



297 and 365 Marshall Mount Road, Marshall Mount: Archaeological Report

FINAL REPORT

Prepared for Maker Engineering

15 May 2024

Biosis offices

NEW SOUTH WALES

Albury

Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle

Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney

Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Western Sydney

Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Wollongong

Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat

Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne

Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta

Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

Document information

Report to: Maker Engineering

Prepared by: Anthea Vella
Hannah Mills

Biosis project no.: 37570

File name: 37570.297.and.365.Marshall.Mount.Rd.AR.FIN01.20240515

Citation: Biosis 2024. 297 and 365 Marshall Mount Road, Marshall Mount: Archaeological Report. Report for Maker Engineering. Vella, A, Mills, H. Biosis Pty Ltd. Wollongong, NSW. Project no. 37570

LGA: Wollongong

Document control

Version	Internal reviewer	Date issued
Draft 01	Samantha Keats	24/05/2023
Final 01	Mathew Smith	16/08/2023

Acknowledgements

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

- Maker Engineering: Tim Howe.
- Registered Aboriginal Parties.

Biosis staff involved in this project were:

- Samantha Keats and Hannah Mills (assistance in the field).
- Jenny Beckius and Henri Liswoyo (mapping).

© Biosis Pty Ltd

This document is subject to copyright and may only be used for the purposes in respect of which it was commissioned and in accordance with the Terms of Engagement of the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Disclaimer:

Biosis Pty Ltd has completed this assessment in accordance with the relevant federal, state and local legislation and current industry best practice. The company accepts no liability for any damages or loss incurred as a result of reliance placed upon the report content or for any purpose other than that for which it was intended.

Contents

Glossary	V
Summary	VI
1 Introduction	1
1.1 Project background	1
1.2 Study area	1
1.3 Planning approvals.....	2
1.4 Objectives of the investigation	2
1.5 Investigators and contributors.....	2
2 Proposed development.....	7
3 Desktop assessment	9
3.1 Landscape context.....	9
3.1.1 Geology, topography and hydrology	9
3.1.2 Soil landscapes.....	10
3.1.3 Landscape resources.....	16
3.1.4 Land use history	18
3.2 Previous archaeological work.....	21
3.2.1 Regional overview	21
3.2.2 Local overview.....	25
3.2.3 AHIMS site analysis	29
3.2.4 AHIMS sites located within the study area	30
3.2.5 AHIMS sites located within 200 metres of the study area	30
3.3 Discussion	32
3.3.1 Predictive model.....	32
4 Archaeological survey	35
4.1 Archaeological survey objectives	35
4.2 Archaeological survey methodology	35
4.2.1 Sampling strategy.....	35
4.2.2 Survey methods.....	35
4.3 Archaeological survey results	36
4.3.1 Visibility.....	36
4.3.2 Exposure	37
4.3.3 Disturbances	39
4.4 Discussion of archaeological survey results	44
5 Scientific values and significance assessment	48
5.1 Introduction to the assessment process.....	48
5.2 Archaeological (scientific significance) values.....	49
5.2.1 Statements of archaeological significance.....	51

6	Impact assessment.....	54
6.1	Predicted physical impacts	54
6.2	Ecologically Sustainable Development	54
6.3	Management and mitigation measures	55
6.3.1	Potential archaeological impacts and mitigation measures	56
7	Recommendations.....	58

Tables

Table 1	Site details.....	VII
Table 2	Investigators and contributors.....	3
Table 3	Shellharbour soil landscape characteristics (Hazelton 1992, pp.58–60).....	10
Table 4	Bombo soil landscape characteristics (Hazelton 1992, pp.43–46)	11
Table 5	Fairy Meadow soil landscape (Hazelton 1992, pp.97–99).....	11
Table 6	Wattamolla Road soil landscape (Hazelton 1992, pp.86–87)	12
Table 7	Traditional Aboriginal plant resources and use within the survey area (Stewart & Percival 1997)	16
Table 8	Eastern Regional Sequence	22
Table 9	Summarised “Landscape Model of Archaeological Sensitivity” for the West Dapto region (AMBS 2006)	24
Table 10	AHIMS site type frequency	29
Table 11	Aboriginal site prediction statements.....	33
Table 12	Survey coverage	36
Table 13	Landform summary.....	36
Table 14	Site contents ratings used for archaeological sites.....	49
Table 15	Site condition ratings used for archaeological sites.....	50
Table 16	Site representativeness ratings used for archaeological sites	51
Table 17	Scientific significance ratings used for archaeological sites	51
Table 18	Scientific significance assessment of archaeological sites recorded within the study area	51
Table 19	Statements of scientific significance for archaeological sites recorded within the study area	52
Table 20	Summary of potential archaeological impacts	54
Table 21	Summary of potential archaeological impacts and mitigation measures	56

Figures

Figure 1	Location of the study area	5
Figure 2	Study area detail	6
Figure 3	Proposed development.....	8
Figure 4	Geological units in the vicinity of the study area.....	13

Figure 5	Hydrology and topography in the vicinity of the study area	14
Figure 6	Soil landscapes in the vicinity of the study area	15
Figure 7	AHIMS within the vicinity of the study area.....	31
Figure 8	Survey coverage and results	42
Figure 9	Landforms.....	43
Figure 10	Aboriginal sites within the study area.....	53
Figure 11	Impact assessment.....	57

Photos

Photo 1	Diagram showing Strahler stream order (Ritter et al. 1995, p.151)	10
Photo 2	1962 aerial with the study area outlined in red (Source: NSW Spatial Services).....	20
Photo 3	1989 aerial with the study area outlined in red (Source: NSW Spatial Services).....	20
Photo 4	2005 aerial with the study area outlined in red (Source: NSW Spatial Services).....	21
Photo 5	General visibility in the study area, photo facing south	37
Photo 6	General visibility in the study area, photo facing east.....	37
Photo 7	Area of exposure associated with vehicle access, photo facing west.....	38
Photo 8	Area of exposure associated with the dam showing soil profiles, photo facing south.....	39
Photo 9	Area of exposure associated with treefall, photo facing west.....	39
Photo 10	Disturbance associated with animal burrowing.....	40
Photo 11	Disturbance associated with cattle activity by the dam	41
Photo 12	Disturbance associated with power lines within the study area.....	41
Photo 13	Exposed bedrock at surface level, indicating shallow soils in this area	44
Photo 14	Location of AHIMS 52-5-0494/WDRA_AX_38 site and PAD, photo facing north	45
Photo 15	View of south-western PAD identified adjacent to a tributary of Marshall Mount Creek.....	46
Photo 16	View of and from south-eastern PAD.....	46
Photo 17	View of and from central PAD	47

Glossary

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AR	Archaeological Report
Biosis	Biosis Pty Ltd
Consultation requirements	<i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i>
DA	Development Application
DECCW	Department of Environment, Climate Change and Water (now Heritage NSW)
DP	Deposited Plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
GPS	Global Positioning System
GSV	Ground Surface Visibility
ICOMOS	International Council on Monuments and Sites
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
MGA	Map Grid of Australia
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	National Parks and Wildlife Service
NSW	New South Wales
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
SEPP	State Environmental Planning Policy
Study area	297 and 365 Marshall Mount Road, Marshall Mount (part of Lot 5 DP 24143 and Lot 8 DP 626078)
the Code	<i>Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i>
WDRA	West Dapto Release Area

Summary

Biosis Pty Ltd (Biosis) was commissioned by Maker Engineering to undertake an Aboriginal Cultural Heritage Assessment (ACHA) of a proposed large lot residential subdivision of 297 and 365 Marshall Mount Road (part of Lot 5 DP 24143 and Lot 8 DP 626078), Marshall Mount New South Wales (NSW) (the study area), which will be submitted to Wollongong City Council (Council) as a Planning Proposal. This Archaeological Report (AR) documents the findings of the archaeological investigations conducted as part of the ACHA. As required under Section 2.3 of The *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010a) (the Code), the AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

The study area is located in farmland approximately 8.4 kilometres north of Albion Park and approximately 22 kilometres south-west of Wollongong central business district (CBD).

There are 114 Aboriginal cultural heritage sites registered within a 1.5 by 1.5 kilometre search on the Aboriginal Heritage Information Management System (AHIMS) register. There is one existing AHIMS site located within the study area (AHIMS 52-5-0494/WDRA_AX_38), and one site identified by this assessment (AHIMS 52-5-1051/Marshall Mount Road AF) (Client service ID: 891928, searched 14 May 2024).

Council is the determining authority and will assess the planning proposal to help them determine if the proposed development is likely to have a significant effect on the environment, including Aboriginal cultural heritage.

The Aboriginal community was consulted regarding the heritage management of the project throughout its lifespan. Consultation has been undertaken as per the process outlined in the Department of Environment Climate Change and Water document (DECCW) document, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b) (consultation requirements).

The survey was conducted on 13 September 2022. The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed low. This was attributed to vegetation cover restricting ground surface visibility (GSV) combined with a low amount of exposures.

One artefact (AHIMS 52-5-1051/Marshall Mount Road AF) and four areas of potential archaeological deposits (PAD) were identified during the survey. All four PADs were assessed to contain moderate potential to contain archaeological deposits. One PAD is located in the area of the previously recorded site AHIMS 52-5-0494/WDRA_AX_38. These PAD sites were identified by favourable positions within the landscape and proximity to water (see Section 4.4). The rest of the study area was assessed to contain low potential. The Aboriginal sites identified as part of the project are outlined in Table 1 below.

Table 1 Site details

Site name	Site type	Significance	Type of harm before mitigated	Consequence of unmitigated harm	Site specific recommendations
AHIMS 52-5-0494/WDRA_AX_38	Sub-surface artefact deposit	Low	Nil	Nil	This site will be avoided by the proposed development. This site should be fenced to avoid impacts and heritage inductions should be undertaken prior to works commencing.
AHIMS 52-5-1051/Marshall Mount Road AF	Surface artefact	Low	Direct	Total loss of value	Avoidance is not possible as part of the development. An Aboriginal Heritage Impact Permit (AHIP) will be required for community collection of the site
Four remaining areas of moderate potential	Four areas of moderate potential	TBC	Nil	Nil	These four areas of moderate potential will be avoided by the proposed development. Heritage inductions should be undertaken prior to works commencing. These areas should be fenced to avoid impacts.

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

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

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

Management recommendations

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: Apply for an AHIP to impact AHIMS 52-5-1051/Marshall Mount Road AF and undertake community collection

Impacts to AHIMS 52-5-1051/Marshall Mount Road AF cannot be avoided, therefore Biosis recommends that an AHIP which covers the site be obtained for the proposed works. The AHIP should allow for direct impacts to AHIMS 52-5-1051/Marshall Mount Road AF to occur and for community collection of the isolated artefact. The AHIP should be obtained prior to works proceeding. **The AHIP should be for a term of 10 years.** An AHIP is required for any activities likely to have an impact on Aboriginal objects or Places or cause land to be disturbed for the purposes of discovering an Aboriginal object. Heritage NSW, Department of Planning and Environment (Heritage NSW) issues AHIPs under Part 6 of the *National Parks and Wildlife Act 1974* (NPW Act).

Advice preparing AHIPs

An AHIP is required for any activities likely to have an impact on Aboriginal objects or Places or cause land to be disturbed for the purposes of discovering an Aboriginal object. Heritage NSW issues AHIPs under Part 6 of the NPW Act.

AHIPs should be prepared by a qualified archaeologist and lodged with Heritage NSW. Once the application is lodged processing time can take between 8-12 weeks. It should be noted that there will be an application fee levied by the Heritage NSW for the processing of AHIPs, which is dependent on the estimated total cost of the development project.

Recommendation 2: Areas identified as having moderate archaeological potential

The assessment has identified four areas of moderate archaeological potential within the study area that will not be impacted by the proposed development. If the proposed development changes and impacts to the areas of moderate archaeological potential cannot be avoided, subsurface investigations (test excavations) and updates to this ACHA will be required prior to the commencement of works.

Impacts which would require further assessment in the form of test excavations within the areas of moderate archaeological potential includes, but is not limited to, any stockpiling areas, set down areas, installation of services, bulk earthworks, landscaping or areas of revegetation, or any other activities that will result in disturbances to the ground surface.

Recommendation 3: Avoidance of AHIMS 52-5-0494/WDRA_AX_38 and the four remaining areas of moderate potential

Impacts to AHIMS 52-5-0494/WDRA_AX_38 and the four remaining areas of moderate potential should be avoided. In order to prevent any impacts to AHIMS 52-5-0494/WDRA_AX_38 and the four remaining areas of moderate potential, these should be fenced off, and all included in a heritage induction prior to works commencing.

Recommendation 4: Long term care and control

The establishment of a long term care agreement in consultation with registered Aboriginal parties (RAPs) should be developed in order to ensure the artefact identified as part of this assessment is adequately cared for. Consultation with the RAPs as part of this assessment has indicated that reburial is the preferred option. This approach considers the principles of Ecologically Sustainable Development (ESD) and intergenerational equity and more importantly ensures that the recovered artefact is managed according to the wishes of RAPs.

Recommendation 5: Heritage induction for all contractors

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.

Recommendation 6: Continued consultation

As per the consultation guidelines it is recommended that the proponent provides a copy of this report to the RAPs and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project

Recommendation 7: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the NSW NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by Heritage NSW. 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 Heritage NSW and Aboriginal stakeholders.

Recommendation 8: Discovery of human remains

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

1. **Discovery:** If suspected human remains are discovered all activity in the vicinity must stop to ensure minimal damage is caused to the remains; and the remains must be left in place and protected from harm or damage.
2. **Notification:** Once suspected human skeletal remains have been found, the Coroner's Office and the NSW Police must be notified immediately. Following this, the find will be reported to the Aboriginal parties and Heritage NSW.

1 Introduction

1.1 Project background

Biosis was commissioned by Maker Engineering to undertake an ACHA for the proposed development of a large lot residential subdivision of 297 and 365 Marshall Mount Road (part of Lot 5 DP 24143 and Lot 8 DP 626078), Marshall Mount NSW (the study area) (Figure 1). This AR documents the findings of the archaeological investigations conducted as part of the ACHA. The AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

Council is the determining authority and will assess the planning proposal to help them determine if the proposed development is likely to have a significant effect on the environment, including Aboriginal cultural heritage.

This investigation has been carried out under Part 6 of the NPW Act. It has been undertaken in accordance with the Code. The Code has been developed to support the process of investigating and assessing Aboriginal cultural heritage by specifying the minimum standards for archaeological investigation undertaken in NSW under the NPW Act. The archaeological investigation must be undertaken in accordance with the requirements of the Code.

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

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

1.2 Study area

The study area is located within part of Lot 5 DP 24143 and Lot 8 DP 628078 and is approximately 8.4 kilometres north of Albion Park and approximately 22 kilometres south-west of Wollongong CBD (Figure 1 and Figure 2). It encompasses 43.5 hectares of private land.

The study area is within the:

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

The study area is bounded by Marshall Mount Road along the northern boundary of the property and private rural land to the east, south and west.

1.3 Planning approvals

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

- NPW Act.
- *NSW National Parks and Wildlife Amendment Act 2010*.
- *State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP)*.
- Wollongong Local Environmental Plan 2009 (LEP).
- Wollongong Development Control Plan 2009.

1.4 Objectives of the investigation

The objectives of the investigation can be summarised as follows:

- To identify and consult with any registered Aboriginal stakeholders and the Illawarra Local Aboriginal Land Council (LALC).
- To conduct additional background research in order to recognise any identifiable trends in site distribution and location.
- To search statutory and non-statutory registers and planning instruments to identify listed Aboriginal cultural heritage sites within the study area.
- To highlight environmental information considered relevant to past Aboriginal occupation of the locality and associated land use and the identification and integrity/preservation of Aboriginal sites.
- To summarise past Aboriginal occupation in the locality of the study area using ethnohistory and the archaeological record.
- To formulate a model to broadly predict the type and character of Aboriginal sites likely to exist throughout the study area, their location, frequency and integrity.
- To conduct a field 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.

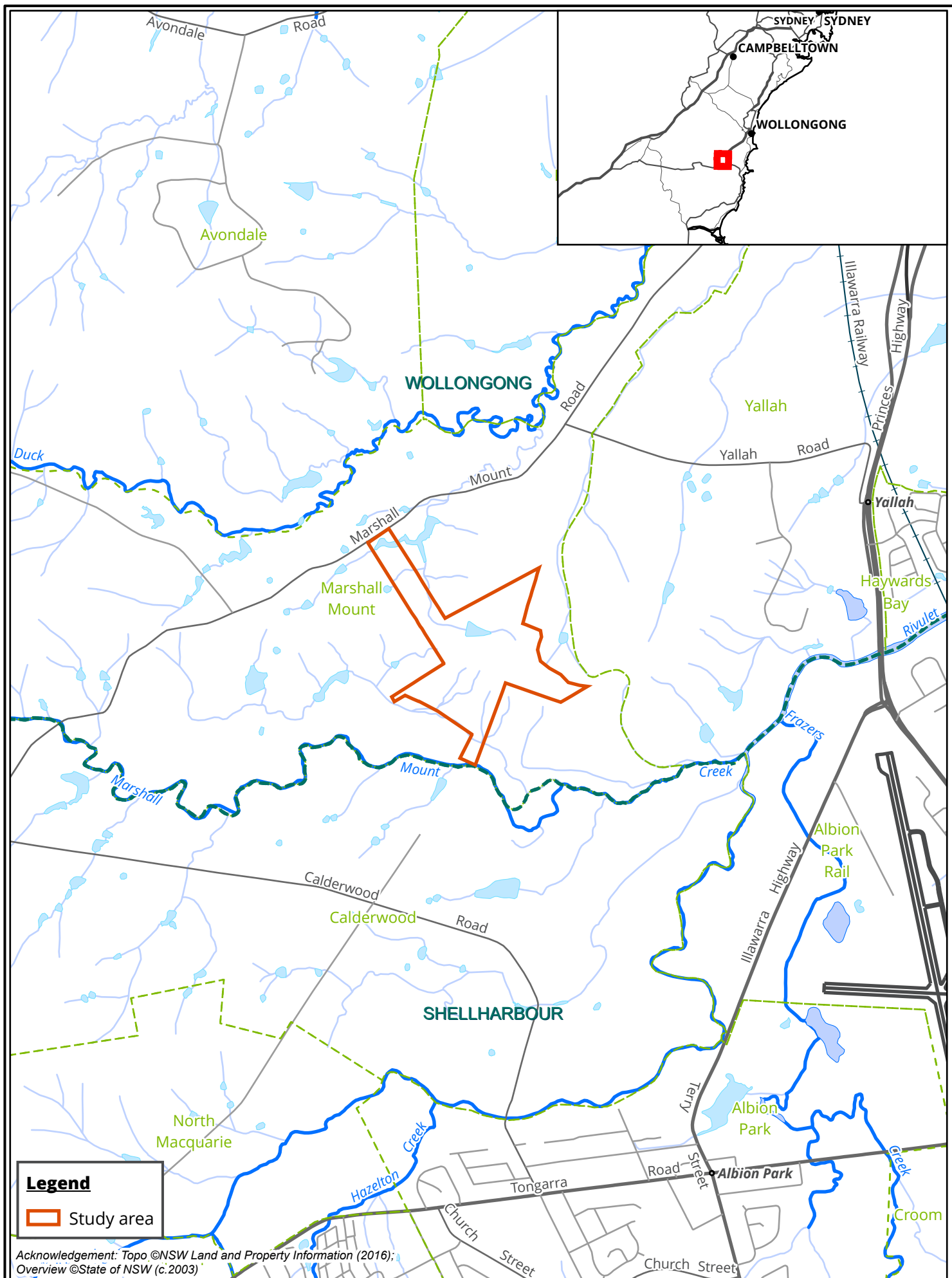
1.5 Investigators and contributors

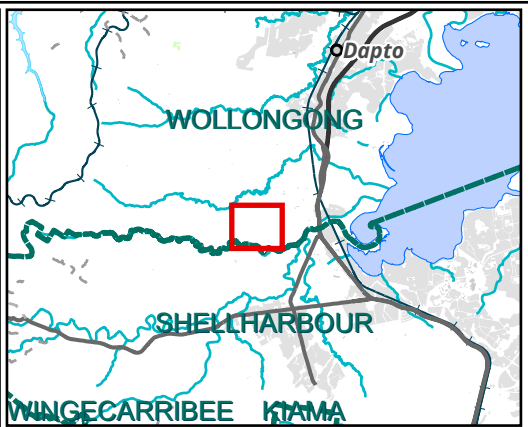
The roles, previous experience and qualifications of the Biosis project team involved in the preparation of this archaeological report are described below in Table 2.

Table 2 Investigators and contributors

Name and qualifications	Experience summary	Project role
Samantha Keats BA Hons	Samantha is a Senior Heritage Consultant and Heritage Manager based in Wollongong and has over eight years' experience. Samantha's project experience includes large scale remote archaeological field surveys, Aboriginal community consultation, archaeological test excavation programs, project management and reporting for major linear infrastructure projects in NSW. Samantha has served as a key team member and project manager on a number of projects in the Illawarra, the South Coast, Canberra, and Far Western NSW. These projects have seen her take part in Aboriginal community consultation, background research, archaeological excavation and survey, and has authored numerous Aboriginal heritage reports. Samantha also possesses significant experience in consulting with Aboriginal stakeholder groups with a particular focus on the South Coast Region where she has undertaken Aboriginal community consultation and archaeological test excavations with representatives from the Illawarra, Jerrinja, and Mogo Local Aboriginal Land Councils, the South Coast People Native Title Claimant group, and a number of Wodi Wodi representatives.	• Field investigation • Quality assurance • Project Director
Anthea Vella B.Arch, M.AHM	Anthea is a Senior Heritage Consultant with over 6 years' experience. Anthea has experience in conducting Aboriginal and historical heritage assessments, surveys and archaeological test excavations for a variety of projects throughout NSW. Anthea has experience in undertaking desktop assessments, project management, reporting, and also has geophysical skills in GPR data collection, processing and interpretation. As a Consultant Archaeologist, Anthea has strong experience in Aboriginal community consultation, field survey, test excavations, salvage excavations, heritage management plans, and archaeological report writing in the Sydney region, Central Coast and Hunter region, and the Illawarra regions.	• Project management • Reporting • Aboriginal community consultation
Molly Crissell B.Arch	Molly joined Biosis in the Newcastle office as a Heritage Consultant in the Heritage team in 2021. She completed her Bachelor of Archaeology, majoring in Geography in 2019. As part of her education, Molly attended the Irish Archaeological Field School in Wexford, Ireland, as a volunteer. Prior to joining Biosis, Molly has worked in Western Australia and NSW gaining experience in Aboriginal and historical excavations and surveys. Working as a Heritage Consultant in WA, Molly gained experience in reporting, community consultation, artefact analysis and project managing.	• Background research • Aboriginal community consultation

Name and qualifications	Experience summary	Project role
Hannah Mills BA, MA Cultural Heritage Studies	Hannah is a Heritage Consultant based in the Biosis' Wollongong office. She completed her Masters in Cultural Heritage Studies in 2020 and undertaken fieldwork across the south coast of NSW. Since joining Biosis, Hannah has gained experience in background research, Aboriginal consultation practices, field investigations and report preparation.	• Field investigation • Reporting

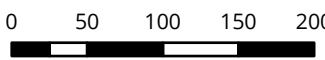




Legend

-  Study area
-  Lot

Figure 2 Study area detail



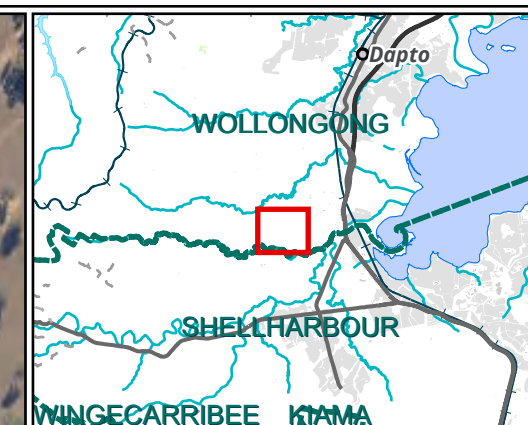
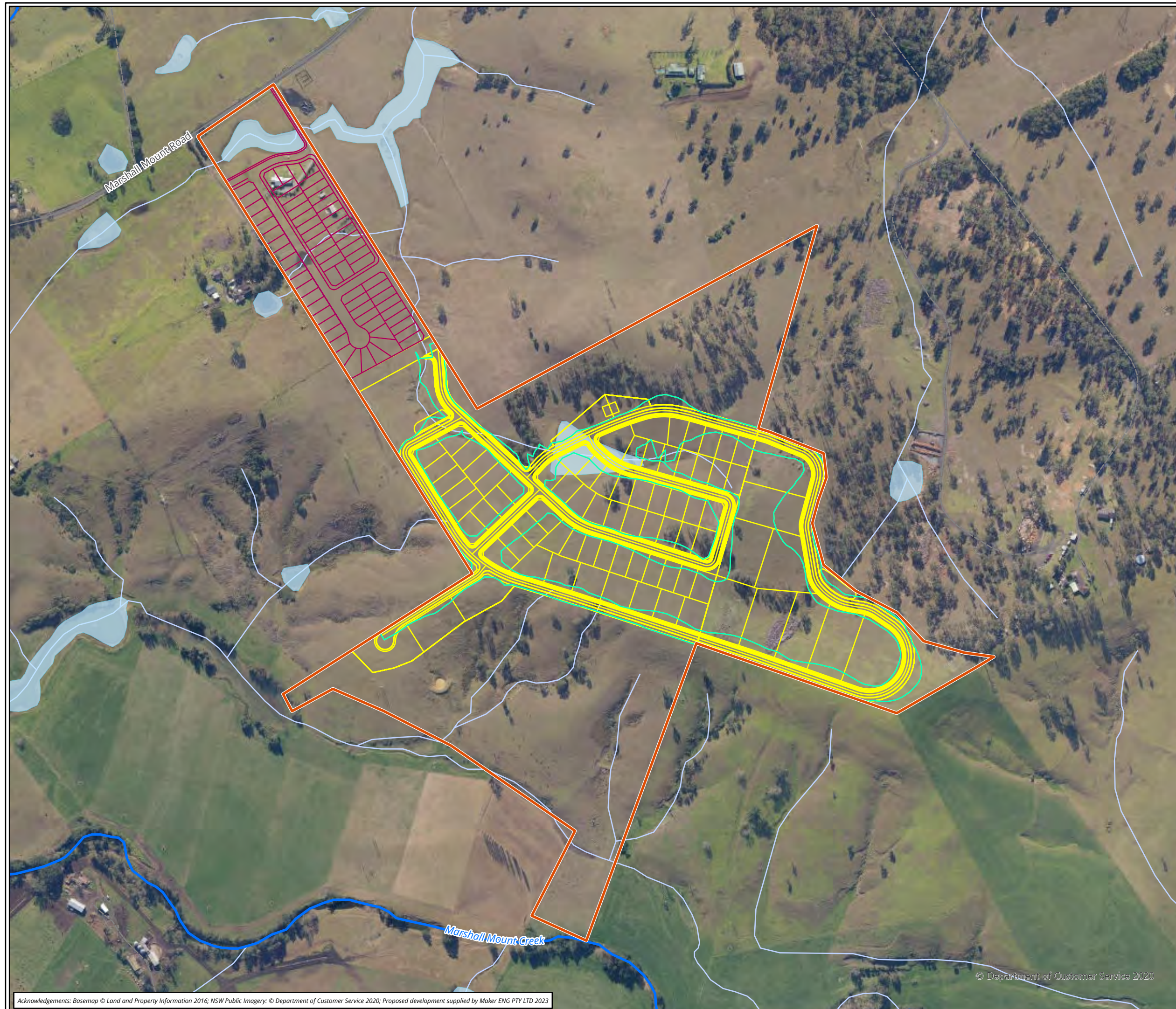
Metres
Scale: 1:5,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56



Matter: 37570, Date: 12 September 2022,
Drawn by: JB, Checked by: AV, Last edited by: jbeckius
Location: P:\37500s\37570\Mapping\
37570_MarshallMountRd_ACHA, Layout: 37570_ACHA_F2_StudyArea

2 Proposed development

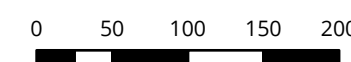
The proposed works will involve the subdivision of part of Lot 5 DP24143 and Lot 8 DP 628078, and will include vegetation clearance, bulk earthworks, civil engineering works, such as the construction of roads, storm water drainages, sewer works, and water supply works. The construction of residential infrastructure and dwellings will also be included within the proposed works (Figure 3).



Legend

- ▬ Study area
- ▬ Proposed work
- ▬ Subdivision (by others)
- ▬ Civil works boundary

Figure 3 Proposed development



Metres
 Scale: 1:5,000@ A3
 Coordinate System:
 GDA 1994 MGA Zone 56



Matter: 37570, Date: 08 August 2023,
 Drawn by: HL, Checked by: AV, Last edited by: hliswoyo
 Location: P:\37500s\37570\Mapping\
 37570_MarshallMountRd_ACHA, Layout: 37570_ACHA_F3_PropDevelopment

3 Desktop assessment

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

3.1 Landscape context

It is important to consider the local environment of the study area 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 study area is located primarily within the Broughton Formation and the Bumbo Latite Member (Figure 4). The Broughton Formation is comprised of late Permian aged volcanoclastic sandstone, conglomerate and mudstone. The Broughton Formation is also interbedded with the Bumbo Latite Member which occurs in the study area. The Bumbo Latite Member is characterised by late Permian latites with breccia pipes containing large phenocrysts of labradorite and small phenocrysts of augite present. Small sections of Berry Siltstone, consisting of shelf deposits of sandy grey mudstone, are also identified in the study area, as are alluvial terrace and alluvial floodplain deposits associated with Duck Creek to the north of the study area.

The study area is situated within a physiographic unit between the Coastal Plain and the Illawarra Escarpment. 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 where the Macquarie Rivulet has entrenched into the Plateau at Macquarie Pass and where other waterways that provide the catchment area of Lake Illawarra are carved into the Escarpment (Bowman 1971). The study area is characterised by slopes, along with several crests. Within the southern portion of the study area, the banks of the tributaries are steeply incised (Figure 5).

Predictive models which have been developed for the region have a tendency to favour higher order streams as the locations of campsites as they would have been more likely to provide a stable source of water and by extension other resources which would have been used by Aboriginal groups.

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

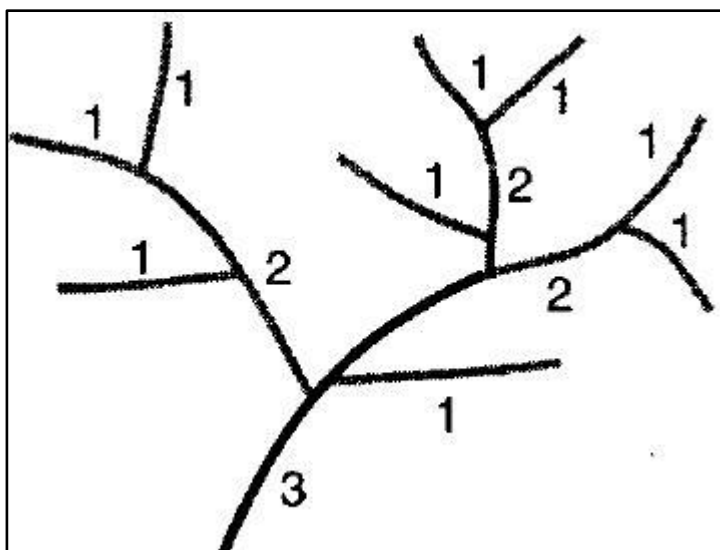


Photo 1 Diagram showing Strahler stream order (Ritter et al. 1995, p.151)

There are several sources of water within and surrounding the study area, as well as five dams (Figure 5). Within the vicinity there is Duck Creek, located approximately 330 metres north, a third order perennial watercourse, and Marshall Mount Creek, located approximately 35 metres south, a fourth order perennial watercourse. In the study area there are several first and second order tributaries of Duck Creek and Marshall Mount Creek.

Using the stream order system, it can be concluded that the first-order, non-perennial water sources identified in the study area would not have provided a reliable source of water. It is considered likely that these would have contained water during rainfall events and would have quickly feed into higher-order tributaries and ultimately into Duck Creek and Marshall Mount Creek, due to the sloped nature of the hills landform surrounding it. Duck Creek and Marshall Mount Creek, as a perennial water source would have provided a reliable source of water and abundance of natural resources. Its proximity to the study area can be considered a potential positive indicator for the presence of Aboriginal occupation sites within the study area, with small transitory Aboriginal sites likely to be present due to the nature of the landforms within the study area.

3.1.2 Soil landscapes

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. Because they are defined by a combination of soils, topography, vegetation and weathering conditions, soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure. The study area contains four soil landscapes: the Shellharbour, Bombo, Fairy Meadow and Wattamolla Road soil landscapes (Figure 6).

The Shellharbour soil landscape is an erosional soil landscape and has a high to very high erodibility rating and would therefore be susceptible to frequent soil movement (Hazelton 1992, pp.58-60). This would result in the poor preservation of archaeological material at shallow depths but may also potentially lead to the exposure of any deeper archaeological deposits where topsoil has eroded away. The dominant soil characteristics of the Shellharbour soil landscape are summarised in Table 3.

Table 3 Shellharbour soil landscape characteristics (Hazelton 1992, pp.58-60)

Soil Material	Description
Shellharbour 1 (sh1)	Friable brownish black sandy loam 2-5 millimetre crumb peds.

Soil Material	Description
Shellharbour 2 (sh2)	Hard setting organic rich black light clay, moderately pedal, 5-10 millimetre platy peds.
Shellharbour 3 (sh3)	Mottled dull reddish brown, sandy clay with characteristic stone line.
Shellharbour 4 (sh4)	Brown strongly pedal heavy clay 20-50 millimetre sub angular to columnar peds
Shellharbour 5 (sh5)	Very sticky, strongly pedal dull reddish brown sandy clay loam to sandy clay at depth.

The Bombo soil landscape is also an erosional landscape and has a high to very high erodibility rating for surface soils and would therefore be susceptible to frequent soil movement (Hazelton 1992, p.44). This would result in poor preservation of archaeological material across the study area that is dominated by the Bombo soil landscape. The dominate soil characteristics of the Bombo soil landscape are summarised in Table 4.

Table 4 Bombo soil landscape characteristics (Hazelton 1992, pp.43-46)

Soil Material	Description
Bombo 1 (bo1)	Friable brown sandy loam topsoil; high organic content; reddish brown in colour; inclusions consist of abundant roots.
Bombo 2 (bo2)	Hard setting sandy loam topsoil; colour ranges from brownish black to dark reddish brown; inclusions consist of 2-6 mm stones (2-10%) and abundant roots.
Bombo 3 (bo3)	Light medium clay subsoil; colour is reddish brown; inclusions can be localised rounded basalt or latite stones of 20-60 mm (2-10%).
Bombo 4 (bo4)	Sandy clay subsoil; reddish brown in colour; inclusions consist of many ex-ped roots.
Bombo 5 (bo5)	Strongly pedal medium clay subsoil; brown in colour; no inclusions.

The Fairy Meadow soil landscape is a swamp landscape that differs from the Shellharbour and Bombo soil landscapes in that it is characterised by low soil erodibility. Flooding and seasonal waterlogging has the potential to cause disturbances to subsurface soil deposits that might contain artefacts, and therefore site preservation may be higher within topographies which are well drained within this soil landscape (Hazelton 1992, pp.97-99). The dominate soil characteristics of the Fairy Meadow soil landscape has the following characteristics (Table 5):

Table 5 Fairy Meadow soil landscape (Hazelton 1992, pp.97-99)

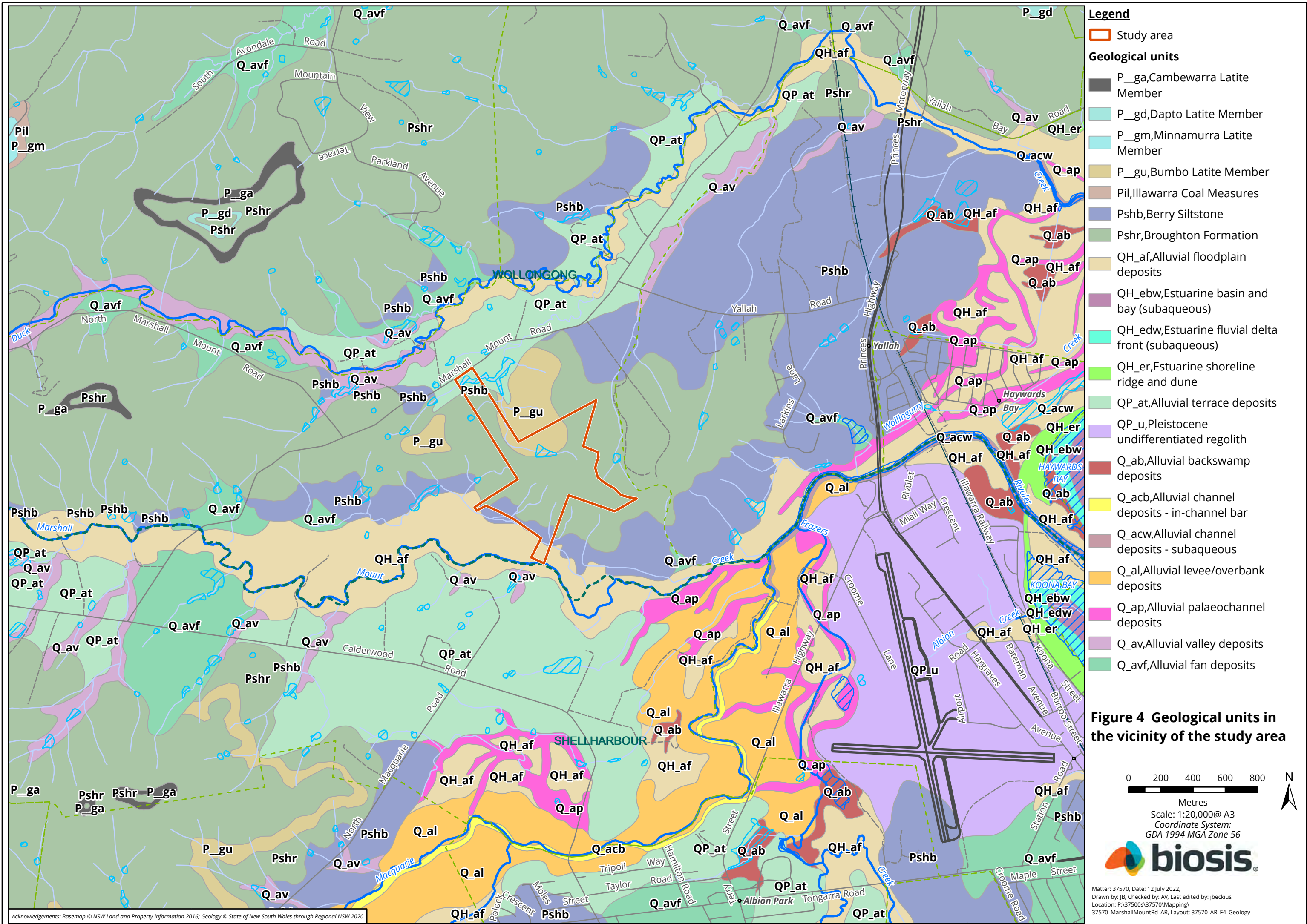
Soil Material	Description
Fairy Meadow 1 (fa1)	Apedal massive sandy loam to loamy sand with porous sandy fabric. This material occurs as topsoil. The surface condition is loose to friable. Colour is brownish black. The pH is neutral to slightly alkaline. In some locations sub-angular to angular (2-20 millimetres) stones constitute up to 10% of the volume of this material. Roots are common.
Fairy Meadow 2 (fa2)	Apedal single grained sandy loam with porous sandy fabric. This material occurs as subsoil. Structure varies from single-grained to massive. Colour ranges from brown to dull brown. The pH is neutral to slightly acidic. Occasionally orange mottles occur at depth. Roots are rare.
Fairy Meadow 3 (fa3)	Moderately pedal light clay to sandy clay loam with rough-faced peds. This material occurs as subsoil. Structure ranges from weakly to moderately pedal. Peds are 5-20 millimetres

Soil Material	Description
	and polyhedral. Colour ranges from brown to dull yellowish brown. Occasionally orange and red mottles occur at depth. pH is slightly acidic. Small to medium rounded gravels make up to 50% of the volume. Roots are rare.
Fairy Meadow 4 (fa4)	Weakly pedal, heavy clay with rough-faced peds. This material occurs as subsoil. Peds are 2-20 millimetres and vary from crumb to polyhedral. The colour ranges from olive brown to dull yellowish brown. Occasional orange and red mottles occur at depth. Localised fine to medium rounded gravels (<20 millimetres) may make up to 50% of the volume. Roots are rare.

The Wattamolla Road soil landscape is a depositional landscape that has moderate erodibility within the topsoils and high erodibility in the subsoils (Hazelton 1992, pp.87). Depositional soil landscapes have the potential to preserve archaeological deposits. However, the erodibility factor may also potentially lead to the exposure of any deeper archaeological deposits where topsoil has eroded away. The dominate soil characteristics of the Wattamolla soil landscape has the following characteristics (Table 6):

Table 6 Wattamolla Road soil landscape (Hazelton 1992, pp.86-87)

Soil Material	Description
Wattamolla Road 1 (wt1)	Moderately pedal fine sandy loam with porous, rough faced sandy fabric. This material occurs as topsoil. Colour is brownish black to greyish brown, with occasional bleaching at depth. The pH is neutral to slightly acidic. In some locations sub-angular stones constitute more than 2% of the volume of this material. Roots are common.
Wattamolla Road 2 (wt2)	Weakly pedal silty loam with porous rough faced silty fabric. This material occurs as topsoil. Structure is weakly pedal with greater than 2 millimetre polyhedral peds. Colour ranges from brown (7.5YR 4/3) to dull brown (7.5YR 4/6). The pH slightly acidic. Roots are common.
Wattamolla Road 3 (wt3)	Weakly to moderately pedal light clay with smooth faced dense peds. This material occurs as subsoil. Structure ranges from weakly to moderately pedal. Peds are 10-20 millimetres and polyhedral to subangular. Colour ranges from brown to yellowish brown. Occasionally red mottles occur at depth. pH is slightly acidic. Roots are less common.
Wattamolla Road 4 (wt4)	Strong pedal, light clay with rough-faced porous peds. This material occurs as subsoil. Peds are 10-20 millimetres subangular blocky peds. The colour is dark reddish brown. pH is slightly acidic. Roots are common.
Wattamolla Road 5 (wt5)	Strongly pedal, medium clay with rough-faced porous peds. This material occurs as subsoil. Peds are 20-50 millimetres polyhedral to subangular blocky peds. The colour is brown to yellowish brown with red and grey clay mottles increasing with depth. pH is acidic. Roots are not common at this depth.



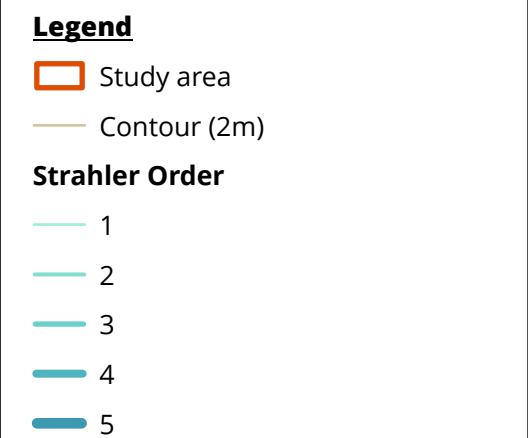
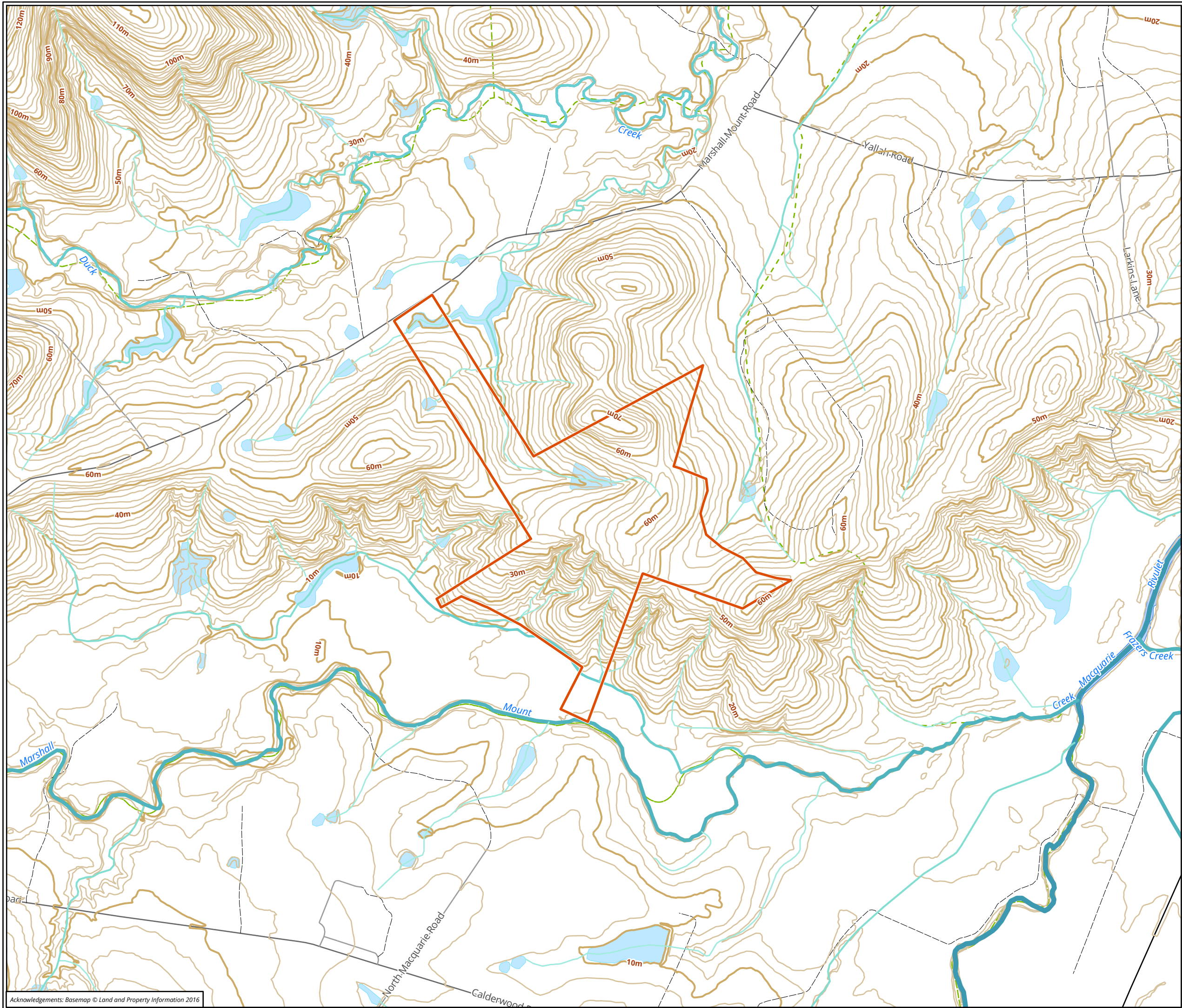
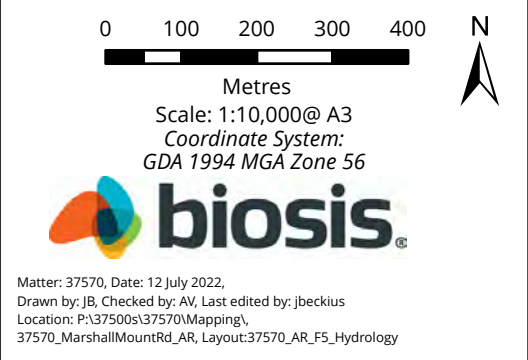
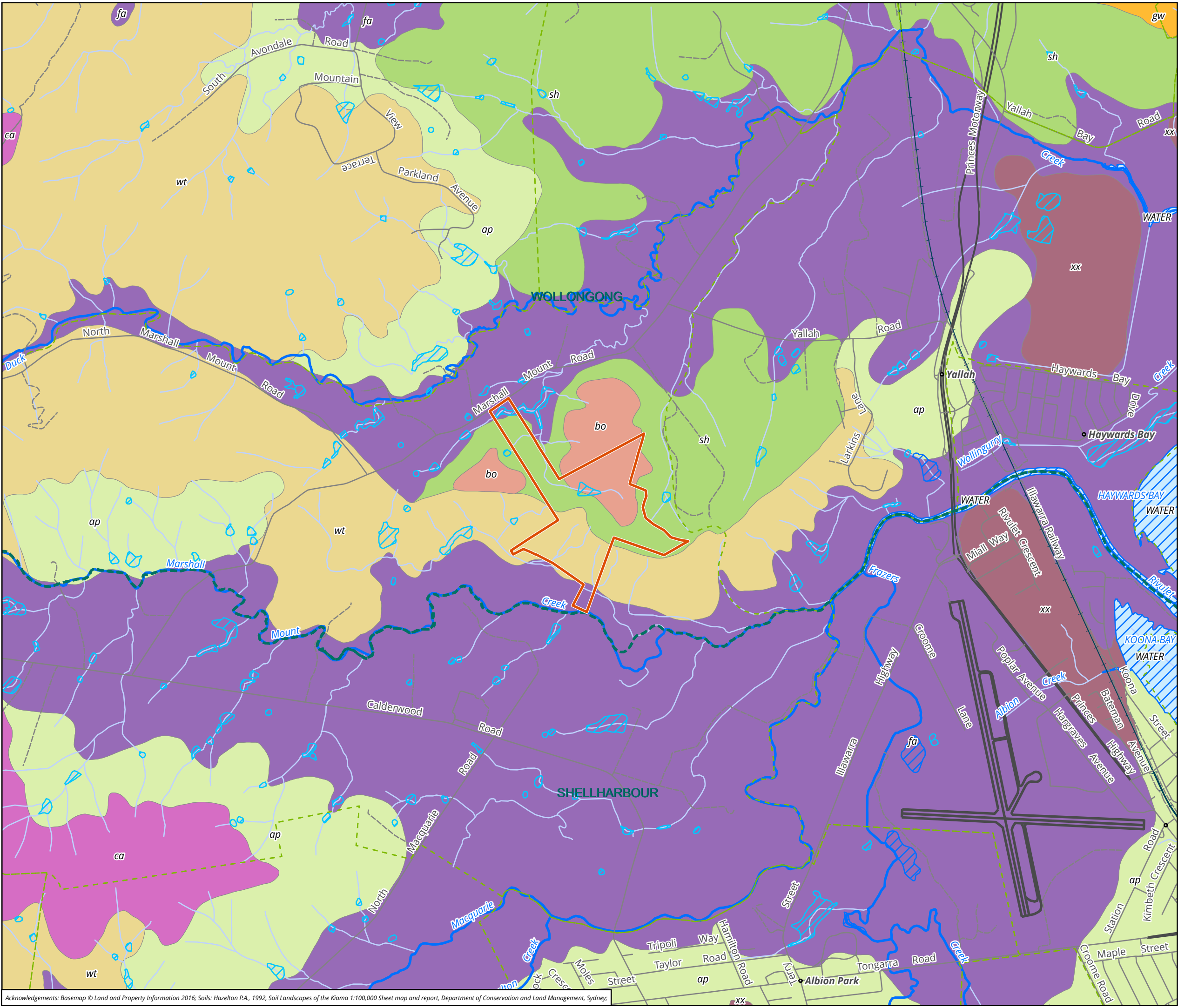


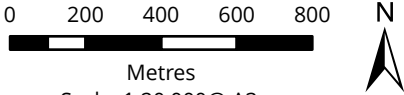
Figure 5 Hydrology and topography in the vicinity of the study area





- Legend**
- Study area
 - Soil landscape units**
 - ap - ALBION PARK
 - bo - BOMBO
 - ca - CAMBEWARRA
 - fa - FAIRY MEADOW
 - gw - GWYNNEVILLE
 - sh - SHELLHARBOUR
 - WATER - WATER
 - wt - WATTAMOLLA ROAD
 - xx - DISTURBED TERRAIN

Figure 6 Soil landscapes in the vicinity of the study area



Matter: 37570, Date: 12 July 2022,
Drawn by: JB, Checked by: AV, Last edited by: jbeckius
Location: P:\37500s\37570\Mapping\
37570_MarshallMountRd_AR, Layout: 37570_AR_F6_Soils

3.1.3 Landscape resources

The Coastal Plain of the Illawarra region provided a number of resources utilized by Aboriginal inhabitants. The geology of the region supports an abundant source 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. This would have been available locally and dispensed through trading with other groups (Donlon & Sefton 1988, p.23). Igneous raw materials would have come from the south of the study area in areas like Gerringong, due to its volcanic nature (Donlon & Sefton 1988, p.55). Other fined grained siliceous materials may have also come from the Cumberland Plain. Silcrete cobbles are known to have occurred across the Cumberland Plain (McDonald 1992), to the north of the study area. Elsewhere on the Plain, the potential raw materials for stone artefact production include silicified wood, tuff, mudstone, quartz, quartzite and basalt. River gravels and cobbles containing silcrete, chert, and other fine grained volcanic rocks have also been used (Attenbrow 2002). 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 for stone axes. The Berry Siltstone formation would have provided accessible outcrops of siltstone, shale and tuffaceous sandstones.

Aerial imagery and vegetation mapping undertaken by the National parks and Wildlife Service (NPWS 2002) 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 (NPWS 2002):

- 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 Woollybutt (*Eucalyptus longifolia*), Stringybark (*Eucalyptus globoidea*, *Eucalyptus eugenoides*), and Honey Myrtle (*Melaleuca decora*).

Plant resources were used in a variety of ways by Aboriginal people. Fibres were twisted into string, which was used for many purposes, including the weaving of nets, baskets and fishing lines. String was also used for personal adornment. Bark was also used to build shelter; by using a large sheet of bark that would be propped against a stick to form a *gunyah* (Attenbrow 2002, p.105).

The vegetation communities previously surrounding the study area provided a range of environments and ecotones that would have supported a wide range of faunal resources, which would have been utilised by Aboriginal peoples. These resources would have included terrestrial mammals and avian resources used for food, tool making, and clothing.

Table 7 Traditional Aboriginal plant resources and use within the survey area (Stewart & Percival 1997)

Species	Traditional use
Ridge top woodland	
Old Man Banksia <i>Banksia serrata</i> Hair-pin Banksia <i>Banksia spinulosa</i>	The nectar of the flowers was sucked or soaked to make a sweet beverage. The cones were used for retaining fire as they will remain alight for a considerable period.
Red Bloodwood <i>Corymbia gummifera</i>	The nectar from flowers was sucked. The resinous sap was used to stop fibre fishing lines from fraying. The red resinous sap was also used to attract Cryptococcus insects which form sweet tasting galls. The exudate was also used internally and applied externally in powdered form to treat sores.

Species	Traditional use
Blue-leaved Stringybark <i>Eucalyptus agglomerate</i>	The bark from these trees was made for making canoes. The bark was also used for making twine by rolling the fibres of soaked bark.
Silver Top Ash <i>Eucalyptus sieberi</i>	A fine grained hard wood used for tool handles, such as axes and oars.
Paperbark Tea-tree <i>Leptospermum trinervium</i>	The leaves are pungent and crushed for medicinal purposes.
Saw Sedge <i>Gahnia sieberiana</i>	The seeds were pounded to produce flour and the bases of the leaves are edible.
Broad Leaf Geebung <i>Persoonia levis</i>	The fruits were eaten, although difficult to collect ripe as birds eat the unripened fruit. The bark of the Geebung was used to make a solution in which fishing lines were soaked for strength.
Mat Rush <i>Lomandra cylindrica</i>	Both the flowers and the bases of the leaves (pea like flavour) were edible.
Forest Grass Tree <i>Xanthorrhoea media</i>	The flower stems produce nectar which can be eaten or placed in water to sweeten drinks. The stalks were used for spear shafts and the resin as glue for tools and weapons. The resin was collected as a powder by beating the leaf bases. The resin was also collected in the trunks of old, dead, burnt stumps.
Gully forest	
Orchids <i>Acianthus spp.</i>	The tubers of this plant were eaten and were an important source of nourishment.
Red Bloodwood <i>Corymbia gummifera</i>	The nectar from flowers was sucked. The resinous sap was used to stop fibre fishing lines from fraying. The red resinous sap was also used to attract Cryptococcus insects which form sweet tasting galls. The exudate was also used internally and applied externally in powdered form to treat sores.
Blue-leaved Stringybark <i>Eucalyptus agglomerate</i>	The bark from these trees was made for making canoes.
Rock Orchid <i>Dendrobium speciosum</i>	The starchy stems are roasted and eaten, and also chewed and rubbed into sores, burns and wounds.
Blue Flax Lilies <i>Dianella species</i>	The fruits were eaten raw. The roots were also eaten after pounding and roasting. The strong leaf fibres were made into string.
Broad Leaf Geebung <i>Persoonia levis</i> Pine-leaf Geebung <i>Persoonia pinifolia</i>	The fruits were eaten, although difficult to collect ripe as birds eat the unripened fruit. The bark of the Geebung was used to make a solution in which fishing lines were soaked for strength.
Upland swamps	
Red-stemmed Wattle <i>Acacia rubida</i>	Seeds were ground for flour.
Swamp Banksia <i>Banksia paludosa</i> Large-leaved Banksia <i>Banksia robur</i>	The nectar of the flowers was sucked or soaked to make a sweet beverage. The cones were used for retaining fire as they remained alight for a considerable period.
Heath Banksia <i>Banksia ericifolia</i>	The flowers were sourced for their sweet nectar and either sucked or soaked.

Species	Traditional use
Common Hop Bush <i>Dodonaea triquetra</i>	The leaves were chewed for toothache and used as a poultice for stonefish and stingray wounds. The liquid made from soaking the roots was used for open cuts and sores.
Spiny headed Mat Rush <i>Lomandra longifolia</i>	The seeds were ground for flour. The flowers and the base of the leaves are edible. The tough leaves were also used to make baskets.
Common Bracken Fern <i>Pteridium esculentum</i>	The rhizome of this plant was a staple food source – roasted first to destroy the toxins before being chewed/eaten.
Saw Sedge <i>Gahnia sieberiana</i>	The seeds were pounded to produce flour and the bases of the leaves are edible.
Warm temperate forest	
Blackwood <i>Acacia melanoxylan</i>	The seeds were collected and eaten.
Lilypilly <i>Amema smithii</i>	The fruit was edible.
Cabbage Tree Palm <i>Livistona australis</i>	The tip of this palm is edible. The leaves were used as roof thatch and for weaving baskets. The bark was used for making fishing lines.
Spiny headed Mat Rush <i>Lomandra longifolia</i>	The seeds were ground for flour. The flowers and the base of the leaves are edible. The tough leaves were also used to make baskets.

Ethnographic resources indicate that Port Kembla was a rich food resource gathering area for Aboriginal people particularly for fishing (Organ 1990, p.220). Aquatic species such as freshwater crayfish would have been easily accessible in larger waterways (Rosen 1995). Aquatic vertebrates, fish and eels, would also have been present within larger creeks and waterways. Fishing spears were described as being barbed with fish teeth as well as fish bones (Attenbrow 2002, p.117).

3.1.4 Land use history

The Illawarra region is the traditional land of the Wodi Wodi, a group of people who spoke a variant of the Dharawal language (Wesson 2009). The area occupied by this group extended from Botany Bay down the coast to around Nowra. To the north of the Wodi Wodi, the Darug are identified, to the west are the Gundanguura, and in the south the Thoorga are identified (Tindale 1974). The areas inhabited by each of the groups are considered to be indicative only and would have changed through time and may have been dependent on certain circumstances (i.e. availability and distribution of resources). Interactions between different types of social groupings would have varied with seasons and resource availability. Traditional stories tell of the arrival of the Wodi Wodi to Lake Illawarra, bringing with them the Dharawal or cabbage tree palm from which their language is named (Wesson & New South Wales Government Office of Environment and Heritage 2005, p.5). Analysis of middens in the region has provided dates of occupation dating back 6,000 to 7,000 years on the coast and at Lake Illawarra (AMBS 2006).

The first recorded contact between Aboriginal and European peoples occurred in 1770, when Captain Cook sailed down the east coast of Australia in the *Endeavour* and observed cook fires and Aboriginal people carrying canoes along the coast (Organ 1990). The next recorded contact occurred in 1796, when Flinders and Bass travelled along the coast in the *Tom Thumb* (Organ 1990). An expedition from Jervis Bay by George William Evans, in which the expedition met several groups of Aboriginal people on the way through the Wollongong area in 1812, was also documented (Organ 1990).

Early historic references record Aboriginal groups moving frequently between the coast and the escarpment and travelling for special ceremonies, although camps were also noted along the coast and coastal plains (AMBS 2006). However, during the 19th and 20th centuries, the arrival of settlers to the Illawarra, created competition for resources, which restricted the movement of Aboriginal inhabitants, and their traditional lifestyle was severely affected.

Within the study area, soil disturbance has been associated with historic pastoral land-use practices. The Dapto and Albion Park area has been subjected to extensive grazing and agricultural practices from 1880's onwards (McDonald 1976). Cedar cutters were the first to open up the Illawarra area from as early as 1805. When they had exhausted the easily accessible timber by 1820, cattle grazing took over and the coastal plain was extensively settled and cleared for pastoral estates and farms. Many early houses were built of rough slab or timber construction (Kass 2010, p.66).

A review of historical aerial imagery (Photo 2, Photo 3, Photo 4, and Figure 2) shows that the study area has been extensively cleared. Aerial imagery from 1962 shows extensive vegetation clearance, with the exception of vegetation left around the first and second order tributaries in the southern portion of the study area (Photo 2). Nearby vegetation has been cleared for a transmission line to the east.

Aerial imagery from 1989 shows several developments (Photo 3). These include a dam in the northern portion of 365 Marshall Mount Road, a house, driveways, tracks, and several sheds, additional vegetation clearance.

By 2005, there has been further developments including vegetation removal and the addition of four dams (Photo 4). In comparing this with current aerial imagery (Figure 2) there has been little change to the study area.

Overall, disturbances caused by recent land use and pastoral activities may have therefore impacted on surface and subsurface evidence of Aboriginal occupation within the study area.



Photo 2 1962 aerial with the study area outlined in red (Source: NSW Spatial Services)



Photo 3 1989 aerial with the study area outlined in red (Source: NSW Spatial Services)



Photo 4 2005 aerial with the study area outlined in red (Source: NSW Spatial Services)

3.2 Previous archaeological work

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

Aboriginal people are known to have inhabited the South Coast of NSW area for at least 20,000 years (AMBS 2006). Material from archaeological excavations of shell middens at Bass Point (located approximately 17.2 kilometres south-east) and a rock shelter at Burrill Lake (located approximately 131 kilometres south) are dated to 15,780 years Before Present (BP) and 20,760 BP, respectively (Mulvaney 1975). At this time, the sites would have been situated approximately 14 kilometres inland from their contemporary coastal location, due to the change in sea level since the last glacial maximum. An additional two Pleistocene sites have also been recorded in the Illawarra hinterland, on a tributary of the Shoalhaven River (Feary & Moorcroft 2011).

3.2.1 Regional overview

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

While Pleistocene occupation has been identified on the south coast, the majority of sites in the Illawarra region date to the last 6,000 years, as many earlier sites were likely submerged with the rise

in sea levels during the late Holocene. This later occupation of the NSW South Coast has been characterised by broad scale technological changes and is known as the Eastern Regional Sequence (Table 8) (based on McDonald (1994)).

Table 8 Eastern Regional Sequence

Eastern Regional Sequence	
The Capertian:	
• Large, heavy artefacts. • Unifacial pebble tools, scrapers, core tools, denticulate saws and hammerstones. • Some bipolar tools and burins. • Dated up to 5,000 BP.	
The Early Bondaian:	
• Capertian characteristics continue, but smaller blades appear and become more prominent. • Backed blades and ground edge axes are introduced. • Lithic materials shift to fine-grained siliceous materials such as silcrete, chert and tuff. • Dated from 5,000 BP to 3,000 BP.	
The Middle Bondaian:	
• The percentage of Bondi points becomes greater than bipolar artefacts. • More quartz artefacts and edge ground artefacts present. • Dated from 3,000 BP to 1,000 BP.	
The Late Bondaian:	
• Quartz increases or dominates assemblages. • Bondi points and backed blades become rare or obsolete. • Predominant tools are eloueras, bipolar artefacts and edge ground hatchets. • Bone and shell implements are introduced. • Dated from 1,600 or 1,000 BP to after European contact.	

This sequence has more recently been examined and argued to be inaccurate in temporal and regional phasing (Mulvaney & Kamminga 1999). Instead, the “Australian Small Tool Tradition” has been suggested for an alternative model that purports site intensification supported by greatly increased artefact discard from 5,000 to 2,000 BP (Hiscock 1986, Attenbrow 1987). The cause for this change remains unclear but increased population and environmental change associated with the stabilisation of sea levels and associated coastal/estuarine resource establishment, or the development of new technologies have all been suggested. However, critics argue that this model may also be too simplistic, as more recent work has identified continuing or decreasing artefact discard in this same time period (Boot 1996).

Sefton (1980) undertook an archaeological survey of the proposed transmission line routes in the West Dapto-Yallah area of the City of Wollongong, approximately seven kilometres from the current study area. Two archaeological sites were identified during this survey. Registered site, AHIMS 52-5-0123/ Yallah Site 1, consisted of one isolated artefact that was located on the northern bank of a tributary of Duck Creek, made from fossilised wood. AHIMS 52-5-0122/ Yallah Site 2 was located within 150 metres of Lake Illawarra on a lower slope and is a sparse scatter of seven artefacts made from chert, jasper and rhyolite. The site was located on a gradual slope, and has been previously

disturbed by quarrying, erosion and underground services (Sefton 1980, p.10). Both sites are within the close proximity to reliable, permanent sources of water on flat elevated grounds.

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. A copy of the Sefton's report could not be obtained, but the review was revised from a study undertaken by AMBS study in 2006 (AMBS 2006).

The following key elements constitute Sefton's site predictive model for 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 deposits could be located in the Pleistocene sediments of the flood plains at West Dapto. Stratified occupational deposits 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, offshore 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 2 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 Lake Illawarra, 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 edge ground tools have been located in adjacent areas on the shores of Lake Illawarra, although 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).

AMBS (2006) conducted an archaeological survey in the West Dapto Area, which includes the suburb of Marshall Mount. Based on this work, they created a predictive model for broad site distribution in their “Landscape Model of Archaeological Sensitivity” of the region (Table 9).

Table 9 Summarised “Landscape Model of Archaeological Sensitivity” for the West Dapto region (AMBS 2006)

Archaeological Sensitivity, West Dapto	
Areas of Low Archaeological Sensitivity	
•	Urban centres, areas of infrastructure and cemeteries.
Areas of Moderate Archaeological Sensitivity:	
•	Streams of upper creek catchments of West Dapto and the spur crests dividing these creek systems.

Archaeological Sensitivity, West Dapto

Areas of Moderate to High Archaeological Sensitivity:

- Sections of Dapto Creek, Sheaffes Creek, Forest Creek, Robins Creek, Mullet Creek and Duck Creek.
- This includes stream banks, alluvial flats and undulating hillslopes.

AMBS subsequently undertook archaeological test excavations as part of a landform sampling strategy. These excavations resulted in the following:

- Recovery of 425 artefacts from 75 of the 136 excavated test pits.
- Dominant lithic materials consisted of chert and quartz with lesser amounts of silicified wood, quartzite, silcrete, silicified tuff and fine grained siliceous material.
- These artefacts were recovered from a variety of landforms including hillslopes, alluvial flats, stream banks, and spur crests.
- More specifically, this model was successful as it identified the Marshall Mount upper creek banks and the spur crests between the Duck Creek and Marshall Mount Creek systems as areas of moderate to high archaeological sensitivity.

As part of the assessment, AMBS also commissioned Philip Hughes to undertake geomorphic testing prior to the commencement of the larger sub-surface investigation program. 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 (AMBS 2006, p.176). 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 (AMBS 2006, p.177).

3.2.2 Local overview

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

Navin Officer (1993) completed archaeological testing in three areas of PAD for a proposed residential subdivision on the southern side of Bong Bong Road, West Dapto approximately nine kilometres north of the current study area. PAD WD1 was located within the lower slope and undulating creek flat landform. PAD WD1 was divided into five transects which were then sampled through the undertaking of 35 test excavation units consisting of a combination of auger holes and spade probes. One surface artefact was located at the western end of PAD WD1. A series of ten random probes were also excavated at 1-2 metres apart, averaging 28 centimetres in depth. Four additional artefacts were recovered, and the area was recorded as a site AHIMS 52-2-1688/ WD1. PAD WD2 was also located within a low rise landform between a creek and a swampy cut-off channel. A total of five test excavation units were excavated in a single transect in PAD WD2. No artefacts were recovered in this area. PAD WD3 was subject to three random spade probes as it was located within a similar landform as WD2; no artefacts were recovered.

Artefacts at the site AHIMS 52-2-1688/ WD1 were recovered from the upper 26 centimetres of the loam deposit within a 1 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 (Navin Officer 1993, p.11). 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 might be present as surface and subsurface deposits in WD1. However, the potential for archaeologically significant sites and/or undisturbed archaeological deposits was assessed to be minimal (Navin Officer 1993, p.12). Consent to Destroy was issued by the National Park and Wildlife in 1993 in order to destroy the site AHIMS 52-2-1688/ WD1.

Navin Officer (1997) undertook an archaeological investigation of a proposed residential subdivision at Lot 1 DP 253917, Mount Brown Road in South Dapto, approximately five kilometres north from 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 (Navin Officer 1997, p.7).

Dominic Steele (2000) was commissioned by SMEC Australia Pty Ltd to undertake an archaeological survey and assessment of the proposed upgrade to the Albion Park water supply system, approximately five kilometres south east of the study area. Three survey units were assessed in order to efficiently cover the scope of the works. No Aboriginal sites or objects were identified during the survey effort. This may have been due to the poor level of visibility across the study area, and the fact that approximately 50% of the proposed pipeline route was located in heavily built-up urban residential areas. It was recommended that monitoring of earthworks be undertaken by the Illawarra LALC, particularly in areas nearby Frazer's Creek, and at the Albion Park High Level Reservoir.

Navin Officer (2004) completed a cultural heritage assessment for the Shellharbour Urban Fringe area which included the Dunmore and Albion Park areas, approximately seven kilometres south-east of the current study area. The initial assessment identified level ground on hill crests close to water as having moderate potential for artefact occurrences, particularly given the likely use of watershed crests as access routes for the rangelands and coastal plain. Grinding grooves were assessed as having a moderate potential to occur, if sandstone outcrops were present, and the same was said of scarred trees, if mature growth trees were present. The general assessment of the area stated that 'areas of archaeological potential within this zone are generally level ground on ridge and spurline crests and benches, especially locally elevated landforms adjacent to freshwater' (Navin Officer 2004, p.19). The survey identified seven PADs in total, with two of these PADs being within 2 kilometres of the study area. The nearest (SUFA1) being approximately 400 metres to the south of the current study area. SUFA1 was identified on the gentle lower slopes of a steep mini spur and associate valley flats and was to the west of Hazelton Creek. This site has not been recorded in AHIMS. It appears that the survey obtained extensive coverage in the corner of the site occupied by the current study area (Navin Officer 2004, p.28). It was noted that the ridgeline that the study area is located along would ordinarily have a moderate to high potential for sites to be present, however the level of disturbance, combined with the total lack of any artefacts being identified and the shallowness of the topsoil led to the conclusion that there was extremely limited potential for subsurface deposits (Navin Officer 2004, p.23). No Aboriginal sites were identified during the survey, and the report concluded that it was impossible to accurately assess the areas of PAD without further investigation.

Navin Officer (2005) completed an Aboriginal archaeological assessment for the Tullimbar Village Development in 2002 located approximately 3.8 kilometres south-east of the study area. During the survey, two sites and four areas of PAD were identified. Subsequent mechanical test excavations

were carried out at AHIMS 52-5-0431/Tullimbar Village PAD 3. A total of 11 artefacts were excavated from 5 of the 14 test pits. The majority of the artefacts recovered were chert, though other raw materials included silcrete, tuff and volcanic rock. One volcanic flake was also recovered from the surface. Considering the low density of artefacts, the presence of a diverse range of raw materials, and the level of bioturbation and earthworks disturbance, it was concluded that the site is a background artefact scatter representing a low intensity occupation site or transient camp of low archaeological significance. No further archaeological excavations were recommended for the northern section of AHIMS 52-5-0431/Tullimbar Village PAD 3.

Biosis (2007) was commissioned by Daly International to complete an archaeological subsurface testing program of the proposed Calderwood Telecommunications Tower footprint on Johnstons Ridge, Shellharbour NSW, approximately two kilometres from the study area. The initial survey assessment identified an area of PAD, known as Calderwood PAD 1, upon a flat crest of Johnstons Ridge. No artefacts were recorded during the survey. The PAD was identified as an area of moderate archaeological potential. Taking into account the nature of the known archaeological occurrences in the region and the characteristics of Calderwood PAD 1, a program of archaeological sub-surface testing was proposed with the intent of identifying, understanding and defining the nature of the Aboriginal archaeological material that might be present.

The sub-surface testing program involved the manual excavation of six, 1 metre squared test pits that sampled the proposed area of development impact. In total an area of 36 metres squared was excavated, with a total excavated volume of 1.18 cubic metres. Seven stone artefacts (flake fragments) were recovered during the subsurface testing from three of the test pits (test pit 1, 2 and 4). Seven additional angular fragments with no defining artefact characteristics were also recovered from two of the test pits (test pit 2 and 3). The recovery of the artefacts during the testing program confirmed the regional predictive modelling which suggests that Aboriginal people would have utilized ridgelines in the past. The low density of artefacts, as well as the artefact assemblage characteristics suggested that the site is a low level of intensity occupation site and is common throughout the region.

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 3.3 kilometres north-west of the study area. The assessed area encompassed 42.88 hectares to the north of Bong Bong Road, west of Mullet Creek. Archaeological survey was undertaken which targeted areas that would be impacted by the proposed development, and landforms and areas identified by 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, AHIMS 52-2-3659/ Bong Bong Road IA1 and AHIMS 52-2-3660/Bong Road IA2. A comprehensive review of AMBS study (2006) indicated that the newly recorded site AHIMS 52-2-3660/Bong Road IA2 was most likely representative of the previously recorded site AHIMS 52-2-3289/WDRA_AX_01. 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, pp.42–43). Their presence conforms to the site predictive model for the region, which suggests that 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.

GML Heritage (2014) completed and ACHA for Lyndal Pty Ltd, on the Stage 3 development of Lot 12 DP 849162. A field survey was conducted, and two isolated finds were identified. A PAD site (SUFA3) had also been previously recorded within the area by Navin Officer in 2004, as part of the Shellharbour Urban Fringe Lands Aboriginal heritage assessment. Test excavations were conducted at PAD site SUFA3 on two separate occasions. In 2011 a total of 35 test pits were excavated and 54

artefacts of varying types were recovered. The most common raw material present was fine-grained siliceous materials that is common to the area. Other raw material types included chalcedony, petrified wood, chert and silcrete. The second stage of test excavations was carried out in 2014. A total of 34 test pits were excavated and 38 artefacts and five non-diagnostic fragments were identified. The most common raw material type was Chalcedony. Other raw material types included silcrete, quartz, and silicified wood. The results of the test excavations identified PAD SUFA3 to be a consistent low density artefact scatter. The site was assessed to be of low potential. Following test excavation PAD SUFA3 was registered on the AHIMS Database as site 52-5-0648.

Biosis Pty Ltd (2015) provided Aboriginal due diligence advice for 225 Crest Road in Albion Park, approximately 3.8 kilometres south of the current study area. The assessment concluded that ridgelines with associated upper slopes and spur lines would possess high archaeological potential and were likely to have been used by Aboriginal people as a transient corridor between the hinterland and the coast. The most likely site types to occur were predicted to be low to moderate density artefact scatters and isolated artefacts. These sites would be the remnants of short-term camping places or would represent lost or discarded material along the transient corridor. The assessment also identified a small area within the eastern end of the area on the upper gentle slopes associated with the ridgeline and the small easternmost part of the entire area as having moderate archaeological potential. Those areas are located within flat areas on spur lines in the vicinity of the watercourses. Areas of low archaeological potential were attributed to steep slopes that would not be suitable for occupation or movement across the landscape. Further assessment was recommended for the areas of high and moderate potential.

Austral Archaeology (2019) conducted an ACHA for proposed relocation of high voltage transmission lines and realignment of an existing underground fibre optic cable owned by Optus (the project/proposed works) within seven lots located approximately 4.2 kilometres south-east of the study area. Archaeological test excavations were undertaken to investigate the extent of PAD 1 and PAD 2 and demonstrated that both areas represent low density background scatters of low archaeological significance. A total of two artefacts were identified in PAD 1 during test excavations from a total of 12 test pits. A total of 13 artefacts were identified in PAD 2 during the archaeological test excavations from a total of 18 test pits. The test excavations also sought to investigate the extent of AHIMS 52-5-0440/Tullimbar Village PAD 4 and determine the level of historic disturbance. No artefacts were recovered from the investigations of AHIMS 52-5-0440/Tullimbar Village PAD 4 and the PAD demonstrated high levels of previous ground disturbance as a result of the modification of Hazelton Creek, agricultural activities such as ploughing, and the levelling of land for the construction of the adjacent farming property.

Biosis (2021) conducted an ADDA for the proposed Albion Park By-Pass (Tripoli Way extension) at Albion Park, approximately 2.8 kilometres south-east of the study area. The survey revealed that large parts of the study area had been subject to significant ground disturbance, such as the initial vegetation removal and construction of roads and residential dwellings throughout the study area. Although these processes would displace surface cultural material, it would not affect deeper buried archaeological deposits. Three areas of moderate potential were identified, therefore it was recommended that an ACHA with test excavations be completed and an AHIP be applied for as an existing Aboriginal site was located within the study area (Tulkeroo ISO).

Biosis (2021) was commissioned by the Illawarra LALC to undertake Aboriginal archaeological and cultural heritage assessment for the proposed residential development at 310 Marshall Mount Road, adjacent to the current study area. This also included the northern portion of 365 Marshall Mount Road as part of the current study area. As part of this assessment a survey was undertaken and three areas of moderate archaeological potential were recorded upon a hill crest, a hill crest/spur, and a creek flat where low levels of prior disturbance had been observed. AHIMS site 52-5-

0489/WDRA AX33 was also revisited as part of the field survey. No cultural material was identified at the site location.

Test excavations were then undertaken as part of this assessment within the areas of moderate archaeological potential (PAD 1, PAD2, and PAD3) identified by the field survey. Test excavations were completed over a period of six days from 21 of June 2019 and 28 of June 2019, and conformed to a methodology developed in accordance with the Code that was reviewed by RAPs as per the consultation requirements (DECCW 2010b). A total of 52 test pits were excavated over 13 transects resulting in the identification of two low density subsurface archaeological deposits (AHIMS 52-5-0939/MMAD01, and AHIMS 52-5-0938/MMAD02).

- MMAD01 consisted of a low density subsurface archaeological deposit located upon a hill crest consisting of 3 artefacts of silcrete and quartz material. MMAD01 was assessed as being relatively intact and was representative of a transient site utilized by Aboriginal people for resource gathering and movement throughout the region. The scientific significance of the site was assessed as low, and there was low potential for further Aboriginal cultural material to be identified.
- MMAD02 consisted of an isolated distal flake fragment recovered from a creek flat. MMAD02 was found to likely be the result of re-depositional processes and may have originally been located upon the same crest landform as AHIMS 52-5-0489/WDRA AX33. MMAD02 was not considered to be *in situ* and possessed low scientific significance, with low potential for further Aboriginal cultural material to be identified across the landform.

3.2.3 AHIMS site analysis

A search of the AHIMS database (Client Service ID: 891928, search date 14 May 2024) identified 114 Aboriginal archaeological sites within a 1.5 by 1.5 kilometre search area, centred on the proposed study area. Two of these registered sites (AHIMS 52-5-0494/WDRA_AX_38 and AHIMS 52-5-1051/Marshall Mount Road AF) are located within the study area and are described below (Figure 7). AHIMS 52-5-1051/Marshall Mount Road AF was identified as part of this assessment. There are also three sites within 200 metres of the study area, also described below (AHIMS 52-5-0938/MMAD02, AHIMS 52-5-0939 and AHIMS 52-5-0493). AHIMS search results are provided in Appendix 1. Table 10 provides the frequencies of Aboriginal site types in the vicinity of the study area. The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports where available. These descriptions and maps were relied on where notable discrepancies occurred.

It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area. Some recorded sites consist of more than one element, for example artefacts and shell, 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 119 results presented here, compared to the 114 sites identified in AHIMS.

Table 10 AHIMS site type frequency

Site type	Number of occurrences	Frequency (%)
Artefact	105	88.24
Shell	9	7.56
PAD	3	2.52

Site type	Number of occurrences	Frequency (%)
Modified tree	2	1.68
Total	119	100

A simple analysis of the Aboriginal cultural heritage sites registered within the 1.5 by 1.5 kilometre buffer of the study area indicates that artefacts are the dominant site type with 88.24% (n=105). This was followed by shell with 7.56% (n=9), PAD with 2.52% (n=3), and modified tree with 1.68% (n=2).

3.2.4 AHIMS sites located within the study area

AHIMS 52-5-0494/WDRA_AX_38

This site was recorded by Australian Museum Consulting in 2006. It is located within 297 Marshall Mount Road (Lot 5 DP 24143). The site consists of three artefacts recovered from a 1 metre by 1 metre excavation on a hill crest, with raw materials featuring one chert and two quartz pieces. Soils consisted of a loosely consolidated brown loam, and small amount of decomposing red sandstone (weathered sandstone). This site was visited in 2021 as part of Biosis' assessment, and no cultural material was identified at the site location (Biosis 2021).

AHIMS 52-5-1051/Marshall Mount Road AF

This site was identified during the archaeological survey undertaken as part of this assessment. It is located within 365 Marshall Mount Road (part of Lot 5 DP 24143). One artefact was identified during the survey in an area of erosion adjacent to the small dam in the north-west of the study area. The artefact consisted of a silcrete angular fragment with a size class of 10-15 millimetres, and a cortex of 30%.

3.2.5 AHIMS sites located within 200 metres of the study area

AHIMS 52-5-0938/MMAD02

This site was recorded by Biosis in 2019 during test excavations. It is located within 310 Marshall Mount Road (located approximately 160 metres north of the study area). The site consists of one subsurface artefact, an isolated chert distal flake. This artefact was recovered from reddish brown silty clay to reddish brown clay between 200-300 millimetres.

AHIMS 52-5-0939/MMAD01

This site was recorded by Biosis in 2019 during test excavations. It is located within 310 Marshall Mount Road (located approximately 160 metres north of the study area). The site consists of three subsurface artefacts (one distal flake fragment, one proximal flake fragment and one longitudinal flake). Raw material types include quartz and silcrete. Artefacts were recovered from very dark brown loamy clay between 100-300 millimetres. There is low potential for further archaeological material to be recovered from the site extent. The scientific significance of this site has been assessed as low.

AHIMS 52-5-0493/WRDA_AX_37

This site was recorded by AMBS in 1998. It is located approximately 150 meters east of the study area, and the site consists of a silicified wood core recovered from a 1 metre by 1 metre excavation on a hill. The artefact was recovered between 200 -300 millimetres of dark brown clayey loam, with some rocky content and stone granules.

Figure 7 AHIMS within the vicinity of the study area

****THIS PAGE HAS BEEN REMOVED FOR PUBLIC EXHIBITION. THIS FIGURE CAN BE PROVIDED UPON REQUEST****

3.3 Discussion

The West Dapto region would have provided many natural resources for the local Aboriginal inhabitants to exploit. Ethno-historical documentation indicates that the entire region was traditionally occupied by the Wodi Wodi people. Tangible evidence of such occupation is reflected within the archaeological record across the landscape in the form of shell middens, stone artefact sites, isolated artefacts and modified trees.

The study area contains several first and second order non-perennial drainage lines. It is considered likely that these would have contained water during rainfall events and would have flowed into higher-order tributaries and ultimately into Duck Creek and Marshall Mount Creek. Duck Creek and Marshall Mount Creek, as perennial water sources would have provided a reliable source of water and abundance of natural resources and would have been a focus of Aboriginal occupation.

Within the study area, soil disturbance has been associated with historic pastoral land-use practices. The Dapto area has been subjected to extensive grazing and agricultural practices from 1880's onwards. Aerial imagery shows modification to drainage lines in the form of dams, construction of buildings and amenities and clearing of land. Disturbances caused by this recent land use and pastoral activities may have impacted on surface and subsurface evidence of Aboriginal occupation within the study area considering the shallow erosional soils present in the study area.

Previous archaeological work has focussed on specific development activities within the area that have contributed to our understanding of the archaeological and cultural landscape values of the locality. Previous studies provide a general overview of Aboriginal archaeological site modelling and predictive behaviour within the current study area.

The study area is characterised by slopes, along with several crests. Within the southern portion of the study area the banks of the tributaries are steeply incised. Erosional soils are located on the crests and slopes and swamp soils along the flats. The depths of erosional soils are generally shallow across ridge lines and associated slopes and therefore subject to erosional processes. Transferral soils are located across the tributaries in the southern portion and can result in the poor preservation of archaeological material throughout the soil deposits.

The dominant site type recorded in the vicinity of the study area are artefact sites, consisting of artefact scatters and isolated artefacts. These sites reflect local patterns of site distribution across the West Dapto area. Higher densities of artefacts and accumulation of shell midden material are generally found associated with Lake Illawarra to the east and indicate significant occupation events. The Escarpment foothills tend to exhibit isolated and low density artefact scatters spread across much of the area, reflecting a long term but less intensive use of the foothills, such as movement corridors or resource gathering areas.

3.3.1 Predictive model

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

These statements are based on:

- Site distribution in relation to landscape descriptions within the study area.
- Consideration of site type, raw material types and site densities likely to be present within the study area.

- Findings of the ethnohistorical research on the potential for material traces to present within the study area.
- Potential Aboriginal use of natural resources present or once present within the study area.
- Consideration of the temporal and spatial relationships of sites within the study area and surrounding region.

Table 11 indicates the site types most likely to be encountered across the present study area. The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 11 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.	Moderate: Stone artefact sites have been previously recorded in the region on level, well-drained topographies in close proximity to reliable sources of fresh water. Due to the distance from permanent freshwater resources, the potential for artefacts to be present within the study area is assessed as moderate.
PADs	Potential sub surface deposits of cultural material.	Moderate: PADs have been previously recorded in the region across a wide range of landforms. PADs are likely to be present within areas adjacent to water courses or on high points in undisturbed landforms.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Low: Shell midden sites have been recorded within the vicinity of the study area however, as there is no permanent water source located in the study area, there is a low potential for shell middens.
Quarries	Raw stone material procurement sites.	Low: There is no record of any quarries being within or surrounding the study area.
Scarred trees	Trees with cultural modifications	Low: Due to extensive vegetation clearance only a small number of mature native trees have survived in the study area. There is low potential for this site type.
Grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	Low: Suitable horizontal sandstone rock outcrops do not occur in the study area

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

4 Archaeological survey

A field survey of the study area was undertaken on 13 September 2022 by Samantha Keats and Hannah Mills of Biosis, accompanied by Kevin Campbell of the Illawarra Local Aboriginal Land Council. The field survey sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological survey objectives

The objectives of the survey were to:

- Provide RAPs an opportunity to view the study area and to discuss previously identified Aboriginal object(s) and/or place(s) in or within close proximity to the study area.
- Attempt to re-identify Aboriginal archaeological sites previously identified in the study area (AHIMS 52-5-0494/WDRA_AX_38).
- Undertake a systematic survey of the study area targeting areas with the potential for Aboriginal heritage.
- Identify and record Aboriginal archaeological sites visible on the ground surface.
- Identify and record areas of PADs.

4.2 Archaeological survey methodology

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

4.2.1 Sampling strategy

The survey effort targeted landforms with a higher potential for Aboriginal heritage. This included flat areas located within elevated positions, such as crest and saddle landforms. Areas adjacent to the waterlines were also targeted due to their proximity to water, which predictive modelling has indicated have a higher potential for Aboriginal heritage. The area in the vicinity of the previously recorded site AHIMS 52-5-0494/WDRA_AX_38 was also targeted.

4.2.2 Survey methods

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

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

- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.

Where possible, identification of natural soil deposits within the study area was undertaken. Photographs and recording techniques were incorporated into the survey including representative photographs of survey units, landform, vegetation coverage, ground surface visibility (GSV) and the recording of soil information for each survey unit were possible. Any potential Aboriginal objects observed during the survey were documented and photographed. The location of Aboriginal cultural heritage and points marking the boundary of the landform elements were recorded using a hand-held Global Positioning System (GPS) and the Map Grid of Australia (MGA) (94) coordinate system.

4.3 Archaeological survey results

Two meandering transects were walked across the study area, targeting areas with higher potential for Aboriginal heritage as outlined above. Three areas of PAD were identified within the southern half of the study area, in vicinity to Marshall Mount Creek and the non-perennial tributary located on the southern boundary. The location of AHIMS 52-5-0494/WDRA_AX_38 was visited during the survey. The survey was limited by extensive grass coverage throughout the study area, limiting visibility.

The results from the field survey have been summarised below, in Table 12 and Figure 8.

Table 12 Survey coverage

Survey unit	Survey unit area (m ²)	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage (%)
Crest	1,129	5	5	2.82	0.25
Flat	3,320	5	5	8.3	0.25
Lower slope	14,739	5	5	36.85	0.25
Saddle	1,749	5	5	4.37	0.25
Upper slope	16,912	5	5	42.28	0.25

Table 13 Landform summary

Landform	Landform area (m ²)	Area effectively surveyed (m ²)	Landform effectively surveyed (%)	No. of Aboriginal sites	No. of artefacts or features
Crest	22,750	2.82	0.01	0	0
Flat	21,095	8.3	0.04	0	0
Lower slope	144,606	36.85	0.03	1	1
Saddle	18,377	4.37	0.03	0	0
Upper slope	225,785	42.28	0.02	0	0

4.3.1 Visibility

In most archaeological reports and guidelines visibility refers to GSV, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (DECCW 2010a).

GSV across the study area was generally low (5%) due to extensive grass coverage (see Photo 5, Photo 6).



Photo 5 General visibility in the study area, photo facing south



Photo 6 General visibility in the study area, photo facing east

4.3.2 Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed and attempts to describe the relationship between those conditions and the likelihood the prevailing conditions

provide for the exposure of (buried) archaeological materials. Whilst also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke & Smith 2004, p.79, DECCW 2010a).

Overall, the study area displayed few areas of high exposure, mainly present around waterbodies, areas of vehicle access, and at the base of trees (see Photo 7, Photo 8 and Photo 9). Low areas of exposure were due to the extensive grass coverage. Approximately 5% of the study area was subject to exposure.



Photo 7 Area of exposure associated with vehicle access, photo facing west



Photo 8 Area of exposure associated with the dam showing soil profiles, photo facing south



Photo 9 Area of exposure associated with treefall, photo facing west

4.3.3 Disturbances

Disturbance in the study area is associated with natural and human agents. Natural agents generally affect small areas and include the burrowing and scratching in soil by animals, such as wombats, foxes, rabbits and wallabies, and sometimes exposure from slumping or scouring. Disturbances associated with recent human action are prevalent in the study area and cover large sections of the

land surface. Examples of human agents can 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; and agricultural practices. Disturbances observed within the study area were associated with animal and human activity including burrowing, vehicle access, dams and powerline construction (Photo 10, Photo 11, Photo 12).



Photo 10 Disturbance associated with animal burrowing



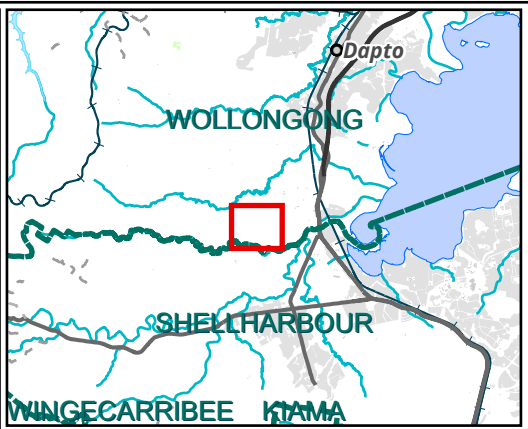
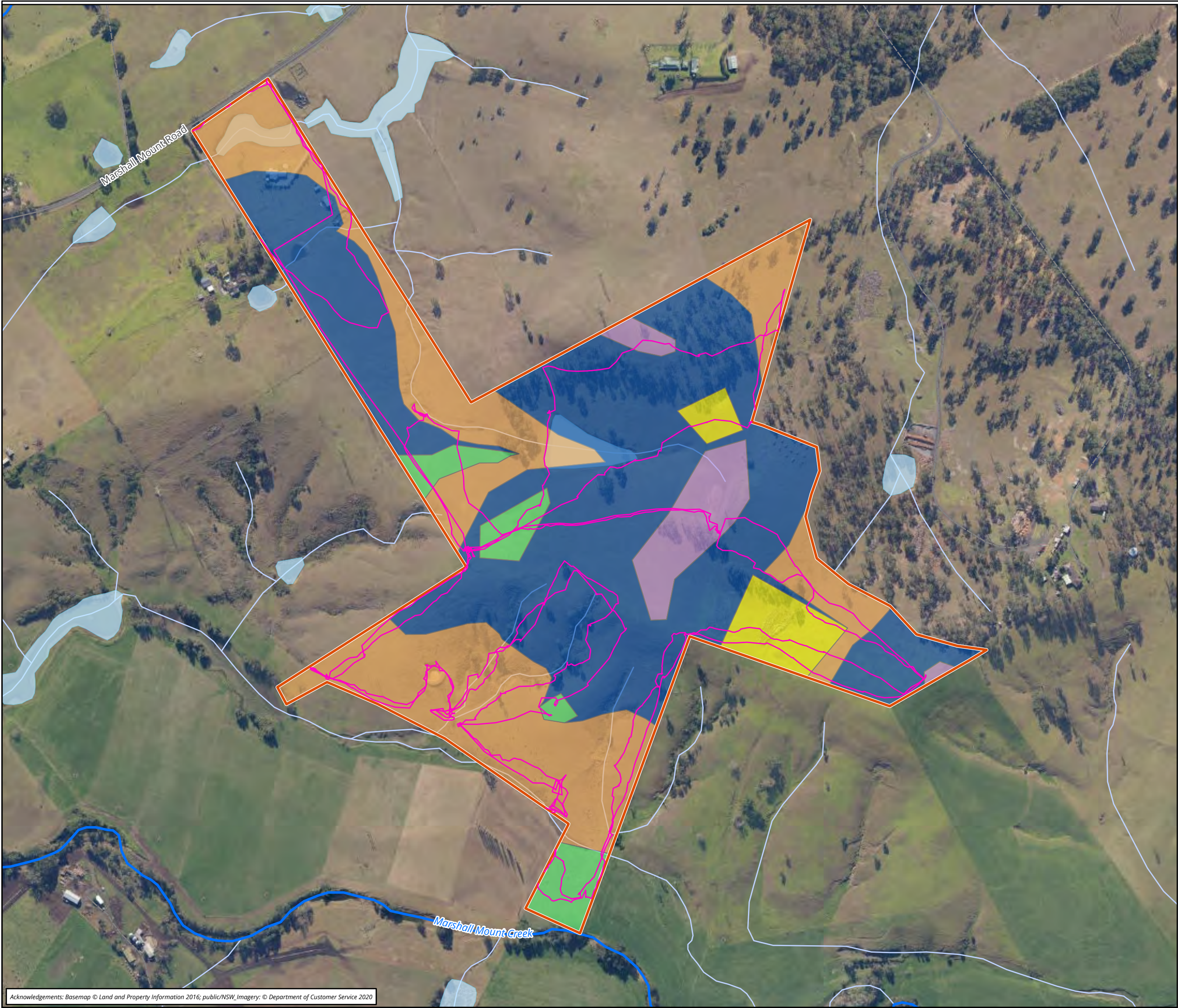
Photo 11 Disturbance associated with cattle activity by the dam



Photo 12 Disturbance associated with power lines within the study area

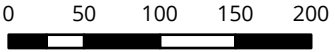
Figure 8 Survey coverage and results

****THIS PAGE HAS BEEN REMOVED FOR PUBLIC EXHIBITION. THIS FIGURE CAN BE PROVIDED UPON REQUEST****



- Legend**
- Study area
 - Survey tracks
- Landform**
- Crest
 - Flat
 - Lower slope
 - Saddle
 - Upper slope

Figure 9 Landforms



Metres
Scale: 1:5,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56



Matter: 37570, Date: 20 September 2022,
Drawn by: JB, Checked by: AV, Last edited by: jbeckius
Location: P:\37500s\37570\Mapping\
37570_MarshallMountRd_AR, Layout: 37570_AR_F9_Landforms

4.4 Discussion of archaeological survey results

The archaeological investigation consisted of two meandering transects targeting favourable landforms within the study area (Figure 8 and Figure 9).

Background research suggested that the study area is located in the Broughton Formation and the Bombo Latite Member geological units, overlain by the erosional Shellharbour soil landscape the Shellharbour, Bombo, Fairy Meadow and Wattamolla Road soil landscapes. Erosional landscapes, such as the Shellharbour and Bombo soil landscapes, are sometimes associated with lower archaeological potential at shallow depths due to susceptibility to soil movement, however undisturbed areas and deeper archaeological deposits are not always impacted. Shallow soils were identified in some areas within the study area, due to exposed shale on the surface (see Photo 13).



Photo 13 Exposed bedrock at surface level, indicating shallow soils in this area

The study area has a varying topography, located on rolling hills with crests, slopes, flat and saddle landforms with water sources available in the vicinity including Duck Creek and Marshall Mount Creek. Reliable sources of water are often associated with areas of historic Aboriginal occupation due to the resources these watercourses support. Predictive modelling also favours landforms that are elevated and flat with proximity to water.

A review of historic aerials identified disturbances caused by recent land use, including the creation of dams, residential construction, and works associated with pastoral activities. A search of the AHIMS register indicated one previously recorded site located within the study area (AHIMS 52-5-0494/WDRA_AX_38), to the east, and a further two sites previously recorded within 200 metres of the study area boundary (AHIMS 52-5-0939/MMAD01 and AHIMS 52-5-0493/WRDA_AX_37). These are all artefact sites.

One artefact was identified during the survey (AHIMS 52-5-1051/Marshall Mount Road AF). The artefact was identified in an area of erosion adjacent to the small dam in the north-west of the study area (within 365 Marshall Mount Road). The artefact consisted of a silcrete angular fragment with a size class of 10-15 millimetres, and cortex of 30%. The area where AHIMS 52-5-1051/Marshall Mount Road AF is located was not

marked as PAD due to the disturbed nature of the area, and unfavourable landforms in the area, and was likely washed downhill and therefore not *in situ*

Four areas of PAD were identified during the survey (see Figure 8). The first is located at the site of the previously recorded AHIMS site within the study area. During the survey, the site of AHIMS 52-5-0494/WDRA_AX_38 was visited (see Photo 14). However, as the artefacts recorded were identified during test excavations and due to extensive grass coverage, no further Aboriginal objects or sites were located. The site was identified during manual testing, with excavations targeting favourable landforms and areas considered to be of high sensitivity following consultation with the Aboriginal stakeholders (AMBS 2006, pp.161–169). The test pit that the artefacts were identified in was dug to 20 centimetres. This site was previously visited in 2021, with no surface cultural material identified at time (Biosis 2021). The area has been assessed to contain moderate potential to contain archaeological deposits. This assessment takes into account the favourable crest landform, proximity to water sources, and previously identified subsurface deposits within the area.



Photo 14 Location of AHIMS 52-5-0494/WDRA_AX_38 site and PAD, photo facing north

The three remaining PADs, all assessed to hold moderate potential to contain archaeological deposits, are located across the southern portion of the study area due partly to their proximity to water. One PAD, located in the south-east, is adjacent to the tributary from Marshall Mount Creek, on a flat landform (Photo 15). The second two PADs were identified by landform. Both are in elevated, flat areas with good views of the wider area and in proximity to watercourses bounding the study area (see Photo 15, Photo 16, Photo 17). These areas are generally undisturbed by previous activity within the study area, indicating that soils in these locations are relatively intact. The remainder of the study area has been assessed to contain low potential to contain archaeological deposits.



Photo 15 View of south-western PAD identified adjacent to a tributary of Marshall Mount Creek



Photo 16 View of and from south-eastern PAD



Photo 17 View of and from central PAD

5 Scientific values and significance assessment

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

5.1 Introduction to the assessment process

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

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

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

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

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

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

5.2 Archaeological (scientific significance) values

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

Research potential

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

Table 14 and Table 15 outline the site content and site condition rating used for archaeological sites.

Table 14 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 15 Site condition ratings used for archaeological sites

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

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

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

Representativeness

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

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

Table 16 outlines the site representativeness ratings used for archaeological sites.

Table 16 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 17.

Table 17 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 archaeological survey. The results are in Table 20.

5.2.1 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 18 below.

Table 18 Scientific significance assessment of archaeological sites recorded within the study area

Site name	Site content	Site condition	Representativeness	Scientific significance
AHIMS 52-5-0494/WDRA_AX_38	1	1	1	3 - Low
AHIMS 52-5-1051/Marshall Mount Road AF	1	1	1	3 - Low
Four remaining areas of moderate potential	-	-	-	TBC – will require further

Table 19 Statements of scientific significance for archaeological sites recorded within the study area

Site name	Statement of significance
AHIMS 52-5-0494/WDRA_AX_38	AHIMS 52-5-0494/WDRA_AX_38 is a sub-surface artefact scatter on a hill crest landform consisting of three artefacts. Raw materials feature chert and quartz. The site covers an area of 1 by 1 metres and soils consisted of a loosely consolidated brown loam, and small amount of decomposing red sandstone (weathered sandstone). This low density artefact scatter is considered a common site type in the region with limited potential to contribute further information about Aboriginal occupation and land use within the local region. The archaeological significance of this site has been assessed as low.
AHIMS 52-5-1051/Marshall Mount Road AF	AHIMS 52-5-1051/Marshall Mount Road AF is an isolated artefact that was identified in an area of erosion adjacent to the small dam in the north-west of the study area (within 365 Marshall Mount Road). The artefact consisted of a silcrete angular fragment. This low density isolated artefact is considered a common site type in the region with limited potential to contribute further information about Aboriginal occupation and land use within the local region. The archaeological significance of this site has been assessed as low.
Four remaining areas of moderate potential	Four areas of moderate potential were identified by the field investigation, that will not be impacted by the current designs for the proposed development. They are situated within flat and crest landforms and are within proximity to natural resources. These areas of moderate potential appear to have been subjected to minimal disturbance, suggesting that artefacts may be <i>in-situ</i> . The archaeological significance of these areas has not yet been determined. The historical significance of the site has been assessed as low due to lack of historical associations. The aesthetic value of the site has been assessed to be moderate due to impacts caused by historical land use. The scientific significance for this area has not been determined by this assessment.

Figure 10 Aboriginal sites located Within the study area

****THIS PAGE HAS BEEN REMOVED FOR PUBLIC EXHIBITION. THIS FIGURE CAN BE PROVIDED UPON REQUEST****

6 Impact assessment

The proposed future development will consist of a residential subdivision. The potential impacts of these works on Aboriginal heritage are presented below.

6.1 Predicted physical impacts

The proposed works will involve the subdivision of part of Lot 5 DP24143 and Lot 8 DP 628078, and will include vegetation clearance, bulk earthworks, civil engineering works, such as the construction of roads, storm water drainages, sewer works, and water supply works; and the construction of residential lots.

These works all have the potential to heavily impact ground surfaces through excavation as a result of the bulk earthworks and will result in direct impacts to one Aboriginal site within the study area (AHIMS 52-5-1051/Marshall Mount Road AF). One site (AHIMS 52-5-0494/WDRA_AX_38), and four remaining areas of moderate archaeological potential will be avoided by the proposed works. A summary of impacts is provided below in Table 20 and Figure 11.

Table 20 Summary of potential archaeological impacts

AHIMS site no.	Site name	Significance	Type of harm	Degree of harm	Consequence of harm
AHIMS 52-5-0494	WDRA_AX_38	Low	Nil	Nil	Nil
AHIMS 52-5-1051	Marshall Mount Road AF	Low	Direct	Total	Total loss of value
N/A	Four remaining areas of moderate potential	TBC	Nil	Nil	Nil

6.2 Ecologically Sustainable Development

One of the primary aims of the NP&W Act is the 'conservation of objects places and features ... of cultural value within the landscape, including ... places, objects and features of significance to Aboriginal people ...' ((s.2A(1)(b)(i)). The *Operational Policy: Protecting Aboriginal Cultural Heritage (Version 2)* (State of NSW and Office of Environment and Heritage NSW 2011) provides guidance to proponents in term of ESD.

ESD has been defined in Part 3, 6. (2) Objective of the Authority of the *Protection of the Environment Administration Act 1991* (NSW). This outlines that the ESD requires the integration of economic and environmental considerations (including cultural heritage) in the decision-making process. In regard to Aboriginal cultural heritage, ESD can be achieved by applying the principle of intergenerational equity and the precautionary principle.

Intergenerational equity

The principle of intergenerational equity states that the present generation should make every effort to ensure the health, diversity and productivity of the environment – which includes cultural heritage – for the benefit of future generations.

In terms of Aboriginal cultural heritage, intergenerational equity can be considered in terms of the 'cumulative impacts' of any proposal to Aboriginal objects and places. For example, if few Aboriginal objects and places remain in a region (because of harm authorised under previous AHIPs), fewer opportunities remain for future generations of Aboriginal people to enjoy the cultural benefits of those Aboriginal objects and places.

Information about the significance of Aboriginal cultural heritage values associated with the Aboriginal objects and places proposed to be harmed will be relevant to the consideration of intergenerational equity and an understanding of the cumulative impacts of a proposal.

Where there is uncertainty, the precautionary principle should also be followed (see below).

The precautionary principle

The precautionary principle states that the lack of full scientific certainty about the threat of harm should not be used as a reason for not taking measures to prevent harm from occurring.

In applying the precautionary principle, decisions should be guided by:

- *a careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment (which includes cultural heritage)*
- *an assessment of the risk-weighted consequences of various options. The precautionary principle is relevant to OEH consideration of potential harm to Aboriginal cultural heritage where:*
- *the proposal involves a risk of serious or irreversible harm to Aboriginal objects or places or to the value of those objects or places, and*
- *there is a lot of uncertainty about the significance of Aboriginal cultural heritage values of the Aboriginal objects or places proposed to be harmed.*

Where this is the case, a precautionary approach should be taken and all cost-effective measures implemented to prevent or reduce harm to the Aboriginal objects/place.

6.3 Management and mitigation measures

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

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

Avoidance of AHIMS 52-5-0494/WDRA_AX_38 and the four areas of moderate potential

The assessment has identified AHIMS 52-5-0494/WDRA_AX_38 and four areas of moderate archaeological potential within the study area that will not be impacted by the proposed development. The proposed development has been re-designed to avoid impacts to these areas which has considered the principals of ESD. If the proposed development changes and impacts to AHIMS 52-5-0494/WDRA_AX_38 and the areas of moderate archaeological potential cannot be avoided, subsurface investigations (test excavations), updates to this ACHA, and an AHIP will be required prior to the commencement of works.

Long term care and control

The establishment of a long term care agreement in consultation with RAPs should be developed in order to ensure the artefact identified as part of this assessment is adequately cared for. Several management options are possible depending on the wishes of RAPs. The artefact identified during the archaeological survey can be given back to the Aboriginal community through a care and control agreement where it can then be used to teach subsequent generations about Aboriginal culture or can be reburied in a culturally appropriate place. This approach considers the principles of ESD and intergenerational equity and more importantly ensures that the recovered artefact is managed according to the wishes of RAPs. RAPs have been provided with the opportunity to review the report and provide comment on how they would like to see the artefact cared for as part of the Stage 4 Aboriginal community consultation process. The outcome of this process has indicated that reburial on site is preferred. A potential reburial location has been provided in Figure 11.

Community collection

The artefact identified during the archaeological survey can be collected by the Aboriginal community under an AHIP and prior to any construction activities. The artefact can then be given back to the Aboriginal community through a care and control agreement or can be reburied in a culturally appropriate place.

6.3.1 Potential archaeological impacts and mitigation measures

The potential archaeological impacts and mitigation measures have been summarised in Table 21 below.

Table 21 Summary of potential archaeological impacts and mitigation measures

AHIMS site	Significance	Type of harm	Degree of harm	Consequence of harm	Mitigation measure
AHIMS 52-5-0494/ WDRA_AX_38	Low	Nil	Nil	Nil	Avoidance of areas; fence site; heritage inductions
AHIMS 52-5-1051/ Marshall Mount Road AF	Low	Direct	Total	Site destroyed	AHIP required for community collection
Four remaining areas of moderate potential	Low	Nil	Nil	Nil	Avoidance of areas; heritage inductions; fence areas

Figure 11 Impact assessment

****THIS PAGE HAS BEEN REMOVED FOR PUBLIC EXHIBITION. THIS FIGURE CAN BE PROVIDED UPON REQUEST****

7 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: Apply for an AHIP to impact AHIMS 52-5-1051/Marshall Mount Road AF and undertake community collection

Impacts to AHIMS 52-5-1051/Marshall Mount Road AF cannot be avoided, therefore Biosis recommends that an AHIP which covers the site be obtained for the proposed works. The AHIP should allow for direct impacts to AHIMS 52-5-1051/Marshall Mount Road AF to occur and for community collection of the isolated artefact. The AHIP should be obtained prior to works proceeding. **The AHIP should be for a term of 10 years.** An AHIP is required for any activities likely to have an impact on Aboriginal objects or Places or cause land to be disturbed for the purposes of discovering an Aboriginal object. Heritage NSW issues AHIPs under Part 6 of the NPW Act.

Advice preparing AHIPs

An AHIP is required for any activities likely to have an impact on Aboriginal objects or Places or cause land to be disturbed for the purposes of discovering an Aboriginal object. Heritage NSW issues AHIPs under Part 6 of the NPW Act.

AHIPs should be prepared by a qualified archaeologist and lodged with Heritage NSW. Once the application is lodged processing time can take between 8-12 weeks. It should be noted that there will be an application fee levied by the Heritage NSW for the processing of AHIPs, which is dependent on the estimated total cost of the development project.

Recommendation 2: Areas identified as having moderate archaeological potential

The assessment has identified four areas of moderate archaeological potential within the study area that will not be impacted by the proposed development. If the proposed development changes and impacts to the areas of moderate archaeological potential cannot be avoided, subsurface investigations (test excavations) and updates to this ACHA will be required prior to the commencement of works.

Impacts which would require further assessment in the form of test excavations within the areas of moderate archaeological potential includes, but is not limited to, any stockpiling areas, set down areas, installation of services, bulk earthworks, landscaping or areas of revegetation, or any other activities that will result in disturbances to the ground surface.

Recommendation 3: Avoidance of AHIMS 52-5-0494/WDRA_AX_38 and the four remaining areas of moderate potential

Impacts to AHIMS 52-5-0494/WDRA_AX_38 and the four remaining areas of moderate potential should be avoided. In order to prevent any impacts to AHIMS 52-5-0494/WDRA_AX_38 and the four remaining areas of moderate potential, these should be fenced off, and all included in a heritage induction prior to works commencing.

Recommendation 4: Long term care and control

The establishment of a long term care agreement in consultation with RAPs should be developed in order to ensure the artefact identified as part of this assessment is adequately cared for. Consultation with the RAPs as part of this assessment has indicated that reburial is the preferred option. This approach considers the principles of ESD and intergenerational equity and more importantly ensures that the recovered artefact is managed according to the wishes of RAPs.

Recommendation 5: Heritage induction for all contractors

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.

Recommendation 6: Continued consultation

As per the consultation guidelines it is recommended that the proponent provides a copy of this report to the RAPs and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project

Recommendation 7: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the NSW NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the Heritage NSW. 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 Heritage NSW and Aboriginal stakeholders.

Recommendation 8: Discovery of human remains

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

1. Discovery: If suspected human remains are discovered all activity in the vicinity must stop to ensure minimal damage is caused to the remains; and the remains must be left in place and protected from harm or damage.
2. Notification: Once suspected human skeletal remains have been found, the Coroner's Office and the NSW Police must be notified immediately. Following this, the find will be reported to the Aboriginal parties and Heritage NSW.

References

- AMBS 2006, *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.
- Attenbrow, V 1987, *The Upper Mangrove Creek Catchment. A Study of Quantitative Changes in the Archaeological Record*, Unpublished PhD thesis, University of Sydney.
- Attenbrow, V 2002, *Sydney's Aboriginal Past: Investigating the archaeological and historical records*, University of New South Wales Press Ltd, Sydney.
- Austral Archaeology 2019, *High Voltage Transmission Line REF Investigations, Tullimbar, NSW: Aboriginal Cultural Heritage Assessment*, Report for Cardno.
- Australia ICOMOS 2013, *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance*, Australia ICOMOS, Burwood, VIC.
- Biosis 2007, *Aboriginal archaeological assessment and sub-surface investigations, Calderwood, NSW*, Report prepared for Daly International.
- Biosis 2009, *Illawarra employment and teaching centre, West Dapto*, Report for Connectland Pty Ltd.
- Biosis 2015, *Due Diligence Advice for Aboriginal archaeological heritage for 225 Crest Road in Albion Park, NSW*, Report prepared for SET Consultants Pty Ltd. Author: Jakovljevic. A, Biosis Pty Ltd, Wollongong, NSW> Project no. 21360.
- Biosis 2021, *310 Marshall Mount Road: Aboriginal Cultural Heritage Assessment*, Report prepared for Illawarra Local Aboriginal Land Council on behalf of Marshall Group. Authors: Leever-Eastman. A, Vella. A, Biosis Pty Ltd, Wollongong, NSW. Report no.28808.
- Boot, P 1996, 'Aspects of prehistoric change in the south coast hinterland of NSW', *Tempus*, vol. 6, pp. 63–79.
- Bowman, H 1971, *Geology of the Wollongong, Kiama and Robertson 1:50,000 Sheets, 9029-II and 9028-I and IV*, Geological Survey of New South Wales, Department of Mines, New South Wales.
- Burke, H & Smith, C 2004, *The Archaeologist's Field Handbook*, 1st edn, Allen and Unwin, Sydney, NSW.
- DECCW 2010a, *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.
- DECCW 2010b, *Aboriginal Cultural Heritage Consultation Requirements for Proponents*, New South Wales Government Department of Environment and Climate Change, Sydney NSW.
- Donlon, D & Sefton, C 1988, *Investigation of a midden at Judbooley Park, Windang, including assessment of Human Skeletal Remains*, Report for the City of Wollongong.
- DSCA 2000, *Aboriginal archaeological assessment: Albion Park water supply upgrade*, Dominic Steele Consulting Archaeology.

Feary, S & Moorcroft, H 2011, *An Indigenous Cultural Heritage Management Plan for the Bundanon Trust Properties*.

Fuller, L 1982, *Wollongong's Native Trees*, McPherson's Printing Group, National Library of Australia.

GML Heritage 2014, *Lot 12 Ashburton Drive, Albion Park: Aboriginal Cultural Heritage Assessment*, Report for Lyndal Pty Ltd.

Hazelton, PA 1992, *Soil Landscapes of the Kiama 1:00,000 Sheet*, Department of Conservation and Land Management (incorporating the Soil Conservation Service of NSW), Sydney.

Hiscock, P 1986, 'Technological change in the Hunter Valley and its implications for the interpretation of late Holocene change in Australia', *Archaeology in Oceania*, vol. 21, no. 1, pp. 40–50.

Kass, T 2010, *A Thematic History of the City of Wollongong*, Wollongong City Council, Wollongong.

Marquis-Kyle, P & Walker, M 1994, *The illustrated Burra Charter: making good decisions about the care of important places*, Repr. with corrections., Australia ICOMOS with the assistance of the Australian Heritage Commission, Sydney, NSW.

McDonald, J 1992, *Cowpasture Road Aboriginal Cultural Heritage Assessment, Release Area Precinct 4, Liverpool*.

McDonald, J 1994, *Dreamtime Superhighway: An Analysis of Sydney Basin Rock Art and Prehistoric Information Exchange*, Unpublished PhD thesis, Canberra.

McDonald, WG 1976, *Nineteenth-Century Dapto*, Illawarra Historical Society, Wollongong, <<http://ro.uow.edu.au/ihspubs/4>>.

Mulvaney, DJ 1975, *The Prehistory of Australia*, Penguin Books, Melbourne, Victoria.

Mulvaney, J & Kamminga, J 1999, *Prehistory of Australia*, Allen and Unwin, St Leonards, NSW.

Navin Officer 1993, *Archaeological Investigation of Proposed Subdivision Site No. 12285 West Dapto, NSW*, Report to K.W.Williams and Associates Pty Ltd.

Navin Officer 1997, *Archaeological Investigation of Proposed Residential Subdivision Lot 1 in DP253917, Mount Brown Road, South Dapto*, A report to martin Morris & Jones, Property Consultancy Division.

Navin Officer 2004, *Shellharbour Fringe Lands Urban Assessment*.

Navin Officer 2005, *Tullimbar village development subsurface archaeological testing program part PAD3*.

NPWS 1997, 'Aboriginal Cultural Heritage: Standards and Guidelines Kit'.

NPWS 2002, *Wollongong LGA Bioregional Assessment (Part I): Native Vegetation of the Illawarra Escarpment and Coastal Plain*, Report for the Commission of Inquiry into Planning and Development on the Illawarra Escarpment. NSW National Parks and Wildlife Service, Sydney, Hurstville NSW.

OEH 2011, 'Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW', <Office of Environment and Heritage, Department of Premier and Cabinet, Sydney NSW>.

Organ, M 1990, *A Documentary History of the Illawarra and South Coast Aborigines 1770-1850*, Aboriginal Education Unit, Wollongong University, Wollongong.

Pearson, M & Sullivan, S 1995, *Looking after heritage places: the basics of heritage planning for managers, landowners and administrators*, Melbourne University Press, Carlton, Victoria.

Ritter, DF, Kochel, RC, & Miller, JR 1995, *Process Geomorphology*, Wm. C. Brown.

Rosen, S 1995, *Heritage Assessment for Nepean Tunnel Amplification Project*, Sydney Water.

Sefton, C 1980, *Aboriginal Cultural Resources Study Illawarra Region*, Illawarra Regional Planning Committee, Wollongong.

Sefton, C 1984, *West Dapto archaeological potential study*, Unpublished report to Wollongong City Council.

Strahler, A 1952, 'Hypsometric (area-altitude) analysis of erosional topology', *Geological Society of America Bulletin*, vol. 63, no. 11, pp. 1117–1142.

Tindale, NB 1974, *Aboriginal Tribes of Australia: The Terrain, Environmental Controls, Distribution, Limits and Proper names*, Australian National University, Canberra.

Wesson, S & New South Wales Government Office of Environment and Heritage 2005, *Murni, Dhungang, Jirrar: living in the Illawarra - Aboriginal people and wild resource use*, Department of Environment and Conservation, Hurstville.

Appendices

Appendix 1 AHIMS results

APPENDIX 1 HAS BEEN REMOVED FOR PUBLIC EXHIBITION