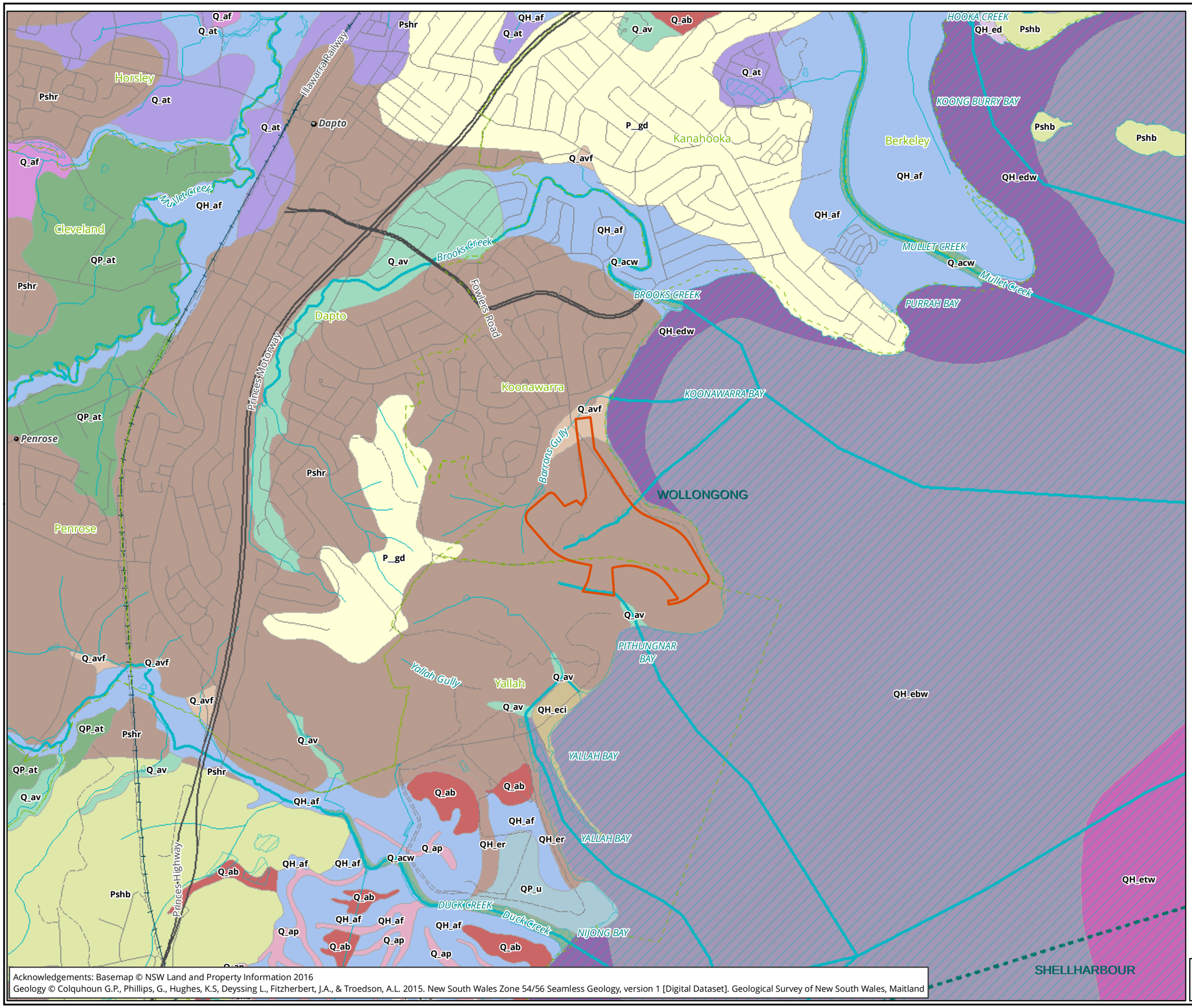
Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. Because they are defined by a combination of soils, topography, vegetation and weathering conditions, soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure. The study area contains one erosional soil landscape called the Shellharbour soil landscape (Figure 5). Erosional soil landscapes comprise soils that are derived from the erosive action of running water, primarily well-defined streams that have the ability to transport their sediment load. Soils may be either absent, derived from water-washed parent materials, or derived from *in situ* weathered bedrock.

The characteristics of the Shellharbour soil landscape are summarised in Table 2.

Table 2 Shellharbour soil landscape characteristics (Hazelton 1992, pp.58–60)

Soil landscape	Topography	Soils
Shellharbour	Rolling low hills with long side slopes and broad drainage lines. Relief 30-50 metres. Slopes <20% incline.	Crests and upper slopes: Hard setting black rich clays overlying <100 cm of brown strongly pedal heavy clay. Mid slopes: Up to 20 cm of brownish black sandy loam overlies <50 cm of strongly pedal reddish brown sandy clay. 50 cm of mottled reddish brown sandy clay overlies <50 cm of brown strongly pedal heavy clay. Foot slopes and drainage plains: Up to 40 cm of reddish brown sandy clay overlies >50 cm of strongly pedal brown heavy clay.

The Shellharbour soil landscape has a high to very high erodibility rating. It would therefore be susceptible to frequent soil movement. This would result in poor preservation of archaeological material at shallow depths but would potentially lead to exposures of any deeper archaeological deposits were topsoil has eroded away.



Legend

Study area

Geological units

- P__gd - Dapto Latite Member
- Pshb - Berry Siltstone
- Pshr - Broughton Formation
- Q_ab - Alluvial backswamp deposits
- Q_acw - Alluvial channel deposits-
- Q_af - Alluvial floodplain deposits
- Q_ap - Alluvial palaeochannel deposits
- Q_at - Alluvial terrace deposits
- Q_av - Alluvial valley deposits
- Q_avf - Alluvial fan deposits
- QH_af - Alluvial floodplain deposits
- QH_ebw - Estuarine basin and bay (subaqueous)
- QH_eci - Estuarine in-channel bar and beach deposits
- QH_ed - Estuarine- fluvial delta front
- QH_edw - Estuarine- fluvial delta front (subaqueous)
- QH_er - Estuarine shoreline ridge and dune
- QH_etw - Estuarine tidal delta flat (subaqueous)
- QP_at - Alluvial terrace deposits
- QP_u - Pleistocene undifferentiated regolith

Figure 4 Geology within the study area vicinity

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

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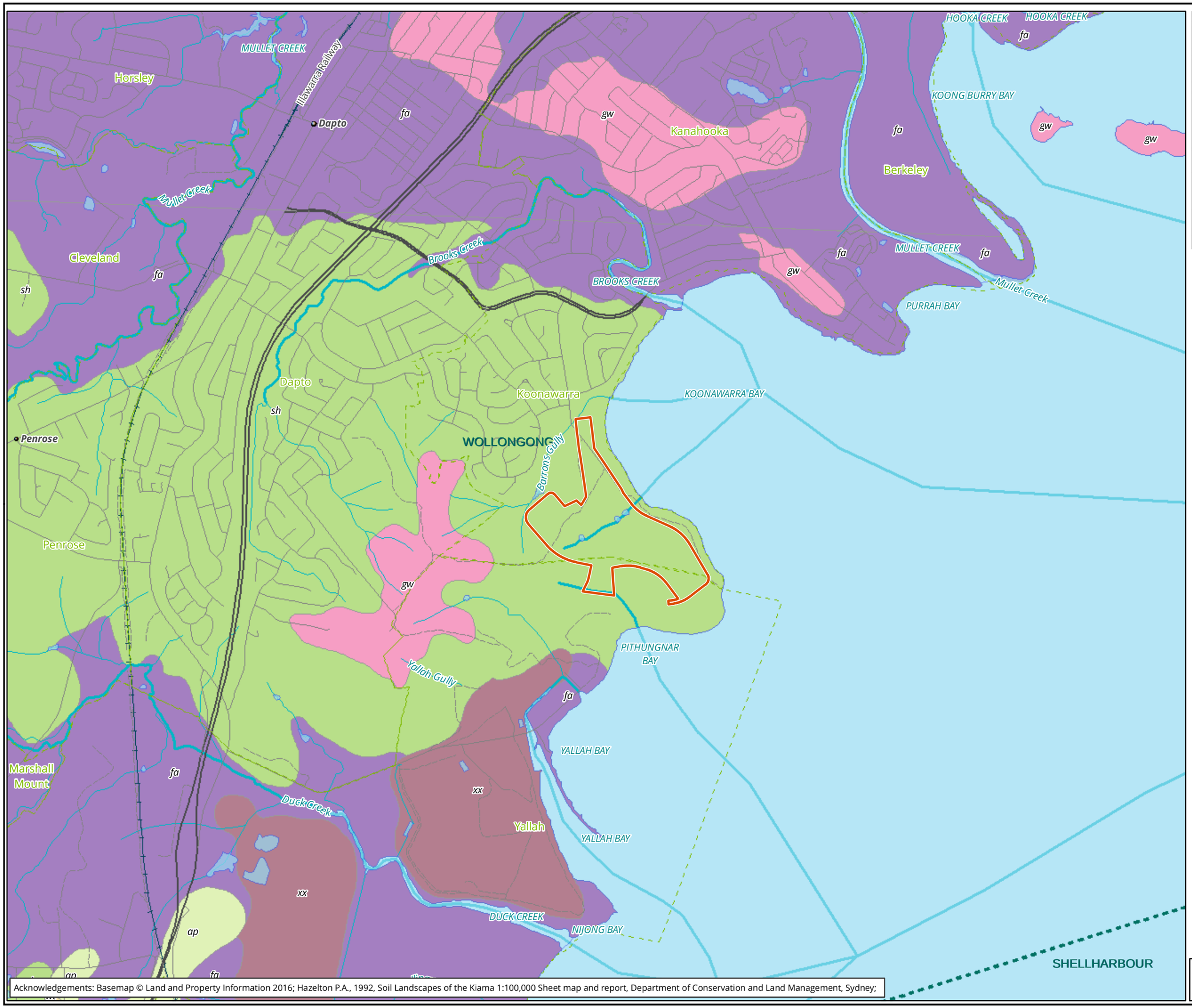

Legend

Study area

Soil landscape units

- ap - ALBION PARK
- fa - FAIRY MEADOW
- gw - GWYNNEVILLE
- sh - SHELLHARBOUR
- wt - WATTAMOLLA ROAD
- xx - DISTURBED TERRAIN

Figure 5 Soil landscapes (1:100,000) within the study area

0 200 400 600 800 1,000

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

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Date: 21 October 2019,
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30437_AR_F5_Soils

Legend

Study area

Landforms

Creekline

Crest

Hill slope

Figure 6 Landforms within the study area

0 50 100 150 200

Metres

Scale: 1:4,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

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Location:P:\30400s\30437\Mapping
30437_AR_F6_Landforms

Acknowledgements: Basemap © Land and Property Information 2016

3.1.4 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. Quartz is the main stone raw-material type suitable for Aboriginal tool manufacture that is likely to occur in the vicinity of the study area in any abundance. This would have been available locally and also from trading with other groups (Donlon & Sefton 1988, p.23). Igneous material would have come from the south of the study area in areas like Gerringong (Donlon & Sefton 1988, p.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.

Aerial imagery and vegetation mapping undertaken by the National parks and Wildlife Service (NPWS) shows that the study area has been cleared of native vegetation; however, native vegetation communities in the vicinity of the study area and around Lake Illawarra would have been comparable to vegetation found in the study area prior to clearing. These vegetation communities include:

- Lowland Woollybutt–Melaleuca Forest located on flat low-lying Shoalhaven Group sediments at elevations between 10 and 35 metres above sea level. It is characterised by the presence of Woolybutt (*Eucalyptus longifolia*), Stringybark (*E. globoidea/E. eugenioides*), and Honey Myrtle (*Melaleuca decora).*
- Coastal Swamp Oak Forest occurring in estuarine environment that include low-lying areas of coastal floodplain and the fringes of lakes and lagoons. Common and abundant species that occur include Swamp Oak (*Casuarina glauca*), Common Reed (*Phragmites australis*), and various sedges.

A number of these plant species would have been used by Aboriginal groups to make various wooden implements. Wood from the Swamp Oak was used to make tools such as nulla nullas, while the bark was removed and made into canoe hulls (Robinson 1991, p.152).

Local Aboriginal groups would have had access to an abundant range of marine, terrestrial and avian species present in the coastal resource zone which would have provided a variety of uses. Marine animals such as cockles, lobster and periwinkles were eaten (Wesson 2009). Abalone and stingrays were also used to make fish hooks and tools in addition to their use as a food source (Wesson & New South Wales Government Office of Environment and Heritage 2009). Terrestrial species on the coastal plain, such as kangaroos, possums and wombats would have been exploited for food and to make cloaks, and tools (Attenbrow 2010). Avian species were used as a food source, and in the case of the pelican and black duck were often totem animals for Aboriginal groups (Wesson 2009).

3.1.5 Land use history

Within the study area, soil disturbance is associated with historic pastoral land-use practices and recreational usage. The entire area between Koonawarra and Yallah bays have been subjected to extensive grazing and agricultural practices from the 1880s onwards. As well as vegetation clearing for pasture and agriculture, other land disturbances within the property include construction of the high voltage transmission lines and towers; recreational usage resulting in impact trails particularly by trail bikes and pedestrian traffic in the low lying areas along the foreshore.

Although these past land activities caused disturbances, they may have impacted only the surface contexts of any existing Aboriginal archaeological site; it is unlikely that they would have destroyed sites. Clearing of the land would have most likely removed any native culturally modified trees that were originally present in the study area.

3.2 Previous archaeological work

The majority of NSW South Coast sites date to the last 6,000 years when the sea-level stabilised following the last ice age. Prior to this, sea-levels were lower and the coastline was located approximately 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-aged Aboriginal sites on the South Coast include Bass Point, dated at 17,010+/-650 BP (ANU-536) (Bowdler 1970, p.254) and Burrill Lake rock shelter, dated at 20,830+/-810 BP (ANU-138) (Lampert 1971, p.122). Test excavations undertaken at the Wollingurry Point midden located to the south of the study area, dated the site to 3360 +/- 90 years BP (Navin Officer 1987, p.104).

3.2.1 Regional overview

Several studies of site patterns and distribution have been completed for the Illawarra and South Coast region. (Figure 7).

Sefton's (1984) study formed part of the Local Environmental Study prior to the Stage 1 of the West Dapto Release Area (WDRA) development in Horsley, north of the study area. A copy of the Sefton's report could not be obtained, but the review was revised from the AMBS study (2006).

The following key elements constitute Sefton's site predictive model of the WDRA:

- Archaeological sites at Bass Point provide evidence of Pleistocene occupation, and there is no evidence to suggest West Dapto could not have been occupied at this time.
- It is possible that stratified occupational deposit could be located in the Pleistocene sediments of the flood plains at West Dapto. Stratified occupational deposit of Holocene age is also likely (and more possible) to occur in the floodplain sediments.
- Ethnohistorical records suggest two major zones of exploitation: (1) the coastal zone, including the shoreline, off shore islands and Lake Illawarra; and (2) the inland zone, including undulating tablelands. Groups who used both areas were small, mobile, and associated with a locality, but also ranged over larger areas. On this basis, it could be expected that the West Dapto area could have been exploited from both east and west directions, in addition to tracks along ridgelines.
- The Lake Illawarra shoreline presents restricted areas for campsites relative to the concentrated resources. Midden sites may not represent base camps (occupation sites) but instead preferred sites for resource exploitation. These preferred sites are expected to occur within two kilometers of the Lake Illawarra shoreline, and would have been established around the lake shore.
- The resources of West Dapto (flora, fauna, available water) would have made the locality attractive to occupation and exploitation. However, resources would have been scattered and at low density in comparison to the lake, and the locality was probably not economically self-contained. Base camps would not have been suitable for exploitation of these resources.
- Stone materials are not sourced within the area, with the exception of latite cobbles and occasional quartz pebbles. Consequently, stone would have been conserved at camp sites.
- Tracks connecting the coast to the interior would be expected through the West Dapto area, due to its geographic location between the two. Aboriginal tracks are usually along ridges, and consequently, sites could be expected in the saddles of ridges.

- Along the eastern coastal plain and the foothills of the escarpment to the west, sites are likely to occur on ridgelines or on dry level land within 100 metres of a creek line.
- In the foothills of the Escarpment to the west, sites may also occur further away from water on saddles of the Marshall Mount spur and on level areas of smaller ridgelines along the escarpment slopes and foothills.
- Extractive sites will also be located in West Dapto. These would occur as scarred trees, isolated large cores, tools of latite or small isolated stone artefacts. These sites may occur in all landform contexts, although scarred trees could only be identified in areas where trees have not been fired or cleared.
- It is not expected that latite quarry sites will occur at West Dapto. Although these tools have been located in adjacent areas on the shores of Lake Illawarra, those tools have been prepared from pebbles or cobbles and not from quarried materials (AMBS 2006, pp.87–88).

The following four areas were identified in WDRA as having high archaeological potential:

- All level areas of the Western foothills zone and the Coastal Plain within 100 metres of a creek located on:
  - Quaternary deposited flood plains.
  - Budgong Sandstone.
  - Berry Siltstone.
- Saddles on the ridges of Marshall Point spur.
- Level areas in the Forest Creek Valley in the Escarpment Protection Zone.
- Level areas of the escarpment slopes on the topographic benches and bluffs.

Three main categories of sites being of potential significance were also identified:

- Stratified occupational deposits: may occur in the flood plain deposits of West Dapto, these deposits would have significant research potential and would be rare. Such a site may contain stone artefacts, food refuse and charcoal, which could be dated to establish a chronology of occupation of West Dapto. This would be significant to the public and be of educational significance. If the site were of Pleistocene age, it would be of major heritage significance to the Australian people, such as that identified at Bass Point.
- Surface camp sites: these unstratified deposits are likely to contain stone artefacts, and possibly, remnants of shell and charcoal. Bone is unlikely to have survived. These sites may provide information on settlement patterns, economic exploitation and stone tool manufacture and maintenance. These sites have research potential, but it is also predicted that they will be the most common site type at West Dapto.
- Scarred trees: although the identification of scarred trees is recognized to be problematical, any found in West Dapto will be of research potential (i.e. study of individual tree scars, relationship with other site types). Scarred trees are rare in the North Illawarra as in most areas, mature native trees have been burnt, and the rarity of scarred trees increases their significance (AMBS 2006, p.90).

Sefton (1990) completed an archaeological survey for West Dapto Stage One Release Area in 1990, located to the west of the study area, south of Bong Bong Road. The survey targeted areas previously identified as having high archaeological potential, i.e. all level areas 100 metres of a creek situated on Quaternary deposits (floodplains) and/or Budgong Sandstone, and areas with remnant mature native vegetation. Three new Aboriginal sites were identified; two scarred trees Bong Bong 1 (AHIMS 52-2-1542) and Bong Bong 3 (52-2-1543), and an artefact scatter, Bong Bong 2 (AHIMS 52-2-1544). Two scars are located on Forest Red Gum *Eucalyptus tereticornis* and Narrow-leaf Stringybark *Eucalyptus eugenoides* trees. Two stone artefacts associated

with Bong Bong 2 were located in an erosion gully above a cow track, approximately 2 metres from Reid Creek. Sefton concluded that the alluvium of the Robins Creek floodplains would contain significant stratified archaeological deposits. However, floodplains associated with the Mullet Creek tributary, derived from Budgong Sandstone, would have been waterlogged and sites were unlikely to be present below alluvial deposits.

Koettig (1992) conducted an assessment of Aboriginal sites for the electrification of the Dapto to Kiama railway line. Landforms surveyed included the low lying coastal plain and foothills. Due to the levels of previous disturbance during the construction of the railway it was considered that any possible archaeological sites would have been destroyed. No sites were located during the survey. Since the railway crosses areas that are deemed as having high archaeological sensitivity, such as dunes, old terraces, areas close to water sources that have not been affected by the recent development, archaeological material could still remain. Any new development outside the boundary of the railway easement was assessed as having archaeological sensitivity.

Navin Officer (1993) completed archaeological testing of a proposed residential subdivision on the southern side of Bong Bong Road, West Dapto. This investigation followed on from Silcox's 1993 recommendation that the site had three areas of potential archaeological sensitivity. Area WD1 located within the lower slope and undulating creek flat landform was divided into five transects which were then sampled with a 35 test excavation units consisting of combination of auger holes and spade probes. One surface artefact was located at the western end of the identified WD1 Area. A series of ten random probes was excavated at 1 to 2 metres apart averaging 28 centimetres in depth. Four additional artefacts were recovered and the area was deemed as site WD1, registered on AHIMS 52-2-1688. WD 2 Area located within a low rise landform between a creek and a swampy cut-off channel had a single transect running through it with a total of five test excavation units and no artefacts recovered. WD 3 Area was subject to only three random spade probes as it had a similar landform as WD 2; no artefacts were recovered.

Artefacts at the site WD1 (AHIMS 52-2-1688) were recovered from the upper 26 centimetres of the loam deposit within a 1 metre by 2 metre area, and consisted of silicified wood, chert and quartz flakes and one unidentified sedimentary core. Navin Officer stated that it was unlikely the artefacts were *in situ*, due to the extensive land use modifications of the topsoil from where artefacts were recovered. Given the dense grass cover, size of the test area and the limitations of subsurface testing, Navin Officer considered that there was a possibility that more artefacts were present both on the surface and subsurface in WD1 Area. However, potential for archaeologically significant sites and/or undisturbed archaeological deposits was assessed to be minimal. A Consent to Destroy was issued by the NPWS in 1993 in order to destroy the site WD1 (AHIMS 52-2-1688).

Navin Officer (1994) was commissioned by Camp Scott and Furphy to undertake an archaeological survey of the proposed Illawarra water quality project installation at Kembla Grange. The survey was a targeted survey of creek banks and flats, areas of exposure around an existing dam, and flat ground on the southern part of their study area. These areas had higher degree of ground surface visibility and were considered as being favoured by Aboriginal people for occupation activities. Footslopes, creek banks, creek flats and plains were all aggrading landforms due to colluvial deposition and mass soil movement and deposition of sediments by water. The steep slopes on the spurs and in the north were sampled (1994, p. 7). During this survey there were no new Aboriginal sites identified. It was argued that archaeological potential in the proposed works area was low due to the results of previous testing in the similar landforms.

AMBS (2006) completed an Aboriginal Heritage Management Plan for the West Dapto Release Area (WDRA). This large scale study was commissioned by the Wollongong City Council and encompasses the study area. From the initial survey program, a total of 24 archaeological sites; 13 open camp sites, 6 isolated finds, 5 scarred trees were located within the boundaries of the WDRA study area. These were positioned on all landforms including creek lines (6), alluvial flats (3), spanning creek lines and alluvial flats (3), hillslopes (8) and

spur crests (4). A second stage of assessment consisted of subsurface testing of a 100 square metre area (100, 1 metre by 1 metre test pits) was undertaken across all representative landforms of the Mullet, Duck and Marshall Mount Creek catchment area.

A total of 425 artefacts (353 from within < 20 centimetres of deposit) were recovered from the following landscape contexts:

- Hillslopes (158, of which 146 were from one test pit).
- Alluvial flats -Pleistocene and Holocene terraces more than 10 metres away from stream channels (118).
- Streams- edges of Pleistocene and Holocene terraces within 10 metres of stream channels (86).
- Spur crests (63).

A range of raw materials were represented including, chert, quartz, quartzite, silcrete, silicified tuff and fine-grained siliceous. Artefact types included broken flakes, flakes, flaked pieces and cores. The range of raw materials and artefact types was considered characteristic of the region by AMBS.

AMBS concluded that from known site patterning it is likely that additional archaeological sites may occur throughout all landforms of the WDRA, although at varying site and artefact densities, and subsequently all parts of the WDRA are considered to have some archaeological potential. AMBS classified the current study area as low to moderate potential. In general, the highest artefact density was encountered along second-order streams, followed by the first order streams, spur crests and then hillslopes. Although artefact numbers recovered from individual test pit was low, high artefact recovery across all the landforms illustrate that the use of WDRA area was widespread, but not intensive. It was concluded that low density artefact scatters would be relatively common within the entire WDRA area.

The report recommended further investigation and management of those areas considered to have higher archaeological potential, including a number of spur crests within the Mullet Creek corridor, the benched foot slopes within the Escarpment foothills adjacent to creek lines and the lower tributaries of major creeks. These landforms would have provided camping sites, functioned as travel routes or provided a range of resources.

Areas of cultural value highlighted by the Aboriginal stakeholders throughout the development of this report are closely related to the archaeological record and the natural environment. All archaeological sites were identified as having cultural values, with the connection between cultural and natural values being emphasised. Large scatters and scarred trees were considered of higher significance, as were those sites retained within a natural setting. Conservation of important archaeological sites and natural areas such as creek lines and vegetated areas was a common theme identified among the Aboriginal

As part of the WDRA, AMBS commissioned Philip Hughes to complete a geomorphology / archaeological testing program prior to the commencement of the larger sub-surface investigation program. Hughes (2005) excavated a series of test pits using a combination of hand excavation and a backhoe within various landforms identified by AMBS (2006). The geomorphic testing revealed that while all landforms had the potential to contain artefact-bearing deposits, archaeological evidence for Aboriginal occupation and use of the Pleistocene terraces would be restricted to the Holocene period. Artefact bearing deposits across all landforms comprise soft to firm soils and sediment. The depth of deposits varies across landforms, with the shallowest sediments occurring on ridges and hill slopes, and the deepest sediments occurring on Holocene terraces. 'Richer' archaeological deposits could be expected within Holocene terraces, but they would be disturbed by floods and perhaps buried in deeper alluvium. Artefacts were retrieved from alluvial flats at a maximum depth of 60 to 70 centimetres.

Biosis (2009) was commissioned by Connectland Pty Ltd to undertake Aboriginal archaeological and cultural heritage assessment for the proposed Illawarra Employment and Teaching Centre, West Dapto, located

approximately 3.3km North West of the study area. The assessed area encompassed 42.88 hectares to the north of Bong Bong Road and west of Mullet Creek. Archaeological survey was targeted towards areas that will be impacted by the proposed development, and landforms and areas identified in the predictive modelling as having high likelihood for the presence of sites, i.e. ridgelines and waterways. Two Isolated artefacts were identified during the site survey, Bong Bong Road IA1 (AHIMS 52-2-3659) to the immediate north of Bong Bong Road within the exposure around the tree, and Bong Bong Road IA2 (AHIMS 52-2-3660). Comprehensive review of AMBS study (2006) indicated that the newly recorded site 52-2-3660 was most likely already recorded site WDRA_AX_01 (AHIMS 52-2-3289). Both Bong Bong Road IA1 and Bong Bong Road IA2 were assessed as having low scientific significance and they were considered to be a common occurrence within the region (Biosis 2009, p.42-3). Their presence conforms to the site predictive model for the region where Aboriginal sites are likely to occur on level, well-drained ground adjacent to wetlands and resources. It was recommended that both sites be salvaged and relocated in the event impacts cannot be avoided.

3.2.2 Local overview

A number of Aboriginal cultural heritage investigations have been conducted within the region (within approximately 5 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.

Sefton (1980) undertook an archaeological survey of the proposed transmission line routes in the West Dapto-Yallah Area of the City of Wollongong. During this survey two archaeological sites were identified. Registered site Yallah Site 1 (52-5-0123) consisted of one isolated artefact that was located on the northern bank of a tributary of Duck Creek, made from fossilised wood. Site Yallah Site 2 (52-5-0122) was located within 150 metres of the Lake Illawarra on a lower slope and is a sparse scatter of seven artefacts made from chert, jasper and rhyolite. This site was located on a gradual slope, and has been previously disturbed by quarrying, erosion and underground services. Both sites are approximately 3 kilometres south-east of the study area and are within close proximity to reliable, permanent sources of water on flat elevated grounds. It was recommended that any excavations in the vicinity of site Yallah 2 be monitored, and no impacts were proposed to site Yallah 1.

Dallas and Navin (1987) conducted an archaeological survey along the southern foreshore of Lake Illawarra and on Bevans, Picnic, Berageree and Werrang islands approximately 7 kilometres south east of the current study area. The survey identified five new shell midden sites and one previously recorded midden site (AHIMS 52-5-0119). In their discussion of the survey results Dallas and Navin suggested that the locations of the middens on the islands was not necessarily indicative of preferential use. Rather, they suggest it was more likely that the lack of disturbances on the islands compared to the more heavily disturbed Illawarra Lake foreshore has resulted in the destruction of foreshore middens and the preservation of island middens.

Navin Officer (1997) undertook an archaeological investigation of a proposed residential subdivision at Lot 1 DP253917, Mount Brown Road in South Dapto, approximately 2.5 kilometres west of the current study area. A survey was conducted as part of this assessment, but the survey did not identify any Aboriginal sites. The absence of sites was attributed to a number of factors including the very low ground surface visibility, a lack of specific resources in the area, and shallow soils with an absence of colluvium material adjacent to drainage lines. Previous land use practices also indicated that little material would have remained *in situ* due to disturbances. The results of this survey were consistent with those obtained from other archaeological surveys in the local area and with the regional pattern of sparse site occurrence in the low hilly lands interior of Lake Illawarra and the coastal plain.

Comber Consultants Pty Ltd (2010) undertook an Aboriginal archaeological assessment for the proposed bike and pedestrian path around Lake Illawarra, which the current study area partly lies within. As part of this assessment Comber undertook basic predictive modelling and developed predictive statements for various

site types. These statements indicated that there was a possibility for middens, burials, open camp sites, axe grinding grooves and isolated finds to be present in the study area.

Following background research, Comber conducted a survey of their study area. No Aboriginal archaeological sites were recorded during this survey, but Area 2, which the current study area lies partially in, and Area 4 of their study area were identified as having a high potential to contain sub surface archaeological deposits.

Considering a high number of previously recorded Aboriginal archaeological sites (13) within the vicinity of the study area and the landform they were in (Lake Illawarra foreshore), it was recommended that archaeological sub-surface testing be undertaken in Areas 2 and 4 in order to determine the existence, and then nature and extent of any such deposits.

3.2.3 Previous Aboriginal archaeological test excavations within the study area

Biosis (2010) conducted an Aboriginal Archaeological Assessment of the Tallawarra lands for TRUenergy which encompassed the current study area. Biosis was commissioned to conduct sub-surface testing for a number of areas assessed by Kelleher and Nightingale as having moderate and high archaeological sensitivity.

A total of 10 areas were excavated across five landform types (Figure 7). These landforms included foreshore, spur line, drainage line, hill slope, and creek line landforms. The excavations identified 24 stone artefacts and one piece of ochre across the 10 excavation areas; the highest number of artefacts were uncovered in the creek line landform (n=13) followed by the drainage line landform (n=10). The foreshore and hill slope landforms each contained one artefact and the spur line did not contain any. The artefact assemblage consisted of a range of raw materials including chert, quartzite, silcrete, basalt, chalcedony and siltstone.

An analysis of the soil profiles within various landform units in the study area indicated that depth of deposit increased with proximity to water (specifically Duck Creek). Disturbances to the soil stratigraphy were found to be limited to the upper (top soil) layer, with lower stratigraphic units showing very low to no evidence of previous disturbance. Two areas (TLPD-2 and TLPD-3) within the current study area were tested during the 2010 test excavation program. The test pit soil profiles within TLPD-2 and TLPD-3 (AHIMS 52-5-0613), were all noted to have four distinct stratigraphic units displaying little to no evidence of previous disturbance in the topsoil and lower layers.

Biosis concluded that the low number of artefacts indicated that Aboriginal people were using the Tallawarra Lands, with occupation focusing on Duck Creek, but it was likely sporadic or low density.

Biosis (2011) were commissioned by the Lake Illawarra Authority to undertake archaeological assessment and test excavations of the Tallawarra recreational shareway based on the recommendations of Comber. The Tallawarra Lands development encompasses parts of the area assessed by Biosis.

As part of this assessment Biosis undertook background research and used it to construct several predictive statements for the study area. These statements indicated that:

- Midden shell and lithic material have been known to occur on sand bodies such as coastal beach dune systems, elevated ground adjacent to wetlands such as low gradient basal colluvial slopes, terminal spur line crests and alluvial terraces along valley floor drainage corridors.
- Artefact scatters may be identified anywhere within the study area but they are more likely to be identified near water-related landforms and on gently inclined slopes within 100 metres of water. Stone artefacts are more likely to consist of sandstone, quartz or volcanics.
- Shelters, grinding grooves and raw materials suitable for stone tool manufacture will not occur within the study area due to a lack of suitable geology.

- Scarred trees may occur anywhere within the study area where mature trees remain.
- A burial was recorded on the shores of Lake Illawarra. Due to alluvial deposits within the study area and previously recorded burial, there is a possibility that unrecorded burials may be located in the area.

The test excavations undertaken as part of the assessment involved 157 auger holes along the foreshore. The excavations identified one new artefact scatter Tallawarra Point 1 (AHIMS 52-5-0126) and extended the pre-existing site Tallawarra Power Station Midden (AHIMS 52-5-0070). Two artefacts consisting of a quartz flake fragment and a silcrete geometric microlith were identified at Tallawarra Point 1. It was suggested that this site was likely representative of transient occupation. Six stone artefacts were also excavated in a tidal creek landform directly south of Tallawarra Power Station Midden (AHIMS 52-5-0070). The artefacts consisted of four chert flakes, one quartz flake and one silcrete flake. This scatter was identified as part of the Tallawarra Power Station Midden (AHIMS 52-5-0070). Biosis suggested that the Tallwara Power Station Midden was representative of camping activities or frequent travel through the area. No midden material was encountered during the test excavations.

Figure 7 Previous test excavations

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3.2.4 AHIMS site analysis

A search of the AHIMS database (Client Service ID: 455755) identified 107 Aboriginal archaeological sites within a 3 square kilometre search area, centred on the study area. AHIMS search results are provided in Appendix 1.

Three AHIMS sites are located within the study area and one within 10 metres of the study area:

- AHIMS 52-5-0223/Boomberry Point 1 is recorded as a small dispersed shell midden comprising of *Anadara trapezia* (Sydney Cockle). It is likely that Boomberry Point 1 has been mapped incorrectly as the site card describes its location as being located on the track running from Tallawarra Power Station to Boomberry Point across Tallawarra Point Headland, three metres south of an unnamed creekline. It was noted that the soil matrix is slightly darker than the surrounding soil and is probably related to the breakdown of charcoal. The highly fragmented shell was visibly exposed on the track and extended under the grass on the side of the track towards the creekline. No artefacts were found even though visibility on the track was 100%. The site is heavily disturbed by horse traffic and the deposition of building rubble and rubbish.
- AHIMS 52-5-0225/Elizabeth Point is recorded as an isolated artefact consisting of a grey chert flake fragement. The site is located along a walking track from Tallawarra Power Station to Boomberry Point across Tallawarra Point Headland. It is also likely that Elizabeth Point has been mapped incorrectly as its current location is further west.
- AHIMS 52-5-0642/Gilba Road 1 is recorded as an isolated artefact located at the beginning of a walking track towards Boomberry Point. This site is currently mapped in the middle of Lake Illawarra; therefore, is also incorrectly mapped and the site is likely located at the end of Gilba Road within 10 metres of the study area.
- AHIMS 52-5-0643/Gilba Road 2 Fill is recorded as an isolated artefact; however, the location is not described. The site card does include a map showing the location of shell scatter adjacent to the walking track, which extends for approximately 120 metres.

Table 3 provides the frequencies of Aboriginal site types in the vicinity of the study area. The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports where available. The descriptions and maps were relied upon when notable discrepancies occurred in the locations of sites.

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 129 results presented here, compared to the 107 sites identified in AHIMS.

Table 3 AHIMS site type frequency

Site type	Number of occurrences	Frequency (%)
Aboriginal ceremony and dreaming	4	3.10
Artefact	83	64.34
Modified tree	1	0.77
PAD	15	11.63

Site type	Number of occurrences	Frequency (%)
Shell	25	19.38
Stone Arrangement	1	0.77
Total	**129**	**100**

A simple analysis of the Aboriginal cultural heritage sites registered within the three square kilometre buffer of the study area indicates that artefacts are the most commonly recorded site type (n=83, 64.34%). This is followed by shells sites (n=25, 19.38%) and PAD sites (n=15, 11.63%). Aboriginal ceremony and dreaming (n=4, 3.10%), modified tree (n=1, 0.77%) and stone arrangement (n=1, 0.77%) were also recorded in the region.

Figure 8 AHIMS search results

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3.3 Discussion

Ethno-historical information regarding the study area indicates that the region was intensively occupied by the Wodi Wodi of the Dharawal language group before European occupation.

The current study area is characterised by the coastal plain landscape, and is situated on the open banks of Lake Illawarra backing onto the slopes of the Mount Brown. The proximity to Lake Illawarra would have provided access to aquatic animals which would have been used by Aboriginal groups in the area as a food source and for tool production. The easy access to aquatic species should result in the potential for shell middens to be present in the study area. This is supported by AHIMS data which showed that middens were the second most common site type in the region. Geology of the Illawarra region also provided access to stone resources useful for tool manufacture. The AHIMS data indicated that stone artefacts are the most common site type in the region so they are likely to be present in the study area.

Previous archaeological work within the study area has not only focussed on specific development activities but has recognised the archaeological and cultural landscape values of the locality. The previous studies provide a general overview of Aboriginal archaeological site modelling and predictive behaviour within the current study area. In general, previous archaeological work indicates that areas of archaeological potential will occur where disturbance has been limited, and the most likely site type to be encountered will be middens sites and artefacts.

3.3.1 Predictive Statements

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

The predictive 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.

Based on this information, a number of predictive statements have been developed, indicating the site types most likely to be encountered during the survey and subsequent sub-surface investigations across the present study area (Table 4). The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 4 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	High: Stone artefact sites are the most common previously recorded site in the region, occurring across a wide range of landforms and within the study area. They have high potential to be present in undisturbed areas within the study area.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Moderate: Shell midden sites have been recorded within the vicinity of study area. The proximity of the study area to Lake Illawarra indicates a high potential for the presence of shell middens.
Burials	Aboriginal burial sites.	Moderate: Aboriginal burial sites are generally situated within deep, soft sediments, caves or hollow trees. Areas of deep sandy deposits will have the potential for Aboriginal burials. The soil profiles associated with the study area are not commonly associated with burials; however, there had been one recorded burial on the edge of Lake Illawarra.
Potential archaeological deposits (PADs)	Potential sub surface deposits of cultural material.	Moderate: PADs have been recorded in the region across a wide range of landforms. They have the potential to be present in undisturbed landforms 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.
Modified trees	Trees with cultural modifications	Low: Due to extensive vegetation clearing from of the study area there is low potential for modified trees.
Axe grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	Low: The geology of the study area lacks suitable horizontal sandstone rock outcrops for axe-grinding grooves. Therefore there is low potential for axe grinding grooves to occur in the study area.
Rock shelters with art and / or deposit	Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground characterised by cliff lines and escarpments. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	Low: The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist, which are not present in the study area.

Site type	Site description	Potential
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 Field investigation

A field investigation consisting of an archaeological survey of the study area was undertaken on 29 June 2017. The field investigation sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological survey objectives

The objectives of the survey were to:

- To attempt to re-identify Aboriginal archaeological sites AHIMS 52-5-0223/Boomberry Point 1, AHIMS 52-5-0225/Elizabeth Point, AHIMS 52-5-0642/Gilba Road 1 and AHIMS 52-5-0643/Gilba Road 2 Fill previously identified in or immediately adjacent to the study area.
- 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 potential archaeological deposits (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. These methods are in accordance with Requirements 5 to 10 of the Code.

4.2.1 Sampling strategy

The survey effort targeted these portions of the study area:

- All landforms (including each occurrence of a specific landform type that will be impacted) that will be potentially be impacted.
- Landforms with a higher potential for Aboriginal heritage and justifying the selection of these landforms.

4.2.2 Survey methods

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

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

Where possible, Identification of natural soil deposits within the study area was undertaken. Photographs and recording techniques were incorporated into the survey including representative photographs of survey units, landform, vegetation coverage, ground surface visibility 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 and the Map Grid of Australia (94) coordinate system.

4.3 Archaeological survey results

A total of five transects were walked across three landforms (Figure 9). This follows the methodology set out in Burke and Smith (Burke & Smith 2004, p.65) which states that a single person can only effectively visually survey an area of two linear metres. No new Aboriginal sites or PADs were identified in the study area. The results from the survey have been summarised in Table 5 below.

The Northern Precinct consists of a crest running through the southern portion of the study area, an open drainage depression in the centre and a simple slope and flats associated with Lake Illawarra (Table 6, Plate 3 and Plate 4).

4.3.1 Constraints to the survey

With any archaeological survey there are several factors that influence the effectiveness (the likelihood of finding sites) of the survey. The factors that contributed most to the effectiveness of the survey within the study area were visibility, exposure and disturbance.

4.3.2 Visibility

In most archaeological reports and guidelines visibility refers to ground surface visibility, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (NPWS 1997). Visibility within the study area was generally poor, with areas of exposure isolated to disturbance associated with the horse ring, dam and fence lines. Visibility was 80% within these areas (Plate 1).

4.3.3 Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed, and attempts to describe the relationship between those conditions and the likelihood the prevailing conditions provide for the exposure of (buried) archaeological materials. Whilst also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke & Smith 2004, NPWS 1997). Overall, the study area displayed areas of exposure of approximately 5%.

4.3.4 Disturbances

Disturbance in the study area is associated with natural and human agents. Natural agents generally affect small areas and include the burrowing and scratching in soil by animals, such as wombats, foxes, rabbits and wallabies, and sometimes exposure from slumping or scouring. Disturbances associated with recent human action are prevalent in the study area and cover large sections of the land surface. The agents include residential development such as landscaping and construction of residential buildings; farming practices, such as initial vegetation clearance for creation of paddocks, fencing and stock grazing; light industrial practices such as creation of artificial dams within the study area. Areas that have gone through disturbance are associated with the horse ring, dams, fence lines and infrastructure associated with the Tallawarra Power Station (Plate 2).

Plate 1 **The study area showing poor surface visibility due to vegetaton cover, facing south**

Plate 2 **Disturbance associated with the construction of horse ring and dams, facing north**

Plate 3 **Crest running through the southern part of the study area, facing west**

Plate 4 **Simple slope down towards open drainage depression, facing east**

Table 5 Survey coverage

Survey Unit	Landform	Survey unit area (m²)	Visibility (%)	Exposure (%)	Effective coverage area (m²)	Effective coverage (%)
1	Creek line	53,175	80	5	1,329	2.49
2	Crest	64,767	80	5	1,619	2.49
3	Hill slope	272,730	80	5	10,909	3.99

Table 6 Landform summary

Landform	Landform area (m²)	Area effectively surveyed (m²)	Landform effectively surveyed (%)	No. of Aboriginal sites	No. of artefacts or features
Creek line	53,175	1,329	2.49	0	0
Hill slope	64,767	1,619	2.49	0	0
Crest	272,730	10,909	3.99	0	0

Legend

Study area

Transect

Figure 9 Survey coverage

0 50 100 150 200

Metres

Scale: 1:4,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

N

Biosis Pty Ltd

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

Matter: 30437
Date: 21 October 2019,
Checked by: SJK, Drawn by: LW, Last edited by: amurray
Location:P:\30400s\30437\Mapping
30437_AR_F9_SurveyCoverage

4.3.5 Discussion of archaeological survey results

The study area is located within a crest and simple slope landform pattern associated with a creek line that drains into Lake Illawarra. There is one soil landscaped present within the study area, an erosional soil landscape called the Shellharbour soil landscape. Erosional soil landscapes have a high to very high erodibility rating and would therefore be susceptible to frequent soil movement and result in poor preservation of archaeological material at shallow depths but would potentially lead to exposures of any deeper archaeological deposits were topsoil has eroded away.

The field investigation revealed that parts of the study area had been subject to previous ground disturbance due to construction of towers for the Tallawarra Power Station. These areas would have displaced surface cultural material and disturbed deeper buried archaeological deposits. Having said that, most of the study area had only limited disturbance that was due to the construction of horse training rings, dams and fence lines, animal trampling from horse agistment. Although these processes would displace surface cultural material, they would not affect deeper buried archaeological deposits. Due to the low levels of ground surface visibility and exposure the AHIMS sites recorded in and adjacent to the study area could not be relocated.

A review of previous archaeological studies, surveys, test excavations and regional predictive modelling indicates that all landforms within the study area were likely utilised to some degree by Aboriginal people in the past. The background research has concluded that:

- Majority of the test pits conducted by AMBS (2006) in the West Dapto Release Area contained artefacts were located within alluvial flats, following by hillslopes, then spur crests , then 3rd order, then 2nd order, then 4th and at last 1st order creek lines.
- AHMS (2012) in excavations further along Robins Creek determined that alluvial flats had the highest density of artefacts (30.2 per metre square), followed by hillslope (17.3 metre square) and spur crest (16.9 metre square).
- Previous investigations along Robins Creek have determined that the alluvial terraces associated with this landform have the potential to contain cultural material which appears to be well preserved *in situ*. Artefacts within the Fairy Meadow soil landscape at this location were retrieved from between 60 to 80 centimetres depth.
- Predictive modelling indicates that of sites located on stream landforms, the majority were along the 3rd order, following by 4th, then 2nd and last 1st order creek lines.

Based on the field investigation and previous assessments the low spur/crest running roughly east-west through the center of the study area has been assessed as having moderate subsurface archaeological potential (Figure 10). Previous research indicates that the landform is likely contain low density artefact sites or isolated artefacts that were discarded as Aboriginal people travelled through the landscape. The test excavation program conducted by Biosis in 2010 indicated that this landform unit has been subject to low levels of previous ground disturbance with four distinct and intact soil horizons identified throughout the testing locations in the northern precinct.

Areas that have undergone significant previous disturbance would have removed sub-surface deposits from their original contexts and were assessed as low potential as a result (Figure 10). Hillslopes were also assessed as low potential as they tended to be sloped and at the time of survey were heavily waterlogged and unsuitable for occupation or travel.

Figure 10 Archaeological potential

This page contains sensitive information and has not been included in this report.

5 Test excavations

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

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

The aims of the testing program are to:

- Determine whether sub-surface archaeological deposits exist which may be impacted upon by the development. If so, to determine the extent and nature of such deposits.
- Identify whether the archaeological material occurs in an intact, undisturbed context, by examining the soil profile and stratigraphy.
- Analyse and interpret any archaeological finds (such as stone artefacts, shell, hearths, knapping floors etc.) recovered during the testing program.
- Inform current knowledge of Aboriginal occupation and land use models of the region.
- Provide management and mitigation measures for Aboriginal archaeological objects identified during the subsurface testing program.

5.1 Research questions

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

- *Do non-disturbed or minimally-disturbed soil profiles exist within the potential archaeological deposits associated with sites AHIMS 52-5-0223/Boomberry Point 1, AHIMS 52-5-0225/Elizabeth Point, AHIMS 52-5-0643/Gilba Road 2 Fill, and AHIMS 52-5-0642/Gilba Road 1?*
- *What species of shell or vertebrate exist within the deposits and what can they tell us about the subsistence patterns of Aboriginal people living in the area?*
- *Are the species of shell or vertebrate remains found within the deposit comparable with the species found in other excavated middens within the region?*
- *What management is appropriate? Does the area warrant further investigation, conservation, or could proposed development works proceed as planned?*

5.2 Test excavation methodology

Test excavations within the study area will conformed to the project methodology outlined below:

- Test excavation will be undertaken within areas of moderate potential identified and within the vicinity of AHIMS 52-5-0223/Boomberry Point 1, AHIMS 52-5-0225/Elizabeth Point, AHIMS 52-5-0643/Gilba Road 2 Fill and AHIMS 52-5-0642/Gilba Road 1.

- At Boomberry Point 1, auger holes will be dug at approximately 10 metre intervals, or other justifiable and regular spacing, to establish the presence of absence of midden material. Where augering shows dense archaeological deposit, a 1 metre x 1 metre pit will be excavated in order to determine the presence and nature of the sub-surface deposit.
- It is possible that Boomberry Point 1 has been mapped incorrectly as the site card describes its location as on the track between Tallawarra Point and Boomberry Point, 3 metres south of an unnamed creekline. Therefore, auger holes will placed as close as possible to the boundary of the study area in the vicinity of this location. Auger holes will be dug at approximately 10 metre intervals, or other justifiable and regular spacing, to establish the extent of the midden, if encountered. Where augering shows dense archaeological deposit, a 1 x 1 metre pit will only be excavated in order to determine the presence and nature of subsurface deposits.
- At Elizabeth Point, up to eight 50 x 50 centimetre pits (with a provision of joining two test pits together) will be excavated in order to determine the presence and nature of subsurface deposits. The test pits will be spaced between 5 and 15 metres apart or other justifiable and regular spacing (being no smaller than five metres).
- Additional test excavations will also be undertaken as close as possible to the location of AHIMS 52-5-0643/Gilba Road 2 Fill, which is located on the boundary of the study area, and at AHIMS 52-5-0642/Gilba Road 1, which is located 15 metres north of the study area.
- At Gilba Road 2 Fill, a grid will also be established along the length of the shells scatter identified and indicated on the site card (approximately 120 metres in length). Auger holes will be dug at approximately 10 metre intervals, or other justifiable and regular spacing, to establish the extent of the midden, if encountered. Where augering shows dense archaeological deposit, a 1 x 1 metre pit will only be excavated in order to determine the presence and nature of subsurface deposits.
- Gilba Road 1 is located just outside the study area; therefore, 50 x 50 centimetre units along one transect will be placed as close as possible to this site. The test pits will be 20 metres or other justifiable and regular spacing (being no smaller than five metres). Test excavations units may be combined up to 1 metre x 1 metre to understand the site characteristics and to accommodate deep deposits if encountered.
- In areas of moderate potential, test excavations will be conducted in 50 x 50 centimetre units along transects at intervals of 40 metres or other justifiable and regular spacing (being no smaller than five metres). Test excavations units may be combined up to 1 metre x 1 metre or spaced closer together to understand the site characteristics and to accommodate deep deposits if encountered.
- Test excavations units must be excavated using hand tools only including spades, handle shovels, hand auger and trowels.
- The first test excavation unit within Boomberry Point 1, Elizabeth Point, Gilba Road 1 and Gilba Road 2 Fill will be excavated and documented in 5 centimetre spits. Based on the evidence of the first excavation unit, 10 centimetre spits or sediment profile/stratigraphic excavation (whichever is smaller) will then be implemented. If shell material is discovered, the pit will be excavated and documented in stratigraphic contexts.
- All material excavated from the test excavation units will be sieved using 3 millimetre aperture wire-mesh sieves.
- Test excavation units must be excavated to at least the base of the identified Aboriginal object-bearing units (where safe excavation permits), and must continue to confirm the soils below are culturally sterile.

- All cultural material recovered from the test pits will be collected and brought to the Biosis office at 30 Wentworth Street, Port Kembla for analysis.
- All faunal remains recovered from the test pits will be analysed using the following method:
  - Minimum number of individual (MNI) animals represented in each discrete area and on site overall.
  - Minimum number of elements (MNE) represented in each discrete area and on site overall.
  - Number of species (NISP) represented in each discrete area and on site overall.
  - Dimensions of each element.
  - Butchery/heat marks.
  - Pathologies.
  - All faunal remains will be photographed in-situ to understand the relationship of the remains with other artefactual material.
- For each test pit or auger hole that is excavated, the following documentation will be taken:
  - Unique test pit identification number.
  - GPS coordinate of each test pit.
  - Munsell soil colour, texture and pH.
  - Amount and location of cultural material within the deposit.
  - Nature of disturbance where present.
  - Stratigraphy.
  - Archaeological features (if present).
  - Photographic records.
  - Context records.
- Test excavation units must be backfilled as soon as practicable due to safety issues.
- Any datable material will be collected for the purposes of radiometric, AMS or OSL dating. Datable materials will be collected, bagged and clearly labelled. They will be temporarily stored in the Biosis office before being sent to the University of Waikato Radiocarbon Dating Laboratory.
- Test excavations can cease when enough information* has been recovered to adequately characterise the cultural material present with regard to their nature and significance within the study area.
- Following test excavation, an AHIMS Aboriginal Site Recording form must be completed and submitted to the AHIMS Registrar as soon as practicable, for each site that has been identified.

*Enough information is defined 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 2010b, pp. 28).

All cultural material recovered from the test pits will be labelled and bagged appropriately, including pit number. Aboriginal objects will be recorded in accordance with requirements 19 and 20 (where applicable) of

the code. For the purposes of recording and analysis the artefacts will be temporarily stored at the Biosis Wollongong office (30 Wentworth Street, Port Kembla 2505). Once the cultural material has been analysed, the cultural material can be managed in the following manners:

- Cultural material can be held by the Aboriginal community under a care and control agreement.
- Cultural material can be returned to country and reburied as soon as practicable in a secure location in accordance with requirements 16b and 26 of the Code of Practice.

5.3 Test excavation results

A total of 141 test pits were excavated within areas of moderate potential and in the vicinity of AHIMS 52-5-0223/Boomberry Point 1, AHIMS 52-5-0225/ Elizabeth Point, AHIMS 52-5-0643/Gilba Road 2 Fill and AHIMS 52-5-0642/Gilba Road 1 (Figure 11).

Test excavations identified subsurface artefacts at AHMIS 52-5-0223 and AHIMS 52-5-0643. No subsurface artefacts were found at AHIMS 52-5-0225 or AHIMS 52-5-0643. Seven new sites were also identified at Tallawarra PAD 1, Tallawarra PAD 2, Gilba Road 3, Gilba Road 4, Gilba Road 5, Gilba Road 6 and Tallawarra IOS 1.

Individual test pit and soil analysis results are provided in Appendix 3. Results are shown in Table 7 and a detailed discussion of results is provided below.

Table 7 Test excavation results

Site	Landform	Area (m^2)	Area tested (m^2)	Area effectively tested (%)	No. of sites	No. of artefacts
Tallawarra North PAD 1 AHIMS pending	Crest	92,000	22	0.02	0	9
Tallawarra North PAD 2 AHIMS pending	Flat	5,050	1	0.02	0	3
Boomberry Point 1 AHIMS 52-5-0223	Simple slope	25	4	16	1	3
Elizabeth Point AHIMS 52-5-0225	Simple slope	25	1.25	5	1	0
Gilba Road 1/Gilba Road 2 Fill AHIMS 52-5-0642/ AHIMS 52-5-0643	Simple slope	5,300	3.5	0.06	1	1
Low potential areas (Gilba Road 3, Gilba Road 4, Gilba Road 5, Gilba Road 6 and Tallawarra ISO 1)	Simple slope	15,000	3	0.02	0	1

5.3.1 AHIMS 52-5-0956/Tallawarra North PAD 1

A total of 88 test pits along five transects (Transects 1 to 5) were excavated in the area of moderate potential along the crest landform unit at 20 metre intervals in order to determine the extent and nature of the archaeological deposits potentially present. Two artefacts were identified in two test pits in Transect 1 and seven artefacts from three test pits in Transect 2 (Figure 11). All artefacts were located within silty clay. The majority of the artefacts were encountered in the top two spits, between 0 and 200 millimetres in depth.

Soil stratigraphy was relatively consistent across Tallawarra North PAD 1. Test pits typically had three contexts that consisted of a dark brown silt present to approximately 90 millimetres, which overlaid a dark brown silty clay that was present to between 90 and 250 millimetres. Below this context was a brown clay present to between 250 and 430 millimetres. Generally, test pits that had only two contexts were relatively shallow at 200 millimetres with clay or bedrock at the base. Sandstone fragments of between 10 and 40 millimetres occurred in context 2 or 3, while some test pits consisted of sandstone bedrock at the base. The soil profiles are relatively consistent with the Shellharbour soil landscape.

Plate 5 Transect 1, test pit 9, showing soil profiles within Tallawarra North PAD 1

Plate 6 Transect 2, test pit 14, showing soil profiles within Tallawarra North PAD 1

Plate 7 Transect 3, test pit 1, showing soil profiles within Tallawarra North PAD 1

Plate 8 Transect 4, test pit 2, showing soil profiles within Tallawarra North PAD 1

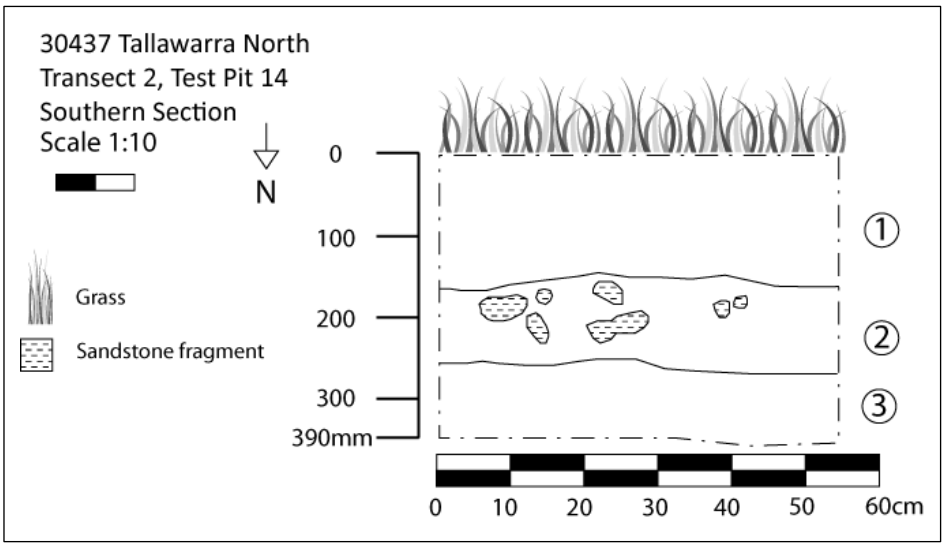


Plate 9 Transect 2, test pit 12, showing stratigraphic profiles within the crest landform at Tallawarra North PAD 1

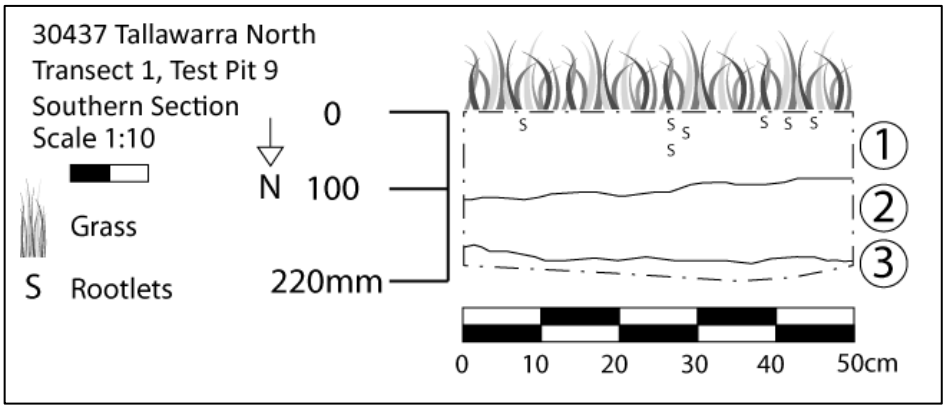


Plate 10 Transect 1, test pit 19, showing stratigraphic profiles within the crest landform at Tallawarra North PAD 1

5.3.2 AHIMS 52-5-0956/Tallawarra North PAD 2 (Wollongong City Council land)

A total of 4 test pits were excavated at PAD 2 at 40 m intervals in order to determine the extent and nature of the archaeological deposits in this area. The position of the test pits were constrained by the presence of three separate underground services. Three artefacts were identified in two test pits (Figure 11). All artefacts were located between the transition from silty clay to clay. Soil stratigraphy was consistent across Tallawarra North PAD 2. Test pits typically had three contexts that consisted of a very dark brown silty clay present to approximately 50 millimetres, which overlaid a black clay that was present to 200 millimetres. Below this context was a very dark greyish brown clay.

Plate 11 Transect 1, test pit 3, showing soil profiles within Tallawarra North PAD 2

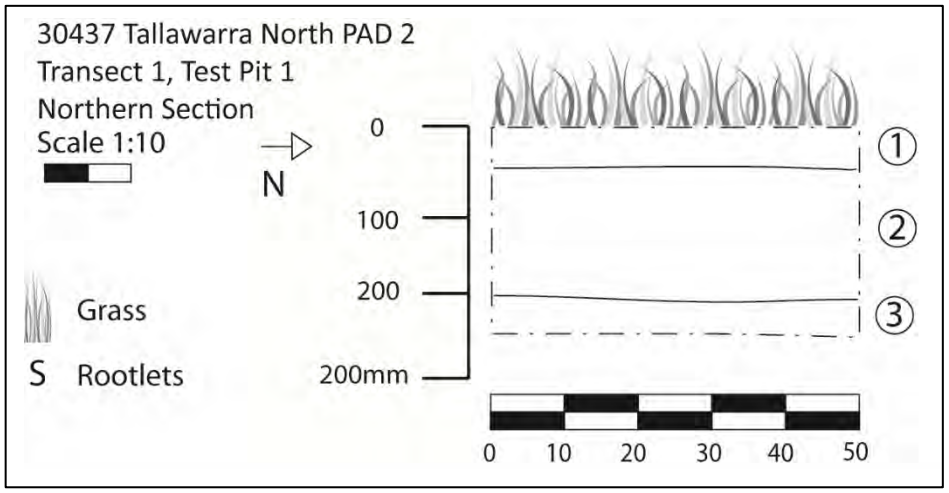


Plate 12 Transect 1, test pit 1, showing stratigraphic profiles within the flat landform at Tallawarra North PAD 2

5.3.3 AHIMS 52-5-0223/Boomberry Point 1

A total of four auger holes were excavated at AHIMS 52-5-0223/Boomberry Point 1 at 10 metre intervals around the site to establish the presence or absence of midden material. Three artefacts were identified; however, no shell was observed (Figure 11).

Soil stratigraphy was relatively consistent between the auger holes. Auger holes typically had three contexts that consisted of a very dark brown clayey silt present to approximately 60 millimetres, which overlaid a very

dark brown silty clay that was present to between 130 and 150 millimetres. Below this context was a very dark brown clay present to approximately 180 millimetres. Three auger holes contained asbestos and were abandoned.

Plate 13 Transect 1, auger hole 2, showing soil profiles associated with Boomberry Point 1

Due to the mapping error associated with Boomberry Point 1 and the description of its correct location being located on the track between Tallawarra Point and Boomberry Point, additional auger holes were excavated just south of the creekline mentioned in the site card. A total of 12 auger holes were excavated at 10 metre intervals to establish the presence or absence of midden material. Two artefacts were identified in two auger holes and no shell was identified (Figure 11). All artefacts were located within clayey sand. The artefacts were encountered in the top two contexts, between 0 and 300 millimetres in depth, with artefact occurrence decreasing past this point.

Soil stratigraphy was relatively consistent between the auger holes. Auger holes typically had three contexts that consisted of a brown clayey sand present to between 40 millimetres and 60 millimetres, which overlaid a dark brown clayey sand that was present to between 130 and 260 millimetres. Below this context was a very dark grey clay present to approximately 180 millimetres. One auger hole contained small charcoal flakes.

Plate 14 Transect 3, auger hole 1, showing soil profiles associated with Boomberry Point 1

Plate 15 Transect 5, auger hole 3, showing soil profiles associated with Boomberry Point 1

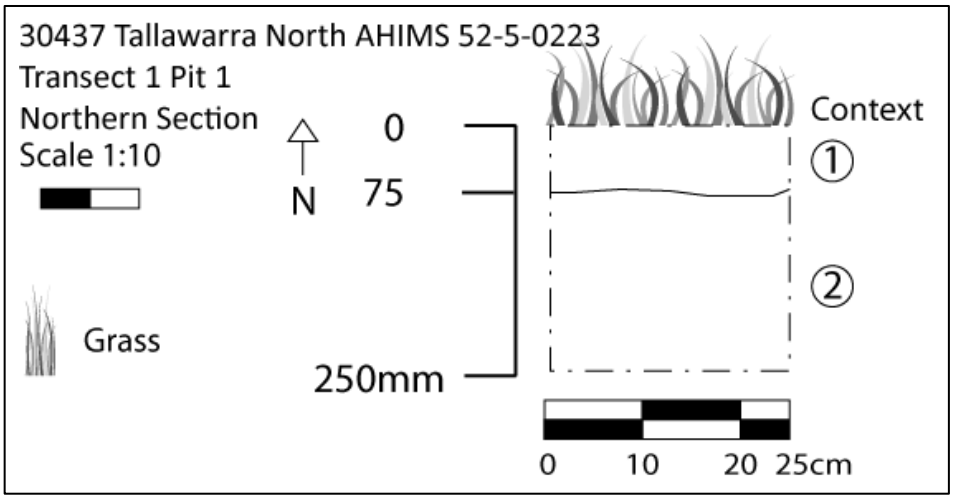


Plate 16 Transect 1, auger hole 2, showing stratigraphic profiles within the simple slope landform associated with Boomberry Point 1

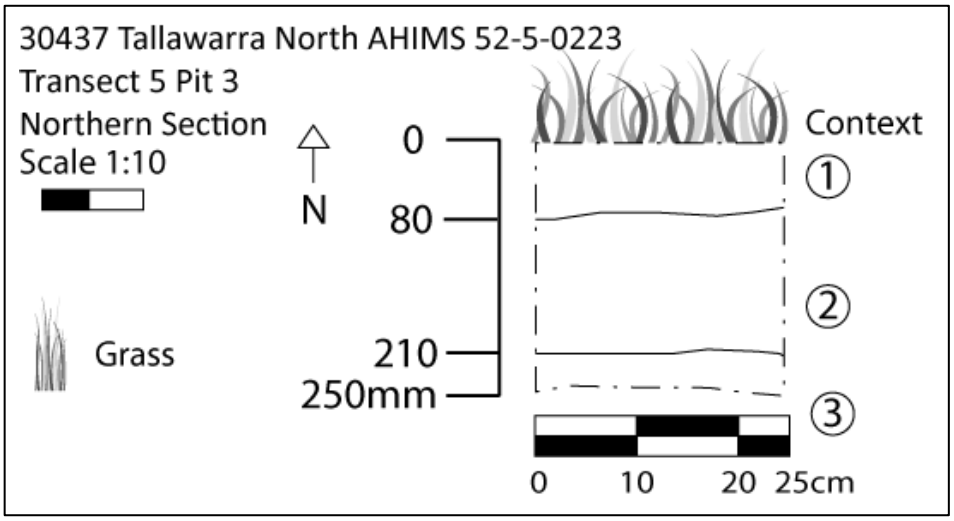


Plate 17 Transect 5, auger hole 3, showing stratigraphic profiles within the simple slope landform associated with Boomberry Point 1

5.3.4 AHIMS 52-5-0225/Elizabeth Point

A total of five test pits were excavated at AHIMS 52-5-0225/Elizabeth Point at 10 metre intervals in order to determine the extent and nature of the archaeological deposits. No artefacts were identified (Figure 11).

Soil stratigraphy consisted of three contexts that consisted of a dark brown silt present to approximately 80 millimetres, which overlaid a dark brown silty clay that was present to between 120 and 230 millimetres. Below this context was a brown clay present to between 230 and 310 millimetres. Sandstone fragments of between 10 and 40 millimetres occurred towards the base of the test pits and charcoal flakes were noted in two test pits. Test pits within the vicinity of Elizabeth Point were consistent with test pits at Tallawarra North PAD 1. The soil profiles are relatively consistent with the Shellharbour soil landscape.

Plate 18 Test pit 2, showing soil profiles at AHIMS 52-5-0225/Elizabeth Point

Plate 19 Test pit 5, showing soil profiles at AHIMS 52-5-0225/Elizabeth Point

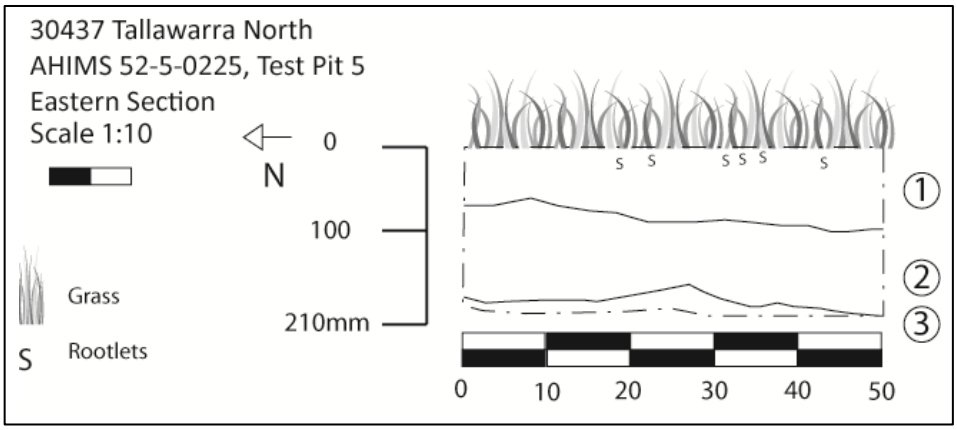


Plate 20 Test pit 5, showing stratigraphic profiles within the simple slope landform associated with Elizabeth Point

5.3.5 Area associated with AHIMS 52-5-0643/Gilba Road 2 Fill and AHIMS 52-5-0642/Gilba Road 1

A total of 14 auger holes were excavated as close to AHIMS 52-5-0643/Gilba Road 2 Fill and AHIMS 52-5-0642/Gilba Road 1 at 10 metre intervals to establish the presence of absence of midden material and to determine the extent and nature of the archaeological deposits. One artefact was identified in one auger hole and no shell was identified (Figure 11). The artefact was located within silty sand between 100 and 200 millimetres in depth. Soil stratigraphy consisted of brown silty sand to approximately 150 millimetres, which overlaid a strong clay that was present to between 160 and 250 millimetres. Some auger holes contained sandstone fragments at the base.

Plate 21 Transect 7, auger hole 1 , showing soil profiles at AHIMS 52-5-0643 and AHIMS 52-5-0642

Plate 22 Transect 1, auger hole 7, showing soil profiles at AHIMS 52-5-0643 and AHIMS 52-5-0642

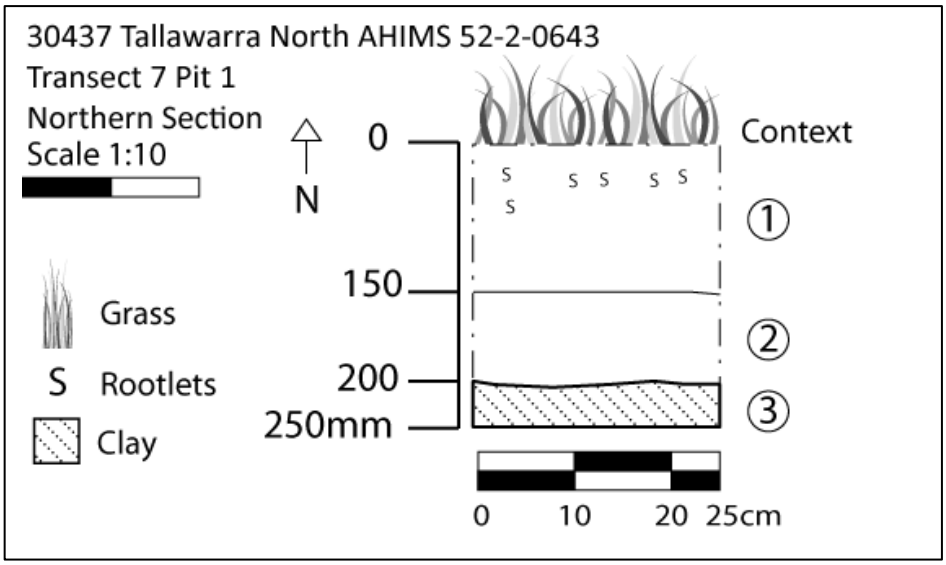


Plate 23 Transect 7, auger hole 1, showing stratigraphic profiles within the simple slope landform associated with Gilba Road 2 Fill and Gilba Road 1

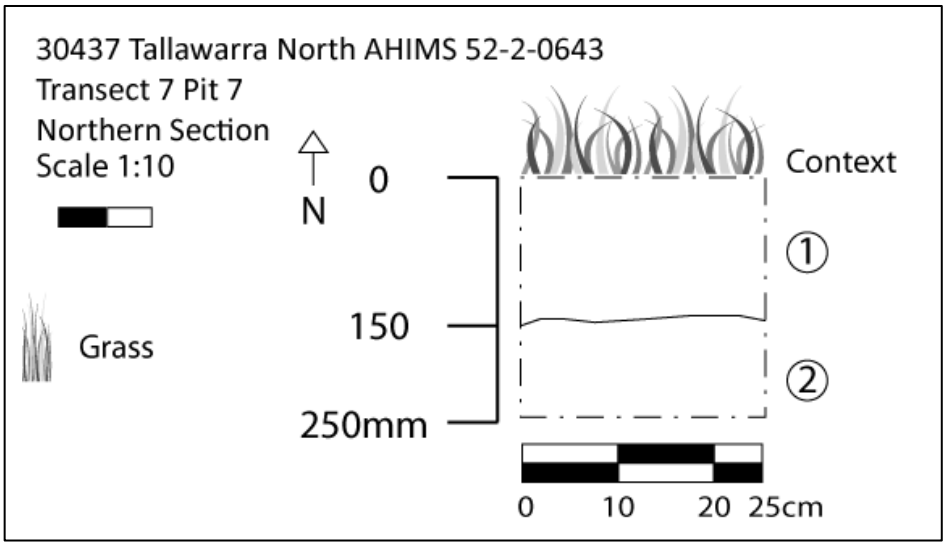


Plate 24 Transect 7, auger hole 7, showing stratigraphic profiles within the simple slope landform associated with Gilba Road 2 Fill and Gilba Road 1

5.3.6 Low potential area

A total of 12 test pits were excavated along the fenceline, south of the unnamed creekline within the low potential area at 40 metre intervals in order to determine the extent and nature of the archaeological deposits. One isolated artefact was identified (Figure 11).

Soil stratigraphy consisted of two contexts that consisted of a very dark grey sandy silt present to between 70 and 180 millimetres, which overlaid a very dark brown clay that was present to approximately 300 millimetres. Sandstone fragments of between 10 and 40 millimetres occurred towards the base of the test pits. The soil profiles are relatively consistent with the Shellharbour soil landscape.

Plate 25 Low potential area, test pit 2, showing soil profiles

Plate 26 Low potential area, test pit 11, showing soil profiles

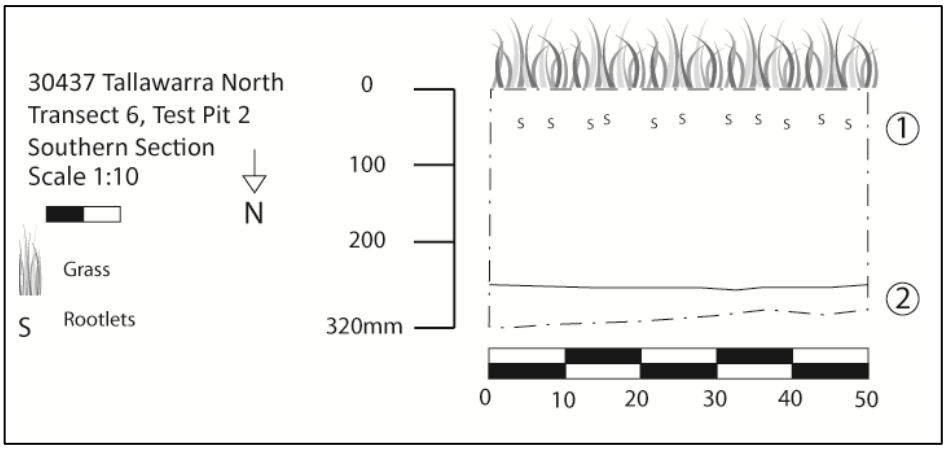


Plate 27 Transect 6, test pit 2, showing stratigraphic profiles within the simple slope landform associated with the low potential area

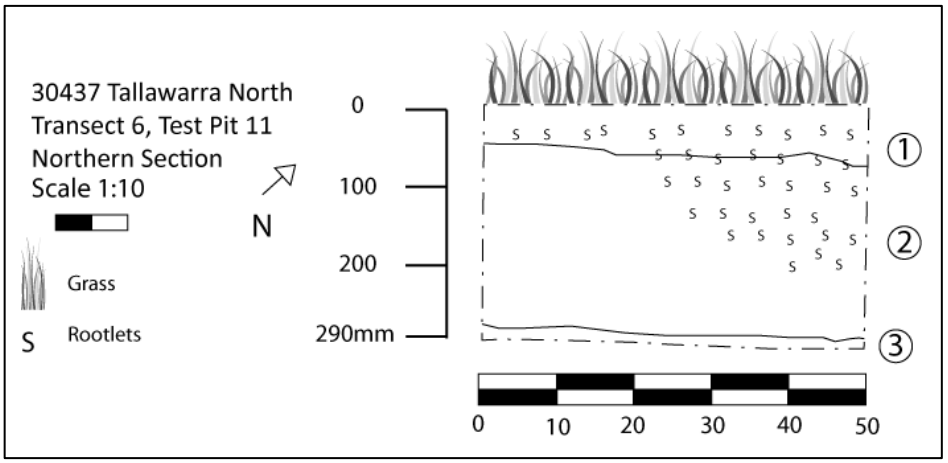
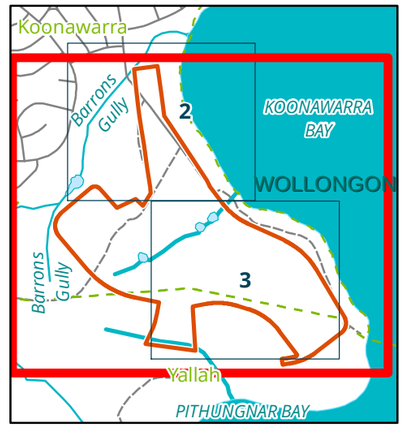


Plate 28 Transect 6, test pit 11, showing stratigraphic profiles within the simple slope landform associated with the low potential area



Legend

- Study area

Test excavations

- Auger
- Test pit
- Transect

Figure 11.1 Test pit and transect locations

0 50 100 150 200

Metres

Scale: 1:4,000 @ A3

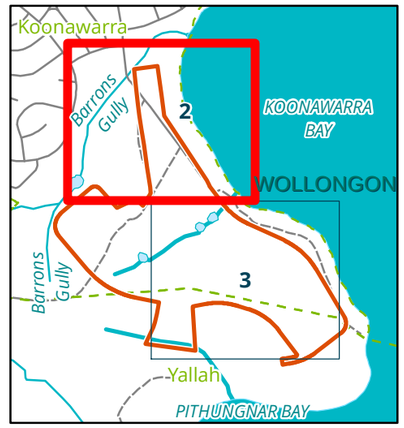
Coordinate System: GDA 1994 NSW Lambert

N

Biosis Pty Ltd

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

Matter: 30437
Date: 15 May 2020,
Checked by: SJK, Drawn by: AEDM, Last edited by: amurray
Location:P:\30400s\30437\Mapping
30437_AR_F11_TestPits



Legend

- Study area

Test excavations

- Auger
- Test pit
- Transect

Figure 11.2 Test pit and transect locations

0 25 50 75 100

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

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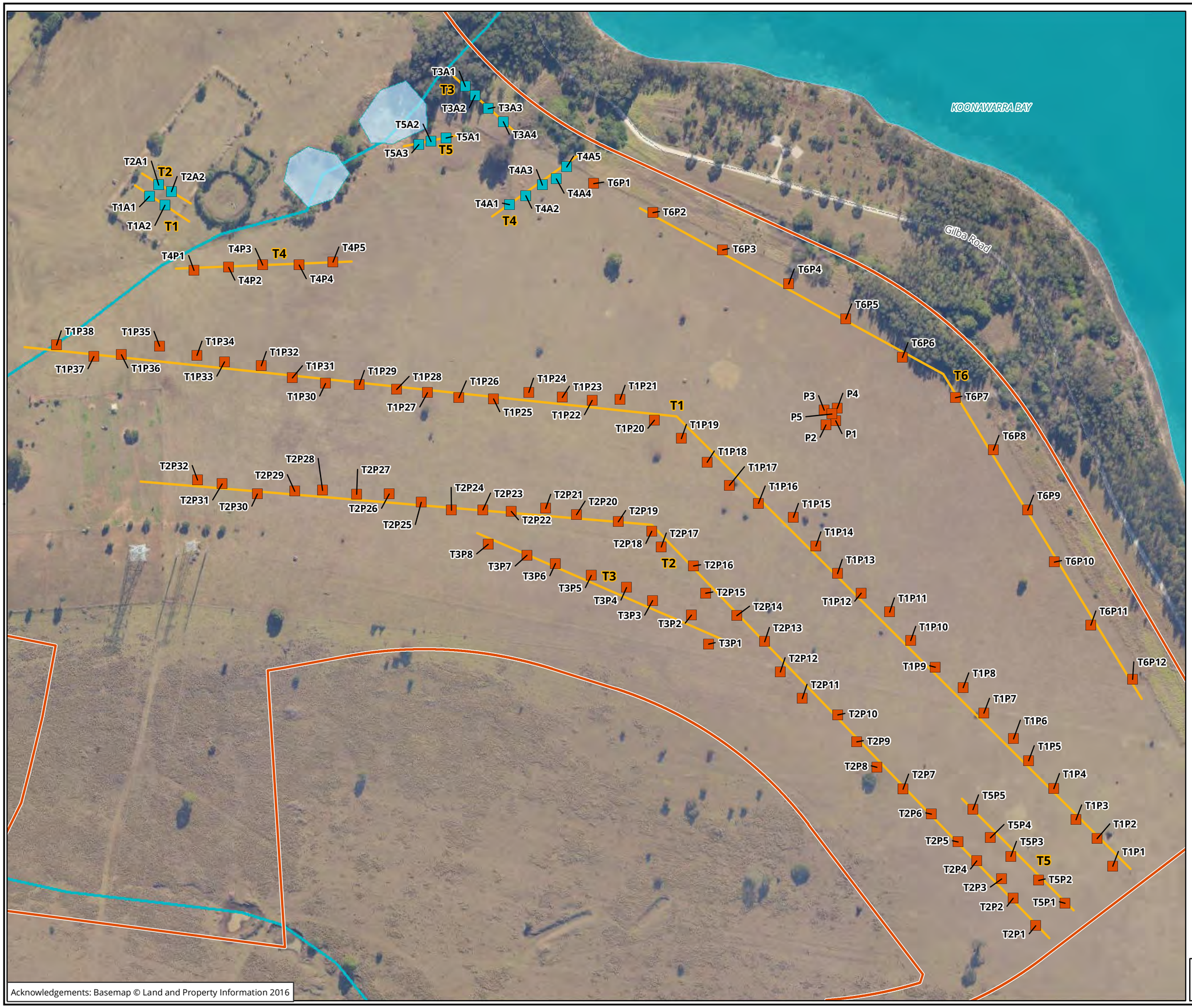
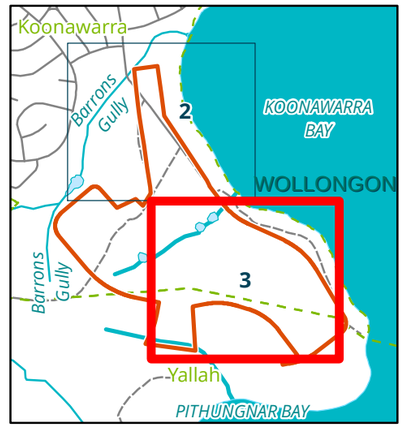
Matter: 30437
Date: 15 May 2020,
Checked by: SJK, Drawn by: AEDM, Last edited by: amurray
Location:P:\30400s\30437\Mapping
30437_AR_F11_TestPits





Legend

- Study area

Test excavations

- Auger
- Test pit
- Transect

Figure 11.3 Test pit and transect locations

0 25 50 75 100

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

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Matter: 30437
Date: 15 May 2020,
Checked by: SJK, Drawn by: AEDM, Last edited by: amurray
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30437_AR_F11_TestPits

Figure 12 Test excavation results

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Figure 13 Aboriginal sites within the study area

This page contains sensitive information and has not been included in this report.

6 Artefact analysis and discussion

The following analysis has been undertaken for the sub-surface artefacts identified during test excavation within the study area. A total of 17 artefacts were identified during the test excavation program. The low number of artefacts retrieved makes it difficult to undertake in-depth lithic analysis; however, basic trends in site use can be made through comparisons with other testing programs in close proximity to the study area.

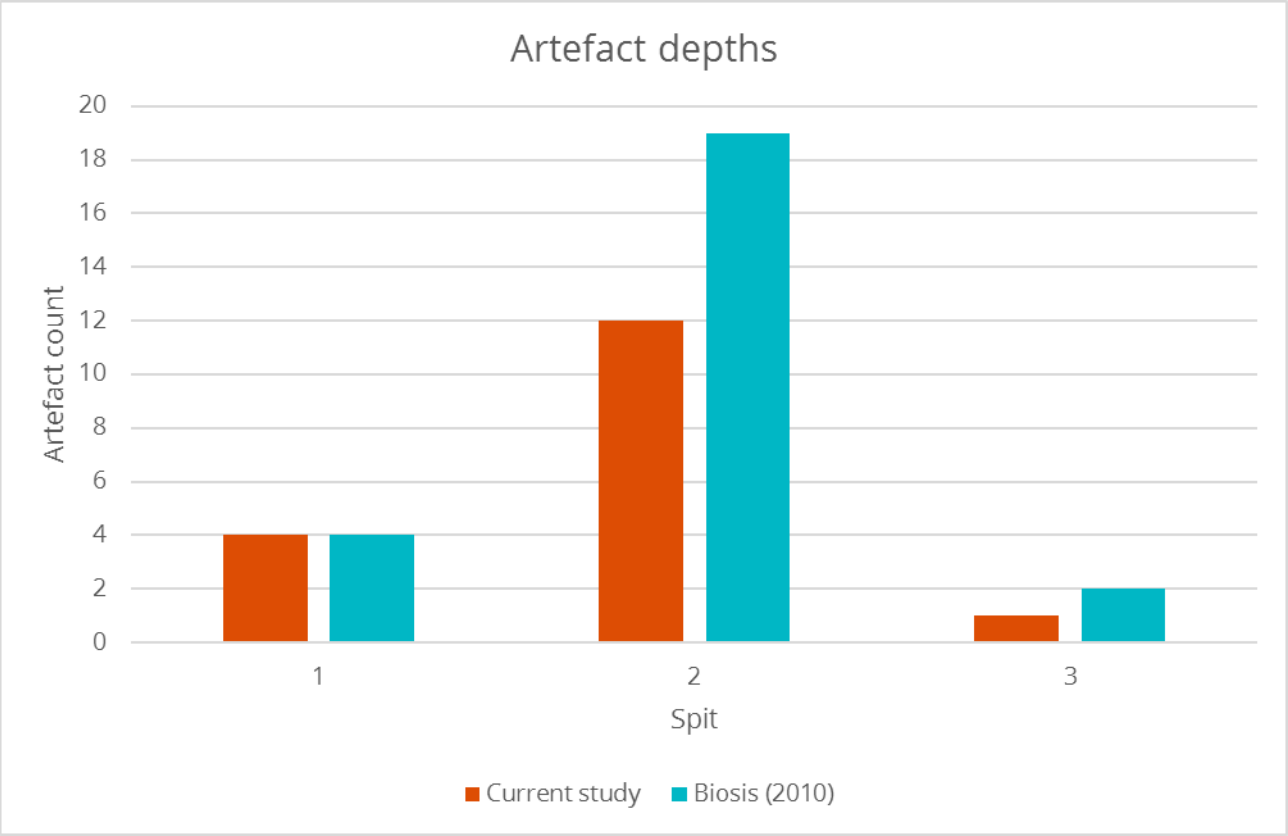
6.1 Vertical distribution

The majority of artefacts were found within spit 2 (n=12), located between 100 and 200 millimetres in depth. Four artefacts were also identified in spit 1 and one in spit 3. All 17 artefacts were confined to the same or similar soil contexts, a moderately compacted silty clay (Table 8).

Table 8 Artefact counts by depth

Area	Spit 1	Spit 2	Spit 3
AHIMS 52-5-0956/Tallawarra North PAD 1	3	8	0
AHIMS 52-5-0955/Tallawarra North PAD 2	1	2	0
AHIMS 52-5-0223/Boomberry Point 1	0	1	1
AHIMS 52-5-0643/Gilba Road 2 Fill	0	1	0
Total	**4**	**12**	**1**

The vertical distribution of artefacts identified were consistent with the results of test excavations conducted by Biosis (2010) within the Tallawarra Lands, which encompassed the current study area. The 2010 test excavations identified the greatest density of artefacts between 100 and 200 millimetres, with lower numbers of artefacts identified in the spit above and below this, mirroring the trends seen in the current study area (Graph 1). It is likely that the period of occupation in the study area occurred during the deposition of artefacts in spit 2, with artefacts located in spit 1 and below spit 2 the result of post depositional processes such as bioturbation, trampling or shrink-swell of clay soils causing movement of artefacts.



Graph 1 Depths of artefacts in current study area and Biosis (2010)

6.2 Raw materials and cortex

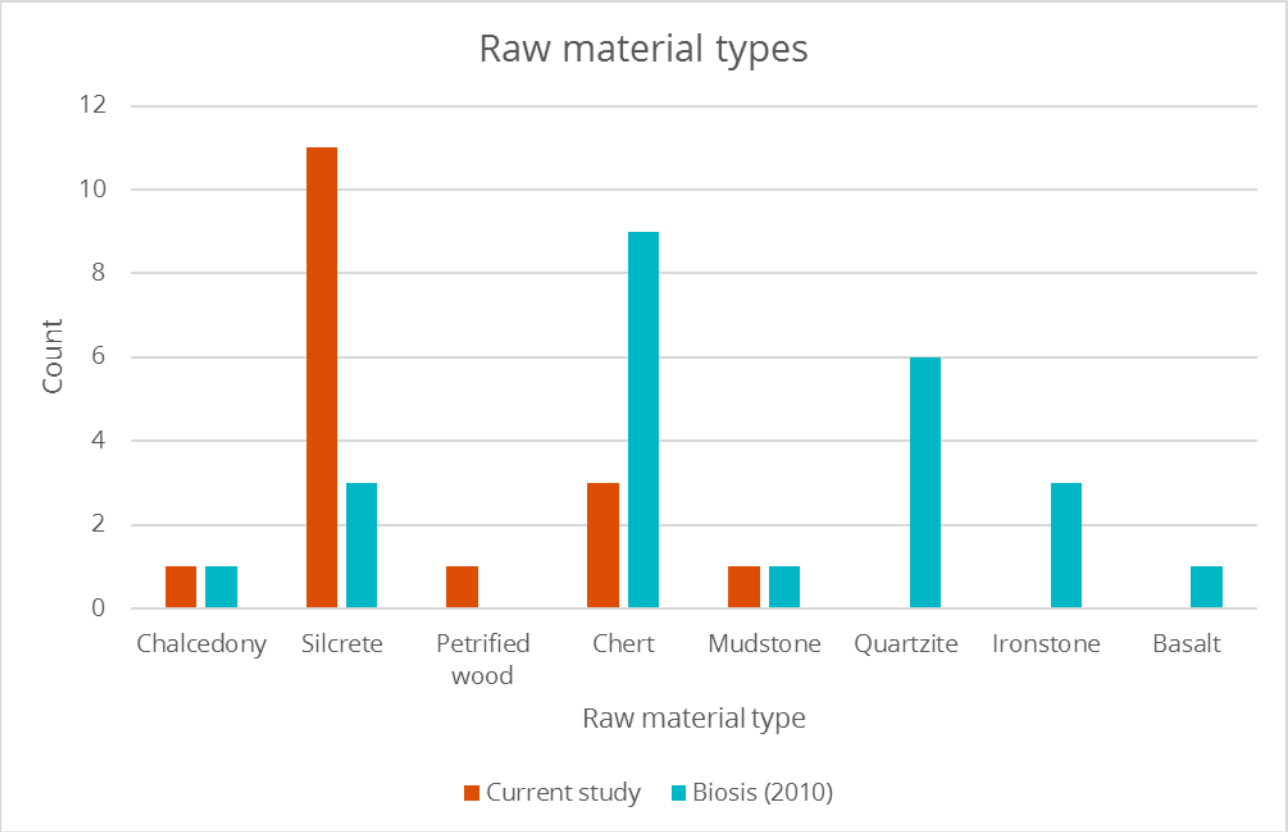
A total of five different raw material types were identified across the study area, all of which are commonly identified across the Illawarra region (Table 9 and Graph 2). Silcrete was the most frequent raw material recorded, making up 64.7% of the total assemblage. The second most common raw material was chert, making up 17.6% of the assemblage. One instance each of petrified wood, chalcedony and mudstone were also identified across the assemblage.

Table 9 Raw materials by PAD

Area	Silcrete	Petrified wood	Chalcedony	Chert	Mudstone
AHIMS 52-5-0956/Tallawarra North PAD 1	8	0	0	2	1
AHIMS 52-5-0955/Tallawarra North PAD 2	2	0	0	1	0
AHIMS 52-5-0223/Boomberry Point 1	1	0	1	0	0
AHIMS 52-5-0643/Gilba Road 2 Fill	0	1	0	0	0
Total	**11**	**1**	**1**	**3**	**1**

The proportion of raw material in the study area does not reflect those identified in the Biosis (2010) test excavations across the Tallawarra Lands. Even though there are similar raw material types, the 2010

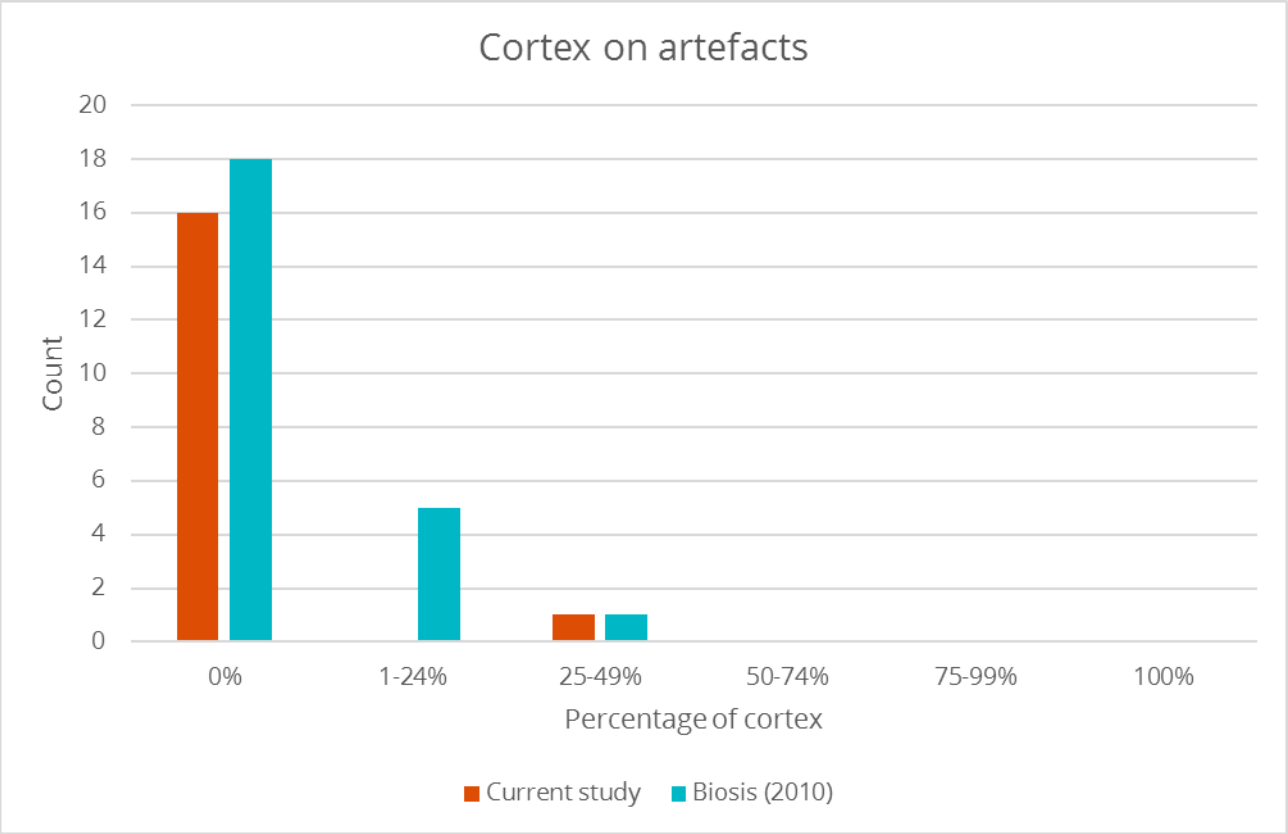
investigations identified chert as the most common raw material followed by silcrete. In addition, the current test excavations did not identify quartzite, ironstone or basalt artefacts amongst the assemblage.



Graph 2 Raw materials identifed in current study and Biosis (2011b)

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 2004).

Only one artefact within the assemblage contained cortex. The very low levels of cortex suggest that no primary reduction occurred within the study area, potentially reflecting that the artefacts were discarded away from raw material sources or areas where primary reduction may have occurred such as high intensity occupation areas. The results of this assessment largely correspond with the results of the 2010 test excavations, in that cortex is not present or present in reduced quantities. Comparing with the results of Biosis (2010) shows that the majority of artefacts had no cortex and where typical of later stages of reduction (Graph 3).



Graph 3 Measurements of cortex on artefacts in current study and Biosis (2011b)

6.3 Artefact types

Artefact types identified within the subsurface assemblage consist of four complete flakes, three proximal flake fragments, two each of medial, distal and angular fragments, and one core fragment (Table 10).

Table 10 Artefact types in study area

Artefact Type	Count	Percentage (%)
Angular Fragment	2	11.76
Core fragment	2	11.76
Flake - Complete	9	52.94
Flake - Distal	2	11.76
Flake - Medial	1	5.88
Flake - Proximal	1	5.88
Total	**17**	**100**

A breakdown of artefact types by each area does not identify any trends in site use (Table 11). Tallawarra North PAD 1, Tallawarra North PAD 2 and Boomberry Point 1 were the only areas to contain complete flakes, while only one of the core fragments was identified in the same area as complete flakes. The limited number

of artefacts at both sites suggests there was relatively little artefact reduction occurring at either site, while the small number of tools (n=1) or artefacts displaying use suggests no long term activities such as food processing or tool manufacture were occurring here.

Table 11 Artefact types by PAD area

Area	Angular fragment	Core fragment	Flake – Complete	Flake – Distal	Flake – Medial	Flake – Proximal
AHIMS 52-5-0956/Tallawarra North PAD 1	2	0	6	1	1	1
AHIMS 52-5-0955/Tallawarra North PAD 2	0	1	2	0	0	0
AHIMS 52-5-0223/Boomberry Point 1	0	0	1	1	0	0
AHIMS 52-5-0643/Gilba Road 2 Fill	0	1	0	0	0	0
Total	**2**	**2**	**9**	**2**	**1**	**1**

Plate 29 Complete chert flake from Tallawarra North PAD 1

Plate 30 Silcrete distal flake fragment from Boomberry Point 1

Plate 31 Complete silcrete flake from Tallawarra North PAD 1

6.4 Discussion of results

The density of artefacts recovered from the test excavations was small; however, they can still tell us something about occupational patterns in the area. The artefacts recovered allow for a comparison with the previous studies undertaken within the Illawarra region that have addressed site patterning for the Wollongong Plains. The general pattern indicates that the majority of Aboriginal sites are located in areas that have abundant resources, are close to permanent water sources and have good vantage points over the surrounding area. As an example of these areas, Lake Illawarra and its immediate surroundings provided a diversity of resources which is confirmed by a high number of archaeological sites that contain high numbers and ranges of cultural material. Areas that are further away from permanent water sources, perennial creeks and lakes, have fewer archaeological sites with lower density and range of cultural material present. Ethnographic accounts suggest that Aboriginal groups were highly mobile, largely dispersed and were moving seasonally for resource exploitation and/or ceremonial activities. Those pathways were documented to exist through the mountains connecting the Plateau with the coast with spur lines and ridge lines being used as traveling corridors.

The wide spread AMBS study of the West Dapto Release Area (2006), which is approximately 2.5 kilometers west of the current study area, suggested that all landforms within the study area were subject to some use by Aboriginal people in the past. They found that artefact densities indicated some landforms were subject to greater use than others, noting that:

- Test pits containing artefacts were located in all landforms in the following order: alluvial flats, hillslopes, spur crests, 3rd order, 2nd order, 4th and at last 1st order creek lines.
- The highest density of artefacts were present in landforms in the following order: hillslopes, 2nd order streams, 1st order streams, 3rd order streams, alluvial flats, 4th order streams, and spur crests.
- 71.18% of test pits contained less than five artefacts.
- Raw materials including, chert, quartz, quartzite, silcrete, silicified tuff and fine-grained siliceous, and included broken flakes, flakes, flaked pieces and cores.

The highest number of artefacts recovered by AMBS in the Duck Creek catchment, 2 kilometres south-west of the study area, were from alluvial flats followed by spur crests. Of the test pits excavated in this catchment, 58.3% of test pits were found to contain artefacts (AMBS 2006, pp. 188). Artefact density for individual test pits was generally very low; however, high recovery rates of artefacts throughout the West Dapto Release Area suggested that the use of the area was widespread rather than intensive (AMBS 2006, pp. 266), with occupation being more intensive or repeated within close proximity to major creek lines and creek convergences where resources were readily accessible (AMBS 2006, pp. 266).

Biosis undertook excavations in 2010 that encompassed the entire Tallawarra Lands and the current study area. This investigation revealed that out of 46 excavated test pits placed across five landforms, 14 had artefacts present. This results in 30% of test pits containing artefacts. This was significantly lower than was found by AMBS. The highest number of artefacts were recovered from 100 to 200 millimetres in depth and located within fluvial landforms such as drainage and creeklines. However, similar to AMBS, artefact densities were generally very low and artefacts were typically represented by unretouched flakes with little to no cortex present. This result indicates that sites are likely to be focused along the Duck Creek corridor (Biosis 2010, p. 115), with occupation decreasing further away from water and the resources present there. It is also likely that sites present in this corridor will consist of isolated or low density artefact scatters consisting of unretouched flakes and debitage, which is representative of sporadic use of the area as a resource collection zone rather than an area of intensive occupation. Cultural material recovered from all the tested sites occurs commonly within the region and had very limited archaeological research potential.

The 2011 test excavations for the Tallawarra recreational shareway, which encompasses parts of the current study area, consisted of 157 auger holes along the foreshore. Eight artefacts were recovered from eight auger holes, which resulted in 5.09% of tests pits containing artefacts. Again, this is significantly lower than was found by AMBS. Six of the eight stone artefacts were excavated in a tidal creek landform directly south of Tallawarra Power Station Midden (AHIMS 52-5-0070) and consisted of four chert flakes, one quartz flake and one silcrete flake. No midden material was encountered during the test excavations. Both the raw materials and artefact types identified within the small assemblage is consistent with previous assessments and the current assessment. The results of the Biosis (2011) assessment suggested that the area was utilised as a resource collection zone, with artefacts present consisting of isolated or low density scatters of low archaeological potential. Biosis concluded that the Tallwara Power Station Midden was representative of camping activities or frequent travel through the area.

The results of the current round of test excavations have provided information which is generally consistent with what has been found by previous assessments undertaken by Biosis (2010, 2011) within Tallawarra Lands. All sites identified in the study area by the current assessment consisted of low density and sporadically placed sites, with 8.5% of test pits containing artefacts. Sites were found to generally be located along the crest landform, unlike the 2010 and 2011 test excavations that identified artefacts in the tidal creek landform. Artefacts making up sites were consistent with Biosis (2010, 2011), with chert and silcrete forming the most common raw material types in all assessments. Similarly, cortex was low across all studies, and there was little variation in artefact types across the assessments with complete flake and flake fragments most common and no usewear evident on artefacts. Furthermore, all three assessments did not identify shell midden material.

The presence of low density artefact scatters are most likely remnants of people traversing the area or represent short-term camping grounds. The most suitable locations for short-term occupation for those travelling along the ridge line are likely to be on hill crests and gently sloped sections of the side slopes due to the more level gradient of these locations. Occupation within these landforms would have been transient, isolated events that might have been frequent in the hill crest landform unit as it offers the most expansive vistas over Lake Illawarra. This is supported by ethnographic evidence that suggests the tracks connecting the coast to the interior would be expected to cross the West Dapto area, due to its geographic location between the two, specifically Bong Bong Pass. Aboriginal tracks are usually along ridges, and consequently, sites could be expected in the saddles of ridges (Sefton 1988, pp. 22-29).

The results of the current and previous assessments in the study area indicate that the area was utilised to some degree, although occupation in the area was not intensive. The Lake Illawarra foreshore and surrounding alluvial plains offered a variety of resources that were utilised by Aboriginal people and the area was likely used as resource gathering zone rather than an area of intensive occupation. This is supported by the existence of sporadic low density artefact scatters and the absence of shell midden material within the study area. The results of these assessments indicate that sub-surface deposits will consist of low density artefact scatters, which share common characteristics with existing identified sites and contain low scientific significance.

6.5 Response to research questions

Do non-disturbed or minimally-disturbed soil profiles exist within the potential archaeological deposits associated with sites AHIMS 52-5-0223/Boomberry Point 1, AHIMS 52-5-0225/Elizabeth Point, AHIMS 52-5-0643/Gilba Road 2 Fill, and AHIMS 52-5-0642/Gilba Road 1?

AHIMS 52-5-0225/Elizabeth Point, AHIMS 52-5-0643/Gilba Road 2 Fill and AHIMS 52-5-0642/Gilba Road 1 all displayed relatively undisturbed test pits. Within AHIMS 52-5-0225, the soil profiles consisted of a silty A horizon of up to 80 millimetres that overlaid a silty clay B horizon to a depth of between 200 and 300

millimetres. Clay occurred at the base of all test pits and no disturbances were observed. The soil profiles are relatively consistent with the Shellharbour soil landscape, which has a high to very high erodibility rating and is susceptible to frequent soil movement. This results in poor preservation of archaeological material at shallow depths but would potentially lead to exposures of any deeper archaeological deposits were topsoil has eroded away. This may explain why no artefacts were recovered from AHIMS 52-5-0225.

Undisturbed soil profiles were also recorded in close proximity to AHIMS 52-5-0643 and AHIMS 52-5-0642. The A horizon consisted of approximately 150 millimetres of silty sand that overlaid a clay to a depth of between 160 and 250 millimetres. Only one artefact was identified and no disturbances were observed. However, auger holes within AHIMS 52-5-0223 showed evidence of disturbances. Two of the four auger holes contained asbestos suggesting disturbances within the area.

What species of shell or vertebrate exist within the deposits and what can they tell us about the subsistence patterns of Aboriginal people living in the area?

There was no shell identified in any test pits or auger holes. AHIMS 52-5-0223/Boomberry Point 1 was recorded as a small dispersed shell midden; however, background research revealed that the correct location of this site is likely located on the track running from Tallawarra Power Station to Boomberry Point, three metres south of an unnamed creekline. Test excavations in the vicinity of the correct location did not reveal any shell fragments and the soil profiles noted on the site card (slightly darker than the surrounding soil and is probably related to the breakdown of charcoal) did not match those encountered during augering.

Are the species of shell or vertebrate remains found within the deposit comparable with the species found in other excavated middens within the region?

As above, there were no shell fragments identified in any test pits or auger holes.

What management is appropriate? Does the area warrant further investigation, conservation, or could proposed development works proceed as planned?

The management, mitigation and recommendations for the proposed development are outlined in Section 8.

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 Aboriginal Cultural Heritage Assessment 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, DPIE and the Heritage Branch, NSW Department of Planning 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 DPIE 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, p.249, NPWS 1997), For this reason, the NPWS summarises the situation as 'while various criteria for archaeological significance assessment have been advanced over the years, most of them fall under the heading of archaeological research potential' (NPWS 1997, p.26). The NPWS criteria for archaeological significance assessment are based largely on the ICOMOS Burra Charter.

Research potential

Research potential is assessed by examining site content and site condition. Site content refers to all cultural materials and organic remains associated with human activity at a site. Site content also refers to the site structure – the size of the site, the patterning of cultural materials within the site, the presence of any stratified deposits and the rarity of particular artefact types. As the site contents criterion is not applicable to scarred trees, the assessment of scarred trees is outlined separately below. The site content ratings used for archaeological sites are provided in Table 12. Site condition refers to the degree of disturbance to the contents of a site at the time it was recorded. The site condition ratings used for archaeological sites are provided in Table 13.

Table 12 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

Rating	Description
	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 13 Site condition ratings used for archaeological sites.

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

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

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

Representativeness

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

Assessment of representativeness also takes into account the contents and condition of a site. For example, in any region there may only be a limited number of sites of any type that have suffered minimal disturbance. Such sites would therefore be given a high significance rating for representativeness, although they may occur commonly within the region. The representativeness ratings used for archaeological sites are provided in Table 14.

Table 14 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 15.

Table 15 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 test excavations. The results are in Table 16.

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 17 below.

Table 16 Scientific significance assessment of archaeological sites recorded within the study area.

Site name	Site content	Site condition	Representativeness	Scientific significance
Boomberry Point 1 AHIMS 52-5-0223	1	1	1	3 - Low
Elizabeth Point AHIMS 52-5-0225	1	1	1	3 - Low
Gilba Road 1 AHIMS 52-5-0642	1	1	1	3 - Low
Gilba Road 2 Fill AHIMS 52-5-0643	1	1	1	3 - Low

Site name	Site content	Site condition	Representativeness	Scientific significance
Gilba Road 3 AHIMS 52-5-0957	1	1	1	3 - Low
Gilba Road 4 AHIMS 52-5-0958	1	1	1	3 - Low
Gilba Road 5 AHIMS 52-5-0959	1	1	1	3 - Low
Gilba Road 6 AHIMS 52-5-0960	1	1	1	3 - Low
Tallawarra North PAD 1 AHIMS 52-5-0956	1	1	1	3 - Low
Tallawarra North PAD 2 AHIMS 52-5-0955	1	1	1	3 - Low
Tallawarra ISO 1 AHIMS 52-5-0954	1	1	1	3 - Low

Table 17 Statements of scientific significance for archaeological sites recorded within the study area.

Site Name	Statement of Significance
Boomberry Point 1 AHIMS 52-5-0223	Boomberry Point 1 consisted of shell midden containing one shell species. The site was exposed on the side of a track in a hill slope landform. The site was noted to be badly disturbed with highly fragmented shell. Test excavations identified three artefacts; however, no shell was found at this site. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Elizabeth Point AHIMS 52-5-0225	Elizabeth Point was recorded as an isolated stone artefact located on a walking track. The artefact was a grey chert flake piece, common in the region and was observed to have been disturbed by the walking track. The site could not be relocated during the survey and no artefacts were identified during test excavations at this site. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Gilba Road 1 AHIMS 52-5-0642	Site was recorded as a stone artefact located at the very beginning of a concrete pathway. Based on the location of this artefact and current aerial imagery the artefact has been disturbed as the concrete pathway now extends through the area the artefact was initially found in. The site could not be relocated during the survey and no artefacts were identified during test excavations at this site. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Gilba Road 2 Fill AHIMS 52-5-0643	The site was recorded as an artefact and was located in an area of fill, with shell and pottery also present. This location of the artefact in an area of fill indicates that the site has been disturbed. The site could not be relocated during the survey and no artefacts were identified during test excavations at this site. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.

Site Name	Statement of Significance
Gilba Road 3 **AHIMS 52-5-0957**	This site is located within a simple slope landform approximately 35 metres south-west of Gilba Road 2 Fill. During test excavations, one artefact was recovered from an auger hole, which consisted of a petrified wood multi-directional core. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Gilba Road 4 **AHIMS 52-5-0958**	This site is located within a simple slope landform, 30 metres south-east of an unnamed creekline. During test excavations, one artefact was recovered from an auger hole, which consisted of a silcrete flake fragment. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Gilba Road 5 **AHIMS 52-5-0959**	This site is located within a simple slope landform, 80 metres east of Gilba Road 5. During test excavations, two artefacts were recovered from one test pit and one auger hole, which consisted of a complete chalcedony flake and complete mudstone flake. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Gilba Road 6 **AHIMS 52-5-0960**	This site is located within a simple slope landform, approximately 140 metres east of Gilba Road 6. During test excavations, one artefact was recovered from a test pit, which consisted of a complete silcrete flake. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Tallawarra North PAD 1 **AHIMS 52-5-0956**	Test excavations within Tallawarra North PAD 1 revealed a low density artefact scatter. The site is located within a crest landform approximately 310 metres from Lake Illawarra and 11 subsurface artefacts were identified. The artefacts consisted of complete flakes and flake fragments, with raw materials including silcrete, chert and mudstone. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Tallawarra North PAD 2 **AHIMS 52-5-0955**	Test excavations within Tallawarra North PAD 2 revealed low density artefact scatter. The site is located within a flat landform approximately 50 metres from an unnamed creekline. Three subsurface artefacts were identified. The artefacts consisted of two complete flakes and one multi-directional core, and raw materials including silcrete and chert. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.
Tallawarra ISO 1 **AHIMS 52-5-0954**	This site is located within a crest landform approximately 60 metres south of an unnamed creekline During test excavations, one artefact was recovered from a test pit, which consisted of a silcrete flake fragment. This site type occurs frequently throughout the region and the scientific significance of this site has been assessed as low. The site has low historical and moderate aesthetic value.

8 Impact assessment

As previously outlined, the project proposes to modify the existing concept approval for the Northern Precinct (MP 09_0131 MOD 1) to allow an increased residential lot yield and lodge a development application for the proposed electrical transmission relocation in the Northern Precinct.

8.1 Predicted physical impacts

The proposed works will include earthworks, the construction of new residential dwellings and associated infrastructure including roads, underground piping and cabling, and associated earthworks.

Within the study area, there are 11 Aboriginal sites that may be subject to harm:

- AHIMS 52-5-0223/Boomberry Point 1.
- AHIMS 52-5-0225/Elizabeth Point.
- AHIMS 52-5-0643/Gilba Road 2 Fill.
- AHIMS 52-5-0642/Gilba Road 1.
- AHIMS 52-5-0957/Gilba Road 3.
- AHIMS 52-5-0958/Gilba Road 4.
- AHIMS 52-5-0959/Gilba Road 5.
- AHIMS 52-5-0960/Gilba Road 6.
- AHIMS 52-5-0956/Tallawarra North PAD 1.
- AHIMS 52-5-0955/Tallawarra North PAD 2.
- AHIMS 52-5-0954/Tallawarra ISO 1.

It is expected that the potential of harm these 11 sites from the proposed development will be direct, with a total loss of value (Figure 14). Strategies to avoid or minimise harm to Aboriginal heritage in or near the study area are discussed below. A summary of impacts is provided below in Table 18.

Table 18 Summary of potential archaeological impacts

AHIMS site no.	Site name	Significance	Type of harm	Degree of harm	Consequence of harm
52-5-0223	Boomberry Point 1	Low	Direct	Total	Total loss of value
52-5-0225	Elizabeth Point	Low	Direct	Total	Total loss of value
52-5-0642	Gilba Road 1	Low	Direct	Total	Total loss of value
52-5-0643	Gilba Road 2 Fill	Low	Direct	Total	Total loss of value
52-5-0957	Gilba Road 3	Low	Direct	Total	Total loss of value

AHIMS site no.	Site name	Significance	Type of harm	Degree of harm	Consequence of harm
52-5-0958	Gilba Road 4	Low	Direct	Total	Total loss of value
52-5-0959	Gilba Road 5	Low	Direct	Total	Total loss of value
52-5-0960	Gilba Road 6	Low	Direct	Total	Total loss of value
52-5-0956	Tallawarra North PAD 1	Low	Direct	Total	Total loss of value
52-5-0955	Tallawarra North PAD 2	Low	Direct	Total	Total loss of value
52-5-0954	Tallawarra ISO 1	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' (Australia ICOMOS 2013). In cases where conservation is not practical, several options for management are available. For sites, management often involves the salvage of features or artefacts, retrieval of information through excavation or collection (especially where impact cannot be avoided) and interpretation.

Avoidance of impact to archaeological and cultural heritage sites through design of the development is the primary mitigation and management strategy, and should be implemented where practicable. The 11 sites located within the study area encompass less than 5% of the development area. In order to avoid these site completely, the subdivision would need to be redesigned. The proponent has advised Biosis that a redesign in order to achieve complete avoidance is not viable.

Another option to mitigate impacts on the sites is through partial avoidance. The proposed development involves subdivision of the land. The proponent will therefore no longer be responsible for the land once the area is subdivided and sold, nor will the proponent be able to control any potential impacts on the site made by the new owners of the land. The conserved areas of the study area will be at risk of destruction without mitigation should the area be developed and portions of the site retained. Partial avoidance through redesign is therefore not considered to be a practicable mitigation method.

Test excavations were undertaken in the study area to determine the nature and extent of AHIMS 52-5-0223/Boomberry Point 1 and AHIMS 52-5-0225/Elizabeth Point, along with two areas of PAD (Tallawarra North PAD 1 and Tallawarra North PAD 2), to retrieve as much data as possible about Aboriginal occupation of the study area. The test excavations have revealed that AHIMS 52-5-0223 contained three subsurface artefacts, while AHIMS 52-5-0225 contained no subsurface deposits, artefacts or shell. Tallawarra PAD 1 contained a low density subsurface artefact scatter and Tallawarra PAD 2 contained three artefacts. AHIMS 52-5-0643/Gilba Road 2 Fill and AHIMS 52-5-0642/Gilba Road 1 also did not contain subsurface artefacts or shell; however, one artefact was recorded from one auger hole in close proximity to AHIMS 52-5-0643/Gilba Road 2 Fill (Gilba Road 3, AHIMS pending). Within the low potential area, one artefact was recovered.

As noted above, the proposed works cannot avoid impacts to 11 AHIMS sites therefore the following mitigation measures, which considered the principles of ecological sustainable development (ESD) and intergenerational equity in their design, are proposed:

- AHIMS 52-5-0956/Tallawarra PAD 1, AHIMS 52-5-0955/Tallwarra PAD 2 and AHIMS 52-5-0959/Gilba Road 5 are low density, subsurface artefact deposits. Three additional isolated artefact sites were also identified. Impacts to these site cannot be avoided by the proposed works. The sites has been tested as part of a test excavation program. The artefacts recovered during the test excavations have been catalogued and analysed which has contributed to our current knowledge of Aboriginal archaeological site type and distribution throughout the Illawarra region. The test excavations have increased our current understanding of Aboriginal occupation in the region ensuring that any scientific and cultural information obtained can be accessed and used by future generations. Further testing and salvage of this site is not recommended. This site should be managed under an Aboriginal CHMP.
- A long term care agreement in consultation with RAPs of the artefacts recovered during the test excavations should be developed. Several management options are possible depending on the wishes of RAPs. Artefacts recovered from the excavations can be given back to the Aboriginal community through a long term care agreement where they can then be used to teach subsequent generations about Aboriginal culture or can be reburied in a culturally appropriate place. We believe this considers the principles of ESD and intergenerational equity and more importantly ensures that recovered artefacts are managed according to the wishes of RAPs.
- A draft CHMP for Tallawarra Lands North Precinct will be prepared in consultation with the RAPs and EES. The CHMP will facilitate the implementation of the mitigation and conservation strategies by clearly setting out a process for the management of Aboriginal cultural heritage prior to, during and subsequent to the construction stages of the proposed development.
- Heritage inductions for all site workers and contractors should be undertaken in order to prevent any unintentional harm to Aboriginal sites located within the study area and its surrounds.

Figure 14 Proposed development showing location of Aboriginal sites

This page contains sensitive information and has not been included in this report.

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: Aboriginal cultural heritage management plan (CHMP)

A CHMP should be developed in consultation with RAPs and EES. The CHMP will facilitate the implementation of the management and mitigation strategies for all Aboriginal sites located within the study area by clearly outlining Aboriginal site management requirements including the management of unexpected finds.

Recommendation 2: Application for an Aboriginal Heritage Impact Permit

Biosis understands that DPIE have requested a CHMP be developed for this project; however, prior to the construction stages it is recommended that the proponent apply to EES for an AHIP to destroy the listed Aboriginal sites within the study area which are currently protected under the NPW Act.

Recommendation 2: Continued consultation with the registered Aboriginal parties

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

Recommendation 3: Discovery of Unanticipated Aboriginal Objects

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

Recommendation 4: Discovery of Aboriginal Ancestral Remains

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

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

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Appendices

Appendix 1 AHIMS results

Appendix 2 Test excavations results

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
Tallawarra PAD 1											
1.1	Test pit	March 2, 2020	Crest	1	0	90	7.5YR 4/2	Silt	Grass roots	6	–
1.1	Test pit	March 2, 2020	Crest	2	90	120	7.5YR 3/2	Clayey silt	–	5.5	–
1.1	Test pit	March 2, 2020	Crest	3	120	180	7.5YR 3/2	Clay	–	6	–
1.2	Test pit	March 2, 2020	Crest	1	0	60	7.5YR 4/2	Silt	Grass roots	6	–
1.2	Test pit	March 2, 2020	Crest	2	60	100	7.5YR 3/2	Clayey silt	–	5.5	–
1.2	Test pit	March 2, 2020	Crest	3	100	130	7.5YR 3/2	Clay	–	6	–
1.3	Test pit	March 2, 2020	Crest	1	0	130	7.5YR 3/2	Silt	Grass roots	5.5	–
1.3	Test pit	March 2, 2020	Crest	2	130	230	7.5YR 2.5/2	Silty clay	Charcoal 20mm, clay stones 30mm	5	2
1.3	Test pit	March 2, 2020	Crest	3	230	280	7.5YR 2.5/2	Clay	Charcoal 20-30mm, clay stones 5-30mm	5	–
1.4	Test pit	March 2, 2020	Crest	1	0	60	7.5YR 3/2	Silt	Grass roots	5.5	–
1.4	Test pit	March 2, 2020	Crest	2	60	100	7.5YR 2.5/2	Silty clay	Clay stones 20-30mm	5	–
1.4	Test pit	March 2, 2020	Crest	3	100	170	7.5YR 4/4	Clay	Clay stones 5-10mm, ants nest	5.5	–
1.5	Test pit	March 2, 2020	Crest	1	0	70	7.5YR 3/2	Silt	Grass roots	5.5	–
1.5	Test pit	March 2, 2020	Crest	2	70	260	7.5YR 3/2	Silty clay	Sand stones 20-200mm, charcoal fragments 5-20mm	5	–
1.5	Test pit	March 2, 2020	Crest	3	260	300	7.5YR 4/2	Clay	Sand stones 5-100mm	5.5	–
1.6	Test pit	March 2, 2020	Crest	1	0	90	7.5YR 3/2	Silt	Grass roots	5.5	–
1.6	Test pit	March 2, 2020	Crest	2	90	160	7.5YR 3/2	Silty clay	Sand stones 10-30mm	5	–
1.6	Test pit	March 2, 2020	Crest	3	160	290	7.5YR 4/2	Clay	Sand stones 5-40mm	5.5	–
1.7	Test pit	March 2, 2020	Crest	1	0	70	7.5YR 3/2	Silt	Grass roots	5.5	–
1.7	Test pit	March 2, 2020	Crest	2	70	190	7.5YR 3/2	Silty clay	Sand stones 5-20mm	5	–
1.7	Test pit	March 2, 2020	Crest	3	190	290	7.5YR 4/2	Clay	Sandstone 5-40mm	5.5	–
1.8	Test pit	March 2, 2020	Crest	1	0	70	7.5YR 3/2	Silt	Grass roots	5.5	–
1.8	Test pit	March 2, 2020	Crest	2	70	220	7.5YR 3/2	Silty clay	–	5	–
1.8	Test pit	March 2, 2020	Crest	3	220	270	7.5YR 4/2	Clay	–	5.5	–
1.9	Test pit	March 3, 2020	Crest	1	0	90	7.5YR 3/2	Silt	Grass roots	5.5	1
1.9	Test pit	March 3, 2020	Crest	2	90	180	7.5YR 3/2	Silty clay	–	5	–
1.9	Test pit	March 3, 2020	Crest	3	180	220	7.5YR 4/2	Clay	–	5.5	–

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
1.10	Test pit	March 3, 2020	Crest	1	0	70	7.5YR 3/2	Silt	Grass roots	5.5	–
1.10	Test pit	March 3, 2020	Crest	2	70	160	7.5YR 3/2	Silty clay	–	5	–
1.10	Test pit	March 3, 2020	Crest	3	160	260	7.5YR 4/2	Clay	–	5.5	–
1.11	Test pit	March 3, 2020	Crest	1	0	80	7.5YR 3/2	Silt	Grass roots	5.5	–
1.11	Test pit	March 3, 2020	Crest	2	80	190	7.5YR 3/2	Silty clay	–	5	–
1.11	Test pit	March 3, 2020	Crest	3	190	220	7.5YR 4/2	Clay	–	5.5	–
1.12	Test pit	March 3, 2020	Crest	1	0	80	7.5YR 3/2	Silt	Grass roots	5.5	–
1.12	Test pit	March 3, 2020	Crest	2	80	230	7.5YR 3/2	Silty clay	Sandstone fragments 5%	5	–
1.13	Test pit	March 3, 2020	Crest	1	0	100	7.5YR 3/2	Silt	Grass roots	5.5	–
1.13	Test pit	March 3, 2020	Crest	2	100	160	7.5YR 3/2	Silty clay	Sandstone fragments 5% 5-40mm	5	–
1.13	Test pit	March 3, 2020	Crest	3	160	250	7.5YR 4/2	Clay	–	5.5	–
1.14	Test pit	March 3, 2020	Crest	1	0	120	7.5YR 3/2	Silt	Grass roots	5.5	–
1.14	Test pit	March 3, 2020	Crest	2	120	290	7.5YR 3/2	Silty clay	Sandstone fragments of 2% 5-20mm	5	–
1.14	Test pit	March 3, 2020	Crest	3	290	390	7.5YR 4/2	Clay	Red/orange mottles	5.5	–
1.15	Test pit	March 3, 2020	Crest	1	0	100	7.5YR 3/2	Silt	Grass roots	5.5	–
1.15	Test pit	March 3, 2020	Crest	2	100	170	7.5YR 3/2	Silty clay	Sandstone fragments of 2% 5-20mm	5	–
1.15	Test pit	March 3, 2020	Crest	3	170	310	7.5YR 4/2	Clay	–	5.5	–
1.16	Test pit	March 9, 2020	Crest	1	0	250	7.5YR 4/2	Clay	–	5.5	–
1.16	Test pit	March 9, 2020	Crest	2	250	310	7.5YR 3/2	Silty clay	Sandstone fragments of 5% 10-80mm	5	–
1.17	Test pit	March 9, 2020	Crest	1	0	200	7.5YR 4/2	Clay	–	5.5	–
1.17	Test pit	March 9, 2020	Crest	2	200	260	7.5YR 3/2	Clay	Sandstone fragments of 5% 10-80mm	5	–
1.18	Test pit	March 9, 2020	Crest	1	0	200	7.5YR 4/2	Clay	–	5.5	–
1.18	Test pit	March 9, 2020	Crest	2	200	300	7.5YR 3/2	Silty clay	Sandstone fragments of 2% 5-20mm	5	–
1.19	Test pit	March 9, 2020	Crest	1	0	200	7.5YR 4/2	Silty clay	–	5.5	–
1.19	Test pit	March 9, 2020	Crest	2	200	300	7.5YR 3/2	Silty clay	Sandstone fragments of 2% 5-20mm	5	–
1.20	Test pit	March 10, 2020	Crest	1	0	90	7.5YR 3/2	Clayey silt	–	6	–
1.20	Test pit	March 10, 2020	Crest	2	90	230	7.5YR 3/2	Silty clay	Sandstone fragments 10-30mm 5%	6	–
1.20	Test pit	March 10, 2020	Crest	3	230	320	7.5YR 3/2	Clay	Sandstone fragments 10-60mm 10%	6	–
1.21	Test pit	March 10, 2020	Crest	1	0	90	7.5YR 3/2	Clayey silt	–	6	–
1.21	Test pit	March 10, 2020	Crest	2	90	300	7.5YR 3/2	Silty clay	Sandstone fragments 5-20mm 5%	6	–

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
1.21	Test pit	March 10, 2020	Crest	3	300	320	7.5YR 3/2	Clay	Sandstone fragments 10-60mm 5%	6	–
1.22	Test pit	March 10, 2020	Crest	1	0	80	7.5YR 3/2	Clayey silt	–	6	–
1.22	Test pit	March 10, 2020	Crest	2	80	260	7.5YR 3/2	Silty clay	Sandstone fragments 5-20mm 5%	6	–
1.22	Test pit	March 10, 2020	Crest	3	260	280	7.5YR 3/2	Clay	–	6	–
1.23	Test pit	March 10, 2020	Crest	1	0	110	7.5YR 3/2	Clayey silt	–	6	–
1.23	Test pit	March 10, 2020	Crest	2	100	270	7.5YR 3/2	Silty clay	Sandstone fragments 5-10mm 2%	6	–
1.23	Test pit	March 10, 2020	Crest	3	270	310	7.5YR 3/2	Clay	Sandstone fragments 10-30mm 2%	6	–
1.24	Test pit	March 10, 2020	Crest	1	0	100	7.5YR 3/2	Clayey silt	–	6	–
1.24	Test pit	March 10, 2020	Crest	2	100	260	7.5YR 3/2	Silty clay	Sandstone fragments 5-50mm 2%	6	–
1.24	Test pit	March 10, 2020	Crest	3	260	330	7.5YR 3/2	Clay	Sandstone fragments 5-10mm 2%, orange mottles	6	–
1.25	Test pit	March 10, 2020	Crest	1	0	110	7.5YR 3/2	Clayey silt	–	6	–
1.25	Test pit	March 10, 2020	Crest	2	110	260	7.5YR 3/1	Silty clay	Sandstone fragments 5-30mm 2%, charcoal fragments 5-10mm 2%	6	–
1.25	Test pit	March 10, 2020	Crest	3	260	330	7.5YR 3/1	Clay	Orange mottles	6	–
1.26	Test pit	March 10, 2020	Crest	1	0	100	7.5YR 3/2	Clayey silt	–	6	–
1.26	Test pit	March 10, 2020	Crest	2	100	350	7.5YR 3/1	Silty clay	Sandstone fragments 5-10mm 2%	6	–
1.26	Test pit	March 10, 2020	Crest	3	350	430	7.5YR 3/1	Clay	Orange mottles	6	–
1.27	Test pit	March 10, 2020	Crest	1	0	110	7.5YR 3/2	Clayey silt	Sandstone 20-40mm 2%	6	–
1.27	Test pit	March 10, 2020	Crest	2	110	340	7.5YR 3/1	Silty clay	Sandstone fragments 5-10mm 2%	6	–
1.27	Test pit	March 10, 2020	Crest	3	340	430	7.5YR 3/1	Clay	Sandstone 40-80mm 10%	6	–
1.28	Test pit	March 11, 2020	Crest	1	0	60	7.5YR 3/2	Clayey silt	–	5	–
1.28	Test pit	March 11, 2020	Crest	2	60	190	7.5YR 2.5/2	Silty clay	Sandstone fragments 5-10mm 2%	6.5	–
1.28	Test pit	March 11, 2020	Crest	3	190	260	10YR 3/4	Clay	Sandstone 40-80mm 10%	6.5	–
1.29	Test pit	March 11, 2020	Crest	1	0	70	7.5YR 3/2	Clayey silt	–	5.5	–
1.29	Test pit	March 11, 2020	Crest	2	70	190	7.5YR 2.5/2	Silty clay	–	5.5	–
1.29	Test pit	March 11, 2020	Crest	3	190	200	10YR 3/4	Clay	Sandstone 40-80mm 10%	6.5	–
1.30	Test pit	March 11, 2020	Crest	1	0	60	7.5YR 3/2	Clayey silt	–	5.5	–
1.30	Test pit	March 11, 2020	Crest	2	60	210	7.5YR 2.5/2	Silty clay	–	5.5	–
1.30	Test pit	March 11, 2020	Crest	3	210	260	10YR 3/4	Clay	–	6.5	–
1.31	Test pit	March 11, 2020	Crest	1	0	70	7.5YR 3/2	Clayey silt	–	5.5	–
1.31	Test pit	March 11, 2020	Crest	2	70	320	7.5YR 2.5/2	Silty clay	–	5.5	–

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
1.31	Test pit	March 11, 2020	Crest	3	320	350	10YR 3/4	Clay	Large sandstone rocks	6.5	–
1.32	Test pit	March 11, 2020	Crest	1	0	70	7.5YR 3/2	Clayey silt	–	5.5	–
1.32	Test pit	March 11, 2020	Crest	2	70	190	7.5YR 2.5/2	Silty clay	–	5.5	1
1.32	Test pit	March 11, 2020	Crest	3	190	210	10YR 3/4	Clay	Large sandstone rocks	6.5	–
1.33	Test pit	March 11, 2020	Open depression	1	0	80	7.5YR 3/2	Clayey silt	–	5.5	–
1.33	Test pit	March 11, 2020	Open depression	2	80	180	7.5YR 2.5/2	Silty clay	–	5.5	–
1.33	Test pit	March 11, 2020	Open depression	3	180	200	10YR 3/2	Clay	–	6.5	–
1.34	Test pit	March 12, 2020	Open depression	1	0	90	7.5YR 3/2	Clayey silt	–	5.5	–
1.34	Test pit	March 12, 2020	Open depression	2	90	280	7.5YR 2.5/2	Silty clay	–	5.5	–
1.34	Test pit	March 12, 2020	Open depression	3	280	300	10YR 3/2	Clay	–	6.5	–
1.35	Test pit	March 13, 2020	Open depression	1	0	90	7.5YR 3/2	Clayey silt	–	5.5	–
1.35	Test pit	March 13, 2020	Open depression	2	90	250	7.5YR 2.5/2	Silty clay	–	5.5	–
1.36	Test pit	March 13, 2020	Open depression	1	0	200	7.5YR 3/2	Sandy silt	Charcoal 5mm-20mm 2%,	5.5	–
1.36	Test pit	March 13, 2020	Open depression	2	200	480	10YR 3/4	Silty sand	Suspected fill material near services	5	–
1.36	Test pit	March 13, 2020	Open depression	3	480	600	10YR 3/4	Sandy clay	–	6	–
1.37	Test pit	March 13, 2020	Open depression	1	0	240	7.5YR 3/2	Sandy silt	Charcoal 5mm-20mm 2%,	5.5	–
1.37	Test pit	March 13, 2020	Open depression	2	240	330	10YR 3/4	Silty sand	Suspected fill material near services	5	–
1.37	Test pit	March 13, 2020	Open depression	3	330	400	10YR 3/4	Clay	–	6	–
1.38	Test pit	March 13, 2020	Open depression	1	0	160	7.5YR 3/2	Sandy silt	Charcoal 5mm-20mm 2%,	5.5	–
1.38	Test pit	March 13, 2020	Open depression	2	160	180	10YR 3/4	Clay	–	6	–
2.1	Test pit	March 2, 2020	Crest	1	0	70	7.5YR 3/2	Silt	–	6	2
2.1	Test pit	March 2, 2020	Crest	2	70	140	7.5YR 4/2	Silty clay	Charcoal 5-10mm, clay stones 5mm	5	–
2.1	Test pit	March 2, 2020	Crest	3	140	170	7.5YR 3/2	Clay	Yellow/orange mottles	5.5	–
2.2	Test pit	March 2, 2020	Crest	1	0	110	7.5YR 3/2	Silt	–	6	–
2.2	Test pit	March 2, 2020	Crest	2	110	170	7.5YR 4/2	Silty clay	Clay stones 5-30mm	5	2
2.2	Test pit	March 2, 2020	Crest	3	170	190	7.5YR 3/2	Clay	Yellow mottles	5.5	–
2.3	Test pit	March 2, 2020	Crest	1	0	90	7.5YR 3/2	Silt	–	6	
2.3	Test pit	March 2, 2020	Crest	2	90	160	7.5YR 4/2	Silty clay	Clay stones 5-30mm	5	2
2.3	Test pit	March 2, 2020	Crest	3	160	230	7.5YR 3/2	Clay	Yellow mottles, large piece of sandstone in north-eastern corner. Finishes on sandstone bed rock	5.5	–
2.4	Test pit	March 2, 2020	Crest	1	0	90	7.5YR 3/2	Silt	–	6	–

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
2.4	Test pit	March 2, 2020	Crest	2	90	140	7.5YR 4/2	Silty clay	Clay stones 5-20mm	5	–
2.4	Test pit	March 2, 2020	Crest	3	140	170	7.5YR 3/2	Clay	Small sandstone rock in south-west corner	5.5	–
2.5	Test pit	March 2, 2020	Crest	1	0	90	7.5YR 3/2	Silt	–	6	–
2.5	Test pit	March 2, 2020	Crest	2	90	150	7.5YR 4/2	Silty clay	Clay stones 5-10mm	5	–
2.5	Test pit	March 2, 2020	Crest	3	150	190	7.5YR 3/2	Clay	Small sandstone rock in south-west corner	5.5	–
2.6	Test pit	March 2, 2020	Crest	1	0	80	7.5YR 3/2	Silt	–	6	–
2.6	Test pit	March 2, 2020	Crest	2	80	200	7.5YR 4/2	Silty clay	Clay stones 5-10mm	5	–
2.6	Test pit	March 2, 2020	Crest	3	200	320	7.5YR 3/2	Clay	Orange mottles	5.5	–
2.7	Test pit	March 3, 2020	Crest	1	0	60	7.5YR 3/3	Silt	–	6	–
2.7	Test pit	March 3, 2020	Crest	2	60	220	7.5YR 2.5/3	Silty clay	Sandstone fragments 5-10mm	5	–
2.7	Test pit	March 3, 2020	Crest	3	220	250	10YR 3/3	Clay	Orange mottles	5.5	–
2.8	Test pit	March 3, 2020	Crest	1	0	70	7.5YR 3/3	Silt	–	6	–
2.8	Test pit	March 3, 2020	Crest	2	70	460	7.5YR 2.5/3	Silty clay	Sandstone fragments 5-10mm	5	–
2.8	Test pit	March 3, 2020	Crest	3	460	500	10YR 3/3	Clay	Orange mottles	5.5	–
2.9	Test pit	March 3, 2020	Crest	1	0	90	7.5YR 3/2	Silt	–	5	–
2.9	Test pit	March 3, 2020	Crest	1	90	250	7.5YR 3/2	Silt	–	5	–
2.9	Test pit	March 3, 2020	Crest	3	250	340	7.5YR 3/4	Clay	Sandstone bedrock coming through base	5.5	–
2.10	Test pit	March 3, 2020	Crest	1	0	200	7.5YR 3/2	Silt	–	5	–
2.10	Test pit	March 9, 2020	Crest	2	200	270	7.5YR 3/4	Clay	–	5	–
2.10	Test pit	March 3, 2020	Crest	3	270	330	7.5YR 3/2	Clay	Charcoal in south-east corner 2%, 2-10mm, orange mottles	5.5	–
2.11	Test pit	March 3, 2020	Crest	1	0	160	7.5YR 3/2	Silt	–	5	–
2.11	Test pit	March 3, 2020	Crest	2	160	280	7.5YR 3/4	Silty clay	Sandstones 10-30mm, 10%	5	–
2.11	Test pit	March 3, 2020	Crest	3	280	360	7.5YR 3/4	Clay	Sandstone bedrock coming through base, sandstone 10-40mm 10%	5.5	–
2.12	Test pit	March 9, 2020	Crest	1	0	100	7.5YR 3/2	Clayey silt	–	5	–
2.12	Test pit	March 9, 2020	Crest	2	100	210	7.5YR 3/2	Silty clay	Charcoal fragments 5-20mm 5%	5	–
2.12	Test pit	March 9, 2020	Crest	3	210	250	7.5YR 3/4	Clay	Charcoal fragments 5-30mm, 5%	5	–
2.13	Test pit	March 9, 2020	Crest	1	0	100	7.5YR 3/2	Clayey silt	–	5	–
2.13	Test pit	March 9, 2020	Crest	2	100	210	7.5YR 3/2	Silty clay	Charcoal fragments 5-20mm 5%	5	–
2.14	Test pit	March 9, 2020	Crest	1	0	120	7.5YR 3/2	Clayey silt	–	5	–
2.14	Test pit	March 9, 2020	Crest	2	120	250	7.5YR 3/2	Silty clay	Charcoal fragments 5-20mm 5%	5	–

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2.14	Test pit	March 9, 2020	Crest	3	250	350	7.5YR 3/4	Clay	Charcoal fragments 5-30mm, 5%	5	–
2.15	Test pit	March 9, 2020	Crest	1	0	200	7.5YR 2.5/1	Silty clay	–	5	–
2.16	Test pit	March 9, 2020	Crest	1	0	260	7.5YR 2.5/1	Silty clay	–	5	–
2.16	Test pit	March 9, 2020	Crest	2	260	330	7.5 YR 3/4	Clay	–	5	–
2.17	Test pit	March 10, 2020	Crest	1	0	170	7.5YR 3/2	Clayey silt	–	5	–
2.17	Test pit	March 10, 2020	Crest	2	170	210	7.5YR 3/2	Clay	–	5	–
2.18	Test pit	March 10, 2020	Crest	1	0	140	7.5YR 3/2	Clayey silt	–	5	–
2.18	Test pit	March 11, 2020	Crest	2	140	480	7.5YR 3/2	Silty clay	Charcoal fragments 5-20mm 5%, sandstone fragments 5%	5.5	–
2.18	Test pit	March 10, 2020	Crest	3	480	560	7.5YR 3/2	Clay	Sandstone rocks >50 mm	5.5	–
2.19	Test pit	March 11, 2020	Crest	1	0	80	7.5YR 3/2	Clayey silt	–	5	–
2.19	Test pit	March 11, 2020	Crest	2	80	280	7.5YR 3/2	Silty clay	Charcoal fragments 5-20mm 5%, sandstone fragments 5%	5.5	–
2.19	Test pit	March 11, 2020	Crest	3	280	300	7.5YR 2.5/2	Clay	Sandstone rocks >50 mm	5.5	–
2.20	Test pit	March 11, 2020	Crest	1	0	60	7.5YR 3/2	Clayey silt	–	6.5	–
2.20	Test pit	March 11, 2020	Crest	2	60	250	7.5YR 3/2	Silty clay	Sandstone fragments 1%	5.5	–
2.20	Test pit	March 16, 2020	Crest	3	110	120	7.5YR 3/2	Clay	Sandstone frags 5%, <10mm	5.5	–
2.21	Test pit	March 11, 2020	Crest	1	0	90	7.5YR 3/2	Clayey silt	–	5.5	–
2.21	Test pit	March 11, 2020	Crest	2	90	320	7.5YR 3/2	Silty clay	Sandstone fragments 5% <20mm	5.5	–
2.21	Test pit	March 11, 2020	Crest	3	320	350	7.5YR 2.5/3	Clay	–	6	–
2.22	Test pit	March 11, 2020	Crest	1	0	40	7.5YR 3/2	Clayey silt	–	5.5	–
2.22	Test pit	March 11, 2020	Crest	2	40	310	7.5YR 3/2	Silty clay	Sandstone fragments 1% <20mm	5.5	–
2.23	Test pit	March 11, 2020	Crest	1	0	90	7.5YR 3/2	Clayey silt	–	5.5	–
2.23	Test pit	March 11, 2020	Crest	2	90	370	7.5YR 3/2	Silty clay	Sandstone fragments 2% <20mm	5.5	–
2.23	Test pit	March 11, 2020	Crest	3	370	400	7.5YR 2.5/3	Clay	–	6	–
2.24	Test pit	March 12, 2020	Crest	1	0	60	7.5YR 3/2	Clayey silt	–	5.5	–
2.24	Test pit	March 12, 2020	Crest	2	60	220	7.5YR 3/2	Silty clay	Sandstone fragments 40% 20mm-80mm	5.5	–
2.24	Test pit	March 12, 2020	Crest	3	220	250	7.5YR 2.5/3	Clay	–	6	–
2.25	Test pit	March 12, 2020	Crest	1	0	70	7.5YR 3/2	Clayey silt	–	5.5	–
2.25	Test pit	March 12, 2020	Crest	2	70	250	7.5YR 2.5/2	Silty clay	Sandstone fragments <20mm 5%	6	–
2.25	Test pit	March 12, 2020	Crest	3	250	300	7.5YR 2.5/2	Clay	–	6.5	–
2.26	Test pit	March 12, 2020	Crest	1	0	80	7.5YR 3/2	Clayey silt	–	5.5	–

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2.26	Test pit	March 12, 2020	Crest	2	80	270	7.5YR 2.5/2	Silty clay	Sandstone fragments <20mm 5%	6	–
2.26	Test pit	March 12, 2020	Crest	3	270	300	7.5YR 2.5/2	Clay	Sandstone fragments 20-50mm 30%	6.5	–
2.27	Test pit	March 12, 2020	Crest	1	0	70	7.5YR 3/2	Clayey silt	–	5.5	–
2.27	Test pit	March 12, 2020	Crest	2	70	220	7.5YR 2.5/2	Silty clay	Sandstone fragments <20mm 5%	6	–
2.27	Test pit	March 12, 2020	Crest	3	220	300	7.5YR 2.5/2	Clay	Sandstone fragments 20-50mm 30%	6.5	–
2.28	Test pit	March 12, 2020	Crest	1	0	80	7.5YR 3/2	Clayey silt	–	5.5	–
2.28	Test pit	March 12, 2020	Crest	2	80	260	7.5YR 2.5/2	Silty clay	Sandstone fragments 200-250mm 70%	6	–
2.28	Test pit	March 11, 2020	Crest	3	260	350	7.5YR 2.5/3	Clay	–	6	–
2.29	Test pit	March 12, 2020	Crest	1	0	70	7.5YR 3/2	Clayey silt	–	5.5	–
2.29	Test pit	March 12, 2020	Crest	2	70	190	7.5YR 2.5/2	Silty clay	Sandstone fragments <20mm 1%	6	–
2.29	Test pit	March 12, 2020	Crest	3	190	200	7.5YR 2.5/2	Clay	Sandstone fragments 1%	6.5	–
2.30	Test pit	March 12, 2020	Crest	1	0	60	7.5YR 3/2	Clayey silt	–	5.5	–
2.30	Test pit	March 12, 2020	Crest	2	60	240	7.5YR 2.5/2	Silty clay	Sandstone fragments <20mm 1%	6	–
2.30	Test pit	March 12, 2020	Crest	3	240	260	7.5YR 2.5/2	Clay	–	6	–
2.31	Test pit	March 13, 2020	Crest	1	0	90	7.5YR 3/2	Clayey silt	–	5.5	–
2.31	Test pit	March 13, 2020	Crest	2	90	250	7.5YR 2.5/2	Silty clay	Sandstone fragments <20mm 5%	6	–
2.31	Test pit	March 13, 2020	Crest	3	250	290	7.5YR 2.5/2	Clay	–	6	–
2.32	Test pit	March 13, 2020	Crest	1	0	90	7.5YR 3/2	Clayey silt	–	5.5	–
2.32	Test pit	March 13, 2020	Crest	2	90	170	7.5YR 2.5/2	Silty clay	Sandstone fragments <20mm 5%	6	–
2.32	Test pit	March 13, 2020	Crest	3	170	200	7.5YR 2.5/2	Clay	Sandstone 20mm < 5%	6	–
3.1	Test pit	March 10, 2020	Crest	1	0	230	7.5YR 3/2	Clayey silt	Charcoal fragments 5-20mm 10%	5.5	–
3.1	Test pit	March 10, 2020	Crest	2	230	330	7.5YR 3/2	Silty clay	Charcoal fragments 5-20mm 10%, red sandstone fragments 20-50mm	5	–
3.1	Test pit	March 10, 2020	Crest	3	330	350	7.5YR 3/2	Clay	Charcoal fragments 5-10mm 5%, red sandstone fragments 20mm	5	–
3.2	Test pit	March 10, 2020	Crest	1	0	190	7.5YR 3/2	Clayey silt	–	5.5	–
3.2	Test pit	March 10, 2020	Crest	2	190	260	7.5YR 3/2	Silty clay	Sandstone fragments 20-50mm 2%	5	–
3.2	Test pit	March 10, 2020	Crest	3	260	300	7.5YR 3/2	Clay	Sandstone fragments 20-60mm 5%	5	–
3.3	Test pit	March 10, 2020	Crest	1	0	190	7.5YR 3/2	Silty clay	Sandstone fragments 5-20mm 5%	5	–
3.3	Test pit	March 10, 2020	Crest	2	190	260	7.5YR 3/2	Clay	Sandstone fragments 10-40mm 2%	5	–
3.4	Test pit	March 11, 2020	Crest	1	0	70	7.5YR 3/2	Clayey silt	–	5.5	–
3.4	Test pit	March 11, 2020	Crest	2	70	230	7.5YR 3/2	Silty clay	Sandstone fragments 20-200 mm 40%	5.5	–

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3.4	Test pit	March 11, 2020	Crest	3	230	260	7.5YR 3/2	Clay	Sandstone fragments 20-200mm 30%, large sandstone rocks in eastern half of pit in context 2 and 3	6	–
3.5	Test pit	March 11, 2020	Crest	1	0	50	7.5YR 3/2	Clayey silt	–	5.5	–
3.5	Test pit	March 11, 2020	Crest	2	50	220	7.5YR 3/2	Silty clay	Sandstone fragments 20-200 mm 10%	5.5	–
3.5	Test pit	March 11, 2020	Crest	3	220	260	7.5YR 3/2	Clay	Sandstone fragments 20-50mm 40%, large sandstone rocks in eastern half of pit in context 2 and 3	6	–
3.6	Test pit	March 12, 2020	Crest	1	0	50	7.5YR 3/3	Clayey silt	–	5.5	–
3.6	Test pit	March 12, 2020	Crest	2	50	220	7.5YR 2.5/3	Silty clay	Sandstone fragments 20 mm 5%	6	–
3.6	Test pit	March 12, 2020	Crest	3	220	280	7.5YR 3/4	Clay	Sandstone fragments 20-50mm 20%	6	–
3.7	Test pit	March 19, 2020	Crest	1	0	50	7.5YR 3/3	Clayey silt	–	5.5	–
3.7	Test pit	March 19, 2020	Crest	2	50	190	7.5YR 2.5/3	Silty clay	Sandstone fragments 20 mm 5%	6	–
3.7	Test pit	March 19, 2020	Crest	3	190	200	7.5YR 3/4	Clay	Sandstone fragments 20-50mm 20%	6	–
3.8	Test pit	March 12, 2020	Crest	1	0	80	7.5YR 3/3	Clayey silt	–	5.5	–
3.8	Test pit	March 12, 2020	Crest	2	80	200	7.5YR 2.5/3	Silty clay	Sandstone fragments 20 mm 5%	6	–
3.8	Test pit	March 12, 2020	Crest	3	200	230	7.5YR 3/4	Clay	Sandstone fragments 20 mm 10%	6	–
4.1	Test pit	March 16, 2020	Open depression	1	0	260	7.5YR 2.5/3	Clayey silt	Grass roots, charcoal 1%	5.5	–
4.1	Test pit	March 16, 2020	Open depression	2	260	300	10YR 3/3	Clay	–	6	–
4.2	Test pit	March 16, 2020	Open depression	1	0	240	7.5YR 2.5/3	Silt	Grass roots, charcoal 1%	5.5	–
4.2	Test pit	March 16, 2020	Open depression	2	240	300	10YR 3/4	Sandy silty clay	–	6	
4.2	Test pit	March 16, 2020	Open depression	3	240	330	10YR 4/3	Clay	–	6	–
4.3	Test pit	March 16, 2020	Open depression	1	0	250	7.5YR 2.5/3	Sandy silt	Grass roots, charcoal 1%	5.5	–
4.3	Test pit	March 16, 2020	Open depression	2	250	280	10YR 3/3	Clay	–	6	–
4.4	Test pit	March 16, 2020	Open depression	1	0	230	7.5YR 2.5/3	Silty sandy clay	Very mixed topsoil possibly colluvial nature, grass roots, charcoal 1%	5.5	–
4.4	Test pit	March 16, 2020	Open depression	2	230	250	10YR 3/3	Clay	–	6	–
4.5	Test pit	March 16, 2020	Open depression	1	0	190	7.5YR 2.5/3	Silty sandy clay	Very mixed topsoil possibly colluvial nature, grass roots, charcoal sandstone frags <20mm 5%	5.5	–
5.1	Test pit	March 16, 2020	Open depression	1	0	60	7.5YR 3/2	Clayey silt	Grass roots	5.5	–
5.1	Test pit	March 16, 2020	Open depression	2	60	130	7.5YR 4/2	Silty clay	–	5.5	–
5.1	Test pit	March 16, 2020	Open depression	3	130	170	7.5YR 3/2	Clay	Sandstone frags 10-30 mm	5.5	–
5.2	Test pit	March 16, 2020	Open depression	1	0	40	7.5YR 3/2	Silt	Grass roots	5	–
5.3	Test pit	March 16, 2020	Open depression	1	0	60	7.5YR 3/2	Silt	Grass roots	6	–
5.3	Test pit	March 16, 2020	Open depression	2	60	130	7.5YR 4/2	Silty clay	Sandstone fragments 10%	5.5	–

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
5.4	Test pit	March 16, 2020	Open depression	1	0	60	7.5YR 3/2	Silt	Grass roots	6	–
5.4	Test pit	March 16, 2020	Open depression	2	60	160	7.5YR 4/2	Silty clay	–	5.5	3
5.4	Test pit	March 16, 2020	Open depression	3	160	170	7.5YR 3/2	Clay	–	5.5	–
5.4	Test pit	March 16, 2020	Open depression	1	0	60	7.5YR 3/2	Silt	Grass roots	6	–
5.5	Test pit	March 16, 2020	Open depression	2	60	100	7.5YR 4/2	Silty clay	–	5.5	–
5.5	Test pit	March 16, 2020	Open depression	3	100	140	7.5YR 3/2	Clay	Sandstone fragments 5%	5.5	–
AHIMS 52-5-0225											
1.1	Test pit	March 3, 2020	Simple slope	1	0	60	7.5YR 3/2	Silt	–	5.5	–
1.1	Test pit	March 3, 2020	Simple slope	2	60	220	7.5YR 3/2	Silt	–	5.5	–
1.1	Test pit	March 3, 2020	Simple slope	3	220	310	7.5YR 4/2	Clay	–	5.5	–
1.2	Test pit	March 9, 2020	Simple slope	1	0	120	7.5YR 3/2	Silt	–	5.5	–
1.2	Test pit	March 3, 2020	Simple slope	2	120	220	7.5YR 3/2	Silty clay	Sandstone fragments 5%	5	–
1.3	Test pit	March 9, 2020	Simple slope	1	0	80	7.5YR 3/2	Silt	–	5.5	–
1.3	Test pit	March 9, 2020	Simple slope	2	80	220	7.5YR 3/2	Silty clay	Sandstone fragments 5%	5	–
1.3	Test pit	March 9, 2020	Simple slope	3	220	310	7.5YR 4/2	Clay	–	5.5	–
1.4	Test pit	March 9, 2020	Simple slope	1	0	80	7.5YR 2.5/1	Clayey silt	–	6	–
1.4	Test pit	March 9, 2020	Simple slope	2	80	130	7.5YR 2.5/1	Clayey silt	–	6	–
1.4	Test pit	March 9, 2020	Simple slope	3	130	150	7.5YR 4/1	Clay	–	6	–
1.5	Test pit	March 9, 2020	Simple slope	1	0	90	7.5YR 2.5/1	Clayey silt	–	6	–
1.5	Test pit	March 9, 2020	Simple slope	2	90	180	7.5YR 2.5/1	Clayey silt	Charcoal fragments 2% 5-10mm	6	–
1.5	Test pit	March 9, 2020	Simple slope	3	180	210	7.5YR 4/1	Clay	–	6	–
AHIMS 52-5-0223											
2.1	Auger hole	March 13, 2020	Simple slope	1	0	80	7.5YR 2.5/2	Clayey silt	No shell	5.5	–
2.1	Auger hole	March 13, 2020	Simple slope	2	70	150	7.5YR 2.5/2	Silty clay	No shell, asbestos found. Abandoned	6	–
2.2	Auger hole	March 13, 2020	Simple slope	1	0	60	7.5YR 2.5/2	Clayey silt	No shell	5.5	–
2.2	Auger hole	March 13, 2020	Simple slope	2	60	150	7.5YR 2.5/2	Silty clay	No shell, asbestos found. Abandoned	6	–
2.2	Auger hole	March 13, 2020	Simple slope	3	150	160	7.5YR 2.5/2	Clay	No shell, asbestos present. Abandoned	6	–
1.2	Auger hole	March 13, 2020	Simple slope	1	0	70	7.5YR 2.5/2	Clayey silt	No shell	5.5	–
1.2	Auger hole	March 13, 2020	Simple slope	2	70	130	7.5YR 2.5/2	Silty clay	No shell	6	–
1.2	Auger hole	March 13, 2020	Simple slope	3	130	140	7.5YR 2.5/2	Clay	No shell	6	–

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
1.1	Auger hole	March 13, 2020	Simple slope	1	0	80	7.5YR 2.5/2	Clayey silt	No shell	6	–
1.1	Auger hole	March 13, 2020	Simple slope	2	80	160	7.5YR 2.5/2	Clayey silt	No shell	6	–
1.1	Auger hole	March 13, 2020	Simple slope	3	160	180	7.5YR 2.5/2	Clayey silt	No shell	6	–
AHIMS 52-5-0223 (CORRECT AHIMS LOCATION)											
3.1	Auger hole	March 16, 2020	Simple slope	1	0	70	7.5YR 2.5/2	Clayey silt	No shell	5.5	–
3.1	Auger hole	March 16, 2020	Simple slope	2	70	240	7.5YR 2.5/2	Silty clay	No shell	6	–
3.1	Auger hole	March 16, 2020	Simple slope	3	240	300	7.5YR 2.5/2	Clay	No shell	6	–
3.2	Auger hole	March 16, 2020	Simple slope	1	0	60	10YR 3/3	Sandy silt	No shell	5.5	–
3.2	Auger hole	March 16, 2020	Simple slope	2	60	230	7.5YR 2.5/2	Silty clay	No shell	6	–
3.3	Auger hole	March 16, 2020	Simple slope	1	0	40	10YR 3/3	Sandy silt	No shell	5.5	–
3.3	Auger hole	March 16, 2020	Simple slope	2	40	260	7.5YR 2.5/2	Silty clay	No shell	6	–
3.3	Auger hole	March 16, 2020	Simple slope	3	260	300	7.5YR 2.5/2	Clay	No shell	6	–
3.4	Auger hole	March 16, 2020	Simple slope	1	0	100	7.5YR 2.5/2	Silty clay	No shell	6	–
3.4	Auger hole	March 16, 2020	Simple slope	2	100	180	7.5YR 2.5/2	Clay	No shell	6	–
4.1	Auger hole	March 16, 2020	Simple slope	1	0	250	7.5YR 4/3	Clayey sand	–	5	–
4.1	Auger hole	March 16, 2020	Simple slope	2	250	350	7.5YR 3/1	Clay	–	5	–
4.1	Auger hole	March 16, 2020	Simple slope	3	350	400	7.5YR 3/1	Clay	–	5	–
4.2	Auger hole	March 16, 2020	Simple slope	1	0	350	7.5YR 4/3	Clayey sand	–	5	–
4.3	Auger hole	March 16, 2020	Simple slope	1	0	300	7.5YR 4/3	Clayey sand	–	5	–
4.4	Auger hole	March 16, 2020	Simple slope	1	0	300	7.5YR 4/3	Clayey sand	–	5	–
4.4	Auger hole	March 16, 2020	Simple slope	2	300	320	7.5YR 3/1	Clay	–	5	–
4.5	Auger hole	March 16, 2020	Simple slope	1	0	200	7.5YR 4/3	Clayey sand	–	5	–
4.5	Auger hole	March 16, 2020	Simple slope	2	200	240	7.5YR 3/2	Clayey sand	–	5	–
4.5	Auger hole	March 16, 2020	Simple slope	3	240	260	7.5YR 3/1	Clay	–	5	–
5.1	Auger hole	March 17, 2020	Simple slope	1	0	50	7.5YR 3/2	Silt	–	5	–
5.1	Auger hole	March 17, 2020	Simple slope	2	50	200	7.5YR 3/2	Clayey silt	Charcoal specks <1mm 2%	5.5	–
5.1	Auger hole	March 17, 2020	Simple slope	3	200	260	10YR 3/3	Clay	–	6	–
5.2	Auger hole	March 17, 2020	Simple slope	1	0	70	7.5YR 3/2	Loamy silt	–	5	–
5.2	Auger hole	March 17, 2020	Simple slope	2	70	230	7.5YR 3/2	Clayey silt	–	5.5	–
5.2	Auger hole	March 17, 2020	Simple slope	3	230	260	10YR 3/3	Clay	–	6	–

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
5.3	Auger hole	March 17, 2020	Simple slope	1	0	70	7.5YR 3/2	Loamy silt	–	5	–
5.3	Auger hole	March 17, 2020	Simple slope	2	70	210	7.5YR 3/2	Clayey silt	–	5.5	–
5.3	Auger hole	March 17, 2020	Simple slope	3	210	250	10YR 3/3	Clay	–	6	–
LOW POTENTIAL AREA											
6.1	Test pit	March 17, 2020	Simple slope	1	0	260	10YR 3/3	Sandy silt	–	6	1
6.11	Test pit	March 17, 2020	Simple slope	3	290	300	7.5YR 3/2	Clay	Mottled clay	5	–
6.11	Test pit	March 17, 2020	Simple slope	2	50	290	7.5YR 2.5/2	Clayey sand	Some rootlets following previous context	5	–
6.11	Test pit	March 17, 2020	Simple slope	1	0	50	7.5YR 3/1	Silty sand	Rootlets	5	–
6.12	Test pit	March 17, 2020	Simple slope	2	180	190	7.5YR 2.5/2	Clayey sand	–	5	–
6.12	Test pit	March 17, 2020	Simple slope	1	0	180	7.5YR 3/3	Silty sand	–	5	–
6.2	Test pit	March 17, 2020	Simple slope	1	0	260	10YR 3/3	Silt	–	6	–
6.2	Test pit	March 17, 2020	Simple slope	2	140	170	10YR 4/3	Clay	–	6	–
6.2	Test pit	March 17, 2020	Simple slope	1	0	140	10YR 3/3	Sandy silt	–	6	–
6.2	Test pit	March 17, 2020	Simple slope	2	140	160	10YR 4/3	Clay	–	6	–
6.3	Test pit	March 17, 2020	Simple slope	2	260	320	10YR 4/3	Clay	–	6	–
6.3	Test pit	March 17, 2020	Simple slope	1	0	140	10YR 3/3	Silt	–	6	–
6.4	Test pit	March 17, 2020	Simple slope	2	180	210	10YR 4/3	Clay	–	6	–
6.4	Test pit	March 17, 2020	Simple slope	1	0	180	10YR 3/3	Silt	–	6	1
6.5	Test pit	March 17, 2020	Simple slope	1	0	160	10YR 3/3	Silt	–	6	–
6.5	Test pit	March 17, 2020	Simple slope	2	160	180	10YR 4/3	Clay	–	6	–
6.6	Test pit	March 17, 2020	Simple slope	1	0	180	10YR 3/3	Silt	–	6	–
6.6	Test pit	March 17, 2020	Simple slope	2	180	200	10YR 4/3	Clay	–	6	–
6.7	Test pit	March 17, 2020	Simple slope	1	0	70	10YR 3/3	Silt	–	6	–
6.7	Test pit	March 17, 2020	Simple slope	2	140	170	10YR 4/3	Clay	Sandstone fragments 10% 50mm	6	–
6.7	Test pit	March 17, 2020	Simple slope	2	150	160	10YR 4/3	Clay	–	6	–
6.7	Test pit	March 17, 2020	Simple slope	2	260	280	10YR 4/3	Clay	–	6	–
6.7	Test pit	March 17, 2020	Simple slope	2	70	70	10YR 4/3	Clay	–	6	–
6.8	Test pit	March 17, 2020	Simple slope	1	0	150	10YR 3/3	Silt	Sandstone fragments 50%, 20-100 mm	6	–
6.9	Test pit	March 17, 2020	Simple slope	1	0	150	10YR 3/3	Sandy silt	–	6	–
AHIMS 52-5-0643											

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
1.1	Auger hole	March 18, 2020	Simple slope	1	0	150	7.5YR 4/4	Silty sand	–	5.5	–
1.1	Auger hole	March 18, 2020	Simple slope	2	150	250	7.5YR 5/6	Sand	–	6	–
1.2	Auger hole	March 18, 2020	Simple slope	1	0	200	7.5YR 4/4	Sand	–	5	–
1.2	Auger hole	March 18, 2020	Simple slope	2	200	320	7.5YR 5/3	Clayey sand	–	5	–
1.3	Auger hole	March 18, 2020	Simple slope	1	0	180	7.5YR 4/4	Sandy silt	–	5	–
1.3	Auger hole	March 18, 2020	Simple slope	2	180	260	7.5YR 5/6	Clay	–	5	–
1.4	Auger hole	March 18, 2020	Simple slope	1	0	100	7.5YR 4/4	Silty sand	Rootlets	5	–
1.4	Auger hole	March 18, 2020	Simple slope	2	100	200	7.5YR 5/6	Clay	–	5	–
1.5	Auger hole	March 18, 2020	Simple slope	1	0	200	7.5YR 4/4	Sand	–	5	–
1.5	Auger hole	March 18, 2020	Simple slope	2	200	210	7.5YR 5/6	Clay	–	5	–
1.6	Auger hole	March 18, 2020	Simple slope	1	0	150	7.5YR 4/4	Silty sand	–	5	–
1.6	Auger hole	March 18, 2020	Simple slope	2	150	250	7.5YR 5/6	Clayey sand	–	5	–
1.7	Auger hole	March 18, 2020	Simple slope	1	0	200	7.5YR 4/4	Silty sand	–	5	–
1.7	Auger hole	March 18, 2020	Simple slope	2	200	250	7.5YR 5/6	Clayey sand	–	5	–
1.8	Auger hole	March 18, 2020	Simple slope	1	0	220	7.5YR 4/4	Silty sand	–	5	–
1.8	Auger hole	March 18, 2020	Simple slope	2	220	250	7.5YR 5/6	Clay	–	5	–
1.9	Auger hole	March 18, 2020	Simple slope	1	0	160	7.5YR 4/4	Clayey silt	–	5	–
1.9	Auger hole	March 18, 2020	Simple slope	2	160	190	7.5YR 5/6	Clay	–	5	–
1.1	Auger hole	March 18, 2020	Simple slope	1	0	160	7.5YR 4/4	Clayey silt	–	5	–
1.1	Auger hole	March 18, 2020	Simple slope	2	160	190	7.5YR 5/6	Clay	–	5	–
1.11	Auger hole	March 18, 2020	Simple slope	1	0	160	7.5YR 4/4	Clayey silt	–	5	–
1.11	Auger hole	March 18, 2020	Simple slope	2	160	210	7.5YR 5/6	Clay	–	5	–
1.12	Auger hole	March 18, 2020	Simple slope	1	0	170	7.5YR 4/4	Clayey silt	Sandstone frags 5% <20mm	5	–
1.12	Auger hole	March 18, 2020	Simple slope	2	160	230	7.5YR 5/6	Clay	–	5	–
1.13	Auger hole	March 18, 2020	Simple slope	1	0	190	7.5YR 4/4	Clayey silt	Sandstone frags 5% <20mm	5	–
1.13	Auger hole	March 18, 2020	Simple slope	2	130	160	7.5YR 5/6	Clay	–	5	–
1.14	Auger hole	March 18, 2020	Simple slope	1	0	190	7.5YR 4/4	Clayey silt	Sandstone frags 5% <20mm	5	–
1.14	Auger hole	March 18, 2020	Simple slope	2	190	210	7.5YR 5/6	Clay	–	5	–
TALLAWARRA PAD 2											
1.1	Test pit	May 6, 2020	Flat	1	0	50	10YR 2/2	Silty clay	Rootlets	5	–

Test pit/auger number	Type	Date	Landform	Context number	Start depth (mm)	End depth (mm)	Colour (Munsell Code)	Texture	Inclusions	PH	Artefacts
1.1	Test pit	May 6, 2020	Flat	2	50	220	10YR 2/1	Clay	–	6.5	–
1.2	Test pit	May 6, 2020	Flat	1	0	50	10YR 2/2 VERY	Silty clay	Rootlets	6.5	–
1.2	Test pit	May 6, 2020	Flat	2	50	220	10YR 2/1	Clay	–	6.5	–
1.3	Test pit	May 6, 2020	Flat	1	0	50	10YR 2/2	Silty clay	Rootlets	6.5	–
1.3	Test pit	May 6, 2020	Flat	2	50	200	10YR 2/1	Clay	–	6.5	–
1.3	Test pit	May 6, 2020	Flat	3	200	250	10YR 3/2	Clay	–	6.5	–
2.1	Test pit	May 6, 2020	Flat	1	0	50	10YR 2/2	Silty clay	Rootlets	6.5	–
2.1	Test pit	May 6, 2020	Flat	2	50	200	10YR 2/1	Clay	–	6.5	–
2.1	Test pit	May 6, 2020	Flat	3	200	250	10YR 3/2	Clay	–	6.5	–

Appendix 3 Artefact analysis

Area	Transect no.	Test pit or auger no.	Spit no.	Type	Raw material	Cortex (%)	Platform type	Platform width (mm)	Platform depth (mm)	Termination	Retouch type	Retouch location	Length (mm)	Width (mm)	Thickness (mm)	Tool type	Notes
52-5-0223	4	Auger 3	3	Flake - Complete	Chalcedony	–	–	–	–	–	–	–	15.54	5.73	2.43	Blade	–
52-5-0223	5	Auger 1	2	Flake - Distal	Silcrete	–	Flaked	10.86	7.66	Feather	–	–	17.34	14.93	5.86	–	–
52-5-0643	1	Auger 4	2	Core - Multidirectional	Petrified wood	–	Flaked	3.42	0.8	Feather	–	–	4.25	6.1	0.79	–	–
PAD1	1	32	2	Flake - Medial	silcrete	–	–	–	–	Feather	–	–	9.66	5.68	1.39	–	–
PAD1	2	3	2	Flake - Complete	silcrete	–	Natural	7.71	2.31	Feather	–	–	6.14	9.74	2.01	–	–
PAD1	5	4	2	Flake - Complete	silcrete	–	Flaked	11.21	3.83	Hinge	–	–	8.39	12.55	3.34	–	–
PAD1	5	4	2	Flake - Distal	Silcrete	–	Flaked	9.42	3.08	Hinge	Overhang removal		40.74	37.17	6.7	–	Platform preparation
PAD1	5	4	2	Flake - Complete	Chert	–	–	–	–	–	–	–	–	–	–	–	–
PAD1	6	4	1	Flake - Complete	Silcrete	–	Flaked	7.13	3.39	Feather	–	–	20.74	13.96	3.76	–	–
PAD1	1	9	1	Flake - Complete	Chert	–	Crushed	–	–	–	–	–	15.2	13.44	3.33	–	–
PAD1	2	3	2	Angular Fragment	Silcrete	–	–	–	–	–	–	–				–	–
PAD1	6	1	1	Flake - Complete	Mudstone	–	Flaked	13.66	14.01	Feather	–	–	14.77	22 .64	13.5	–	–
PAD1	2	2	2	Flake - Proximal	Silcrete	–	Flaked	8.6	2.58	Feather	–	–	17.03	11.67	2.39	–	–
PAD1	2	2	2	Angular Fragment	Silcrete	–	–	–	–	–	–	–	18.72	19.3	13.85	–	–
PAD2	1	3	2	Flake - Complete	Chert	33-66%	–	–	–	–	–	–	15.54	5.73	2.43	–	–
PAD2	1	3	2	Flake - Complete	Silcrete	–	Flaked	10.86	7.66	Feather	–	–	17.34	14.93	5.86	–	–
PAD2	2	1	1	Core - Multidirectional	Silcrete	–	Flaked	3.42	0.8	Feather	–	–	4.25	6.1	0.79	–	–