



New Public School, Estella Road, Estella Archaeological Report

Prepared for Hansen Yuncken

28 January 2020

Biosis offices

NEW SOUTH WALES

Newcastle

Phone: (02) 4911 4040

Email: newcastle@biosis.com.au

Sydney

Phone: (02) 9101 8700

Email: sydney@biosis.com.au

Wollongong

Phone: (02) 4201 1090

Email: wollongong@biosis.com.au

Albury

Phone: (02) 6069 9200

Email: albury@biosis.com.au

VICTORIA

Melbourne

Phone: (03) 8686 4800

Email: melbourne@biosis.com.au

Ballarat

Phone: (03) 5304 4250

Email: ballarat@biosis.com.au

Wangaratta

Phone: (03) 5718 6900

Email: wangaratta@biosis.com.au

Document information

Report to: Hansen Yuncken

Prepared by: James Cole
Meaghan Aitchison
Mathew Smith

Biosis project no.: 27668

File name: 27668.NewPSWaggaWagga.AR.FIN02.20200124

Citation: Biosis 2020. New Public School, Estella Road, Estella: Archaeological Report. Report for Hansen Yuncken. Authors: J Cole, M Aitchison & M Smith, Biosis Pty Ltd, Sydney. Project no.27668

Document control

Version	Internal reviewer	Date issued
Draft 01	Taryn Gooley	09/11/2018
Final 01	Amanda Atkinson	18/12/2018
Final 02	Elizabeth Wyatt	24/01/2020

© Biosis Pty Ltd

This document is and shall remain the property of Biosis Pty Ltd. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of the Engagement for 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.

Acknowledgements

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

Government Departments

- Office of Environment and Heritage.
- National Native Title Tribunal.

Client

- Hansen Yuncken.

Biosis

- Will Truscott for assistance in the field.
- Anne Murray and Dave Kazemi for mapping.

Contents

Acknowledgements	i
Glossary.....	iv
Summary	vi
1 Introduction	1
1.1 Project background	1
1.2 Study area.....	1
1.3 Planning approvals	1
1.4 Objectives of the investigation.....	1
1.5 Investigators and contributors	2
2 Proposed development	7
3 Desktop assessment.....	8
3.1 Landscape context.....	8
3.1.1 Topography, Geology and hydrology	8
3.1.2 Soil landscapes	11
3.1.3 Landscape resources	13
3.1.4 Land use history	14
3.2 Previous archaeological work	15
3.2.1 Regional overview	15
3.2.2 Local overview.....	15
3.2.3 AHIMS site analysis	18
3.3 Discussion.....	21
3.3.1 Predictive statements.....	21
4 Archaeological survey	24
4.1 Archaeological survey objectives.....	24
4.2 Archaeological survey methodology	24
4.2.1 Sampling strategy.....	24
4.2.2 Survey methods.....	24
4.3 Archaeological survey results.....	25
4.4 Discussion of archaeological survey results	32
5 Scientific values and significance assessment.....	33
5.1 Introduction to the assessment process.....	33
5.2 Archaeological (scientific significance) values.....	34
5.2.1 Statements of archaeological significance	36
6 Impact assessment	37
6.1 Predicted physical impacts	37
6.2 Management and mitigation measures	37

7	Recommendations	38
----------	------------------------------	-----------

Tables

Table 1	Investigators and contributors.....	2
Table 2	East Bomen soil landscape characteristics (Chen & McKane 1997).....	11
Table 3	Aboriginal uses of plants located in the vicinity of the study area (Murrumbidgee Catchment Authority 2008, pp.25–37)	13
Table 4	Tarcutta bypass test excavation results (Kelleher Nightingale Consulting Pty Ltd 2009, pp.18–30)	17
Table 5	Aboriginal site predictive statements (OzArk Environmental & Heritage Management Pty Ltd 2018, pp.23–25).....	18
Table 6	AHIMS search results.....	19
Table 7	Aboriginal site prediction statements	21
Table 8	Survey coverage	29
Table 9	Landform summary	29
Table 10	Site contents ratings used for archaeological sites	34
Table 11	Site condition ratings used for archaeological sites.....	35
Table 12	Site representativeness ratings used for archaeological sites	36
Table 13	Scientific significance ratings used for archaeological sites	36

Figures

Figure 1	Location of the study area	5
Figure 2	Study area detail	6
Figure 3	Geological units near the study area	9
Figure 4	Hydrology in the vicinity of the study area.....	10
Figure 5	Soil landscapes near the study area.....	12
Figure 6	AHIMS sites within the vicinity of the study area.....	20
Figure 7	Survey transects.....	30
Figure 8	Survey results	31

Plates

Plate 1	Transect 1 facing north, with some exposure along vegetation cover	25
Plate 2	Transect 2 facing south, with dense ground cover	26
Plate 3	Transect 3 facing north, with some exposure in the foreground	26
Plate 4	Exposure located along the southern end of Transect 3	27
Plate 5	Transect 4, facing north, with some exposure.....	27
Plate 6	Transect 5, facing north, with exposure in the foreground	28

Glossary

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
Consultation requirements	<i>Aboriginal cultural heritage consultation requirements for proponents 2010</i>
DA	Development Application
DECCW	Department of Environment, Climate Change and Water (now OEH)
DP	Deposited Plan
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
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
OEH	Office of Environment and Heritage
PAD	Potential Archaeological Deposit
PS	Public School
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
Study area	Part Lot 4 DP 1218378, immediately west of Peter Hastie Oval
the code	<i>Code of practice for archaeological investigation of aboriginal objects in NSW</i>

Note: Under recent legislation changes the functions and responsibilities of the Office of Environment and Heritage are now being performed by the Biodiversity and Conservation Division of the Department of Planning, Industry and Environment. Any references to 'Office of Environment and Heritage' are now 'Biodiversity and Conservation Division'.

Summary

Biosis Pty Ltd (Biosis) was commissioned by Hansen Yuncken (Hansen Yuncken) on behalf of School Infrastructure NSW to undertake an Aboriginal cultural heritage assessment (ACHA) and archaeological report (AR) for the proposed development of a new public school (PS) on Estella Road, Estella New South Wales (NSW) (the study area). The study area consists of part of Lot 4 DP 1218378, immediately west of Peter Hastie Oval.

The proposed works are being assessed as a State Significant Development (SSD), with the Department of Planning, Industry and Environment (DPIE) acting as the determining authority. This AR has been formulated in support of the Environmental Impact Statement (EIS) for the project.

The Aboriginal community was consulted regarding the heritage management of the project throughout its lifespan. Consultation has been undertaken as per the process outlined in the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a) (consultation requirements).

There are 11 Aboriginal cultural heritage sites registered with the Aboriginal Heritage Information Management System (AHIMS) register within a 5 kilometre buffer of the study area. No registered Aboriginal sites are located within the study area.

A field investigation consisting of an archaeological survey was conducted on 5 October 2018. The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed low. This was attributed to vegetation cover restricting ground surface visibility (GSV) combined with a low amount of exposures.

No previously unrecorded Aboriginal cultural heritage sites were identified during the field survey and no areas of archaeological sensitivity were identified.

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

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

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

Management recommendations

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

Recommendation 1: No further archaeological investigations required

No Aboriginal sites, objects, or areas of archaeological potential were identified within the study area. The entire study area has been assessed as having low archaeological potential. Therefore, no further investigations are required. This recommendation is conditional upon Recommendations 2 to 4.

Recommendation 2: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the Department of Planning, Industry and Environment.

If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking the proposed development activities, the proponent must:

1. Not further harm the object.
2. Immediately cease all work at the particular location.
3. Secure the area to avoid further harm to the Aboriginal object.
4. Notify the Department of Planning, Industry and Environment as soon as practical on 131555, providing any details of the Aboriginal object and its location.
5. Not recommence any work at the particular location unless authorised in writing by the Department of Planning, Industry and Environment.

If skeletal remains are unexpectedly encountered during the activity, work must stop immediately, the area secured to prevent unauthorised access and contact made with NSW Police and the Department of Planning, Industry and Environment.

Recommendation 3: Continued consultation with the registered Aboriginal stakeholders

It is recommended that the proponent provides a copy of this final report to the Aboriginal stakeholders for their records. 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.

1 Introduction

1.1 Project background

Biosis was commissioned by Hansen Yuncken to undertake an ACHA and Aboriginal archaeological investigation for the proposed new PS at Estella Road, Estella, NSW (Figure 1). The purpose of this investigation is to support an EIS being prepared to address the Secretary's Environmental Assessment Requirements (SEARs) for the project, which is being assessed as an SSD.

This investigation 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.

1.2 Study area

The study area is located on Estella Road, Estella NSW, and forms part of Lot 4 DP 1218378, immediately west of Peter Hastie Oval. The study area is within the:

- City of Wagga Wagga Government Area (LGA).
- Parish of North Wagga Wagga.
- County of Clarendon.

The study area is bordered to the north by a car park, to the east by Peter Hastie Oval, to the south by Estella Road and urban development, and to the west by an open paddock (Figure 1, Figure 2).

1.3 Planning approvals

The proposed development will be assessed as an SSD in accordance with the SEARs for the project (SSD 9494). The SEARs relating to Aboriginal heritage are as follows:

- *Address Aboriginal Cultural Heritage (ACH) in accordance with the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW).*
- *The EIS must demonstrate attempts to avoid any impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.*

Accordingly, the project is being undertaken in accordance with the following guidelines:

- Consultation requirements.
- The code.
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011).*

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 Wagga Wagga 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 1.

Table 1 Investigators and contributors

Name and qualifications	Experience summary	Project role
James Cole BA (hons)	James is an archaeologist with five years' experience. James has had experience working as an archaeologist and project manager on a number of Aboriginal and European heritage projects across New South Wales, Victoria, and Tasmania, and is skilled in both excavation and field recording. James has well developed skills in Aboriginal archaeology, serving as a key team member and project manager on a number of projects in Sydney, the Illawarra, the Hunter Region, and in Western NSW. These projects have seen him take part in Aboriginal consultation, background research, the formation of predictive modelling, fieldwork, and report authorship. He is also skilled in undertaking historical heritage assessments, having completed a number of Statements of Heritage Impact as the primary author.	Project management Report writing Consultation

Name and qualifications	Experience summary	Project role
William Truscott BArch (hons)	William has eight years' experience as an archaeologist working in Victoria, New South Wales, Western Australia and Tasmania. William has extensive experience conducting archaeological surveys, subsurface testing programs and site salvage programs investigating both Aboriginal and Historical places. As a cultural heritage advisor he has worked with a number of clients including state government agencies, local government agencies, private industry and small scale developers. William has co-authored a range of reports including cultural heritage management plans, Aboriginal and historical heritage assessments and salvage reports and provided support services to consulting archaeologists in their analysis and research.	Field survey
Meaghan Aitchison BArch (hons)	Meaghan completed a Bachelor of Arts (Honours) majoring in archaeology through University of New England. Since joining Biosis in June 2017, Meaghan has gained experience working as an archaeologist and heritage advisor in Victoria and New South Wales. Meaghan has experience undertaking archaeological surveys, subsurface testing programs, Aboriginal place salvages and historic excavations, project management, legislative interpretation and advice and community consultation.	Report writing
Mathew Smith BA/BSc (hons)	Mathew is an archaeologist who has three years of experience in the consulting industry. Mathew has worked on a number of Aboriginal cultural heritage projects across New South Wales as an archaeologist and project manager and specialises in the identification and analysis of lithic assemblages. Mathew has well developed skills in Aboriginal archaeology, serving as a key team member and project manager on a number of projects in Sydney, the Illawarra, the Hunter Region, Far Western NSW and Central NSW. These projects have seen him take part in all facets of the NSW Aboriginal cultural heritage assessment process including Aboriginal consultation, background research, the formation of predictive modelling, field survey, test excavation, salvage excavation, report authorship and AHIP applications.	Report writing

Name and qualifications	Experience summary	Project role
Taryn Gooley B.A.Sc (hons)	Taryn has eight years' archaeological consultancy experience, as well as extensive volunteering experience on archaeological research projects overseas. Taryn has a strong background in project management, leading project teams and volunteer groups in heritage management projects throughout New South Wales and Western Australia. Taryn has successfully completed numerous projects throughout the Newcastle, Port Stephens, Lake Macquarie, Hunter Valley, Liverpool Plains, and North Western NSW regions. Taryn has extensive experience in undertaking remote archaeological surveys and large scale archaeological testing and salvage excavation programs. Taryn has participated in and managed a number of long term archaeological programs under Part 4 and Part 5 of the EP&A Act.	Quality assurance

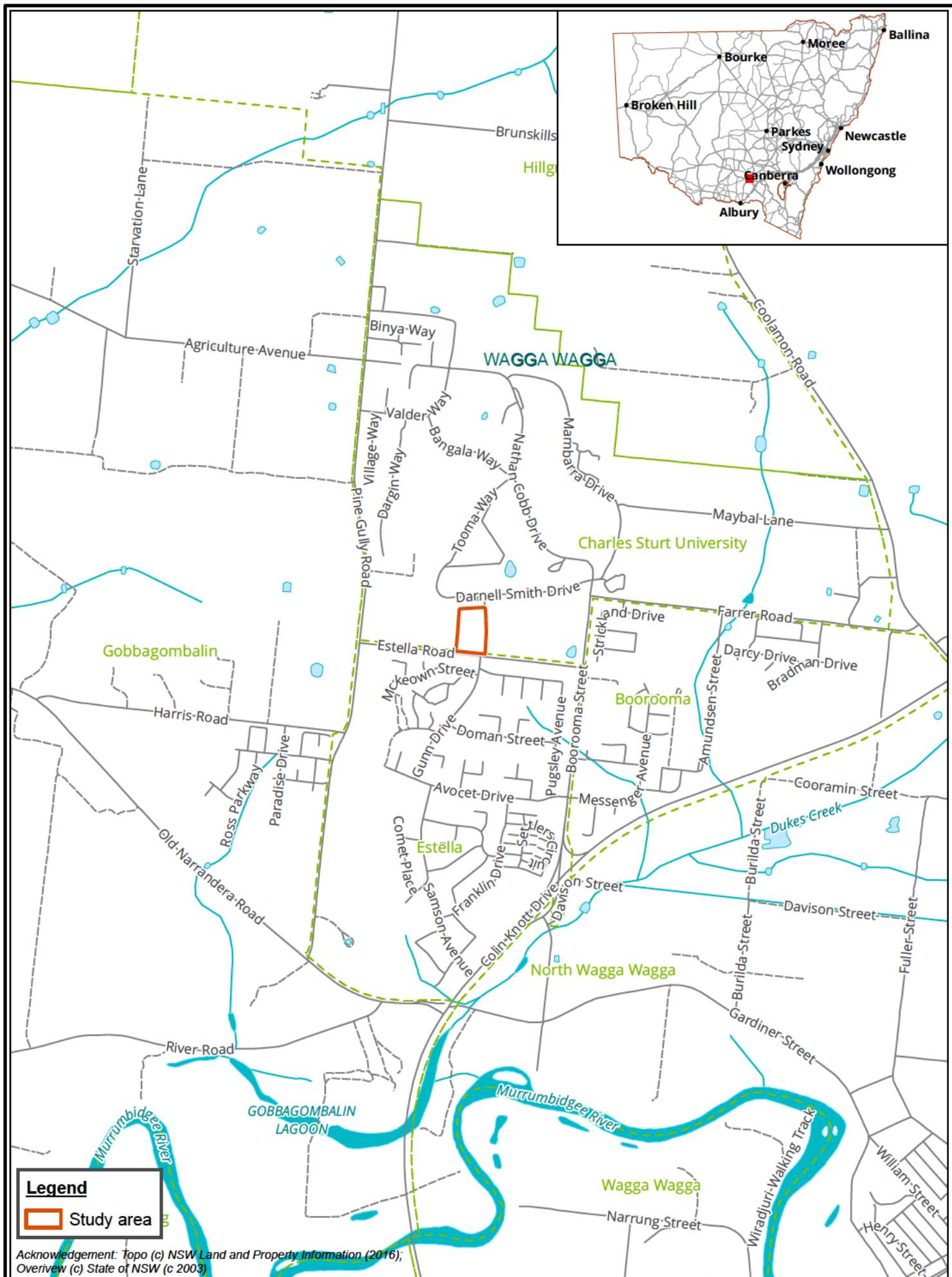
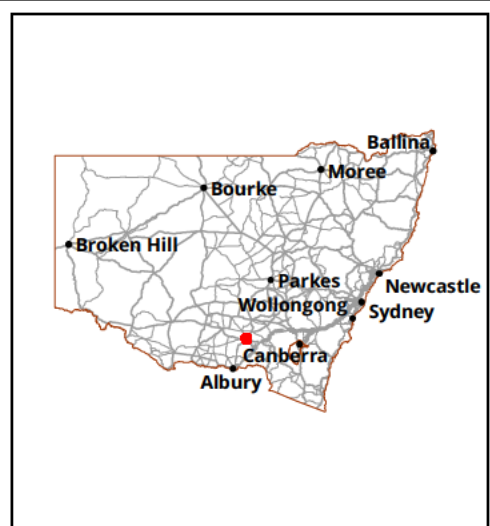


Figure 1: Location of the study area



Legend

Study area

Figure 2: Study area detail

0 10 20 30 40 50
Metres

Scale: 1:1,500 @ A3
Coordinate System: GDA 1994 MGA Zone 55

biosis
Biosis Pty Ltd

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

Matter: 27668,
Date: 08 August 2018,
Checked by: MLA, Drawn by: DK, Last edited by: dkazemi
Location: P:\27600s\27668\Mapping\27668_F2_ProjectArea.mxd

2 Proposed development

The project involves the design and construction of a new public school, and includes the following elements:

- Construction of a new public school, comprising core facilities (Core-21) and 16 future focus learning designed learning spaces.
- Construction of school landscaping works, comprising gardens, outdoor learning and play spaces.

The proposal is in the schematic design phase, and plans of the proposed development are available in Appendix 2. A large part of the study area will be subject to impact through the proposed works. Activities expected to be required as part of the proposed development include the following:

- Bulk earth works.
- The installation of all services required to run a functioning school such as water, sewer, electricity, gas, telecommunications, etc.
- Construction of buildings, car park, drop off and pick up bays.
- Landscaping activities.

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

3.1.1 Topography, Geology and hydrology

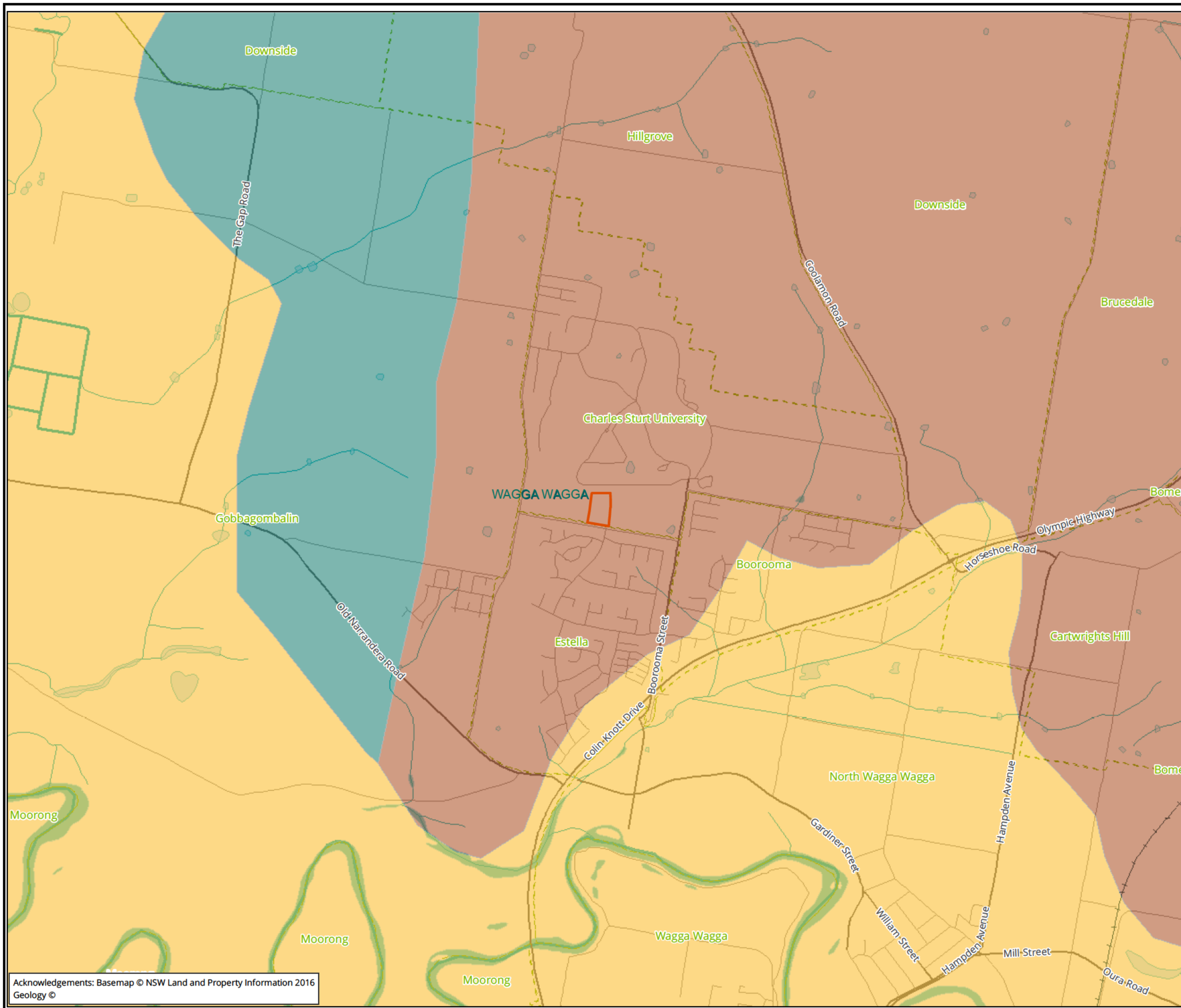
Based on available contours, the study area is located across a gentle slope averaging around 6.15%, with elevation decreasing to the south-west. More broadly the study area is located within a system of undulating hills, with typical landforms present including crests, slopes, and drainage depressions (Speight 1998, p.66).

Geologically, the study area overlies Silurian granites (gw) aged between 419 and 443 million years old, and described as (Figure 3):

Granite. Includes S-type granite with quartz feldspar muscovite biotite and cordierite. Some granite may be porphyritic - where larger crystals (typically feldspar) are surrounded by smaller ones.

Includes granites of the extensive Koetong Supersuite that extends from West Wyalong into Victoria, the Young Granodiorite that underlies cherry and stone fruit orchards in that area, and the Wyangla Granite (Geological Survey of New South Wales n.d.).

The study area is not located in close proximity to any permanent sources of water (Figure 4). The nearest source of water to the study area is an unnamed first order drainage channel, located approximately 350 metres to the south-west. This drainage channel feeds into Dukes Creek, a third order non-perennial watercourse located around 1.3 kilometres south-west of the study area. Dukes Creek in turn flows into the Gobbagombalin Lagoon 2 kilometres south of the study area, which is located adjacent to the Murrumbidgee River around 2.2 kilometres south of the study area. The nearest perennial sources of water to the study area are Gobbagombalin Lagoon and the Murrumbidgee River.



Legend

Study area

Geological unit (1:250000)

- Ou
- Qa
- gw

Figure 3: Geological units near the study area

0 250 500 750 1,000 1,250
Metres

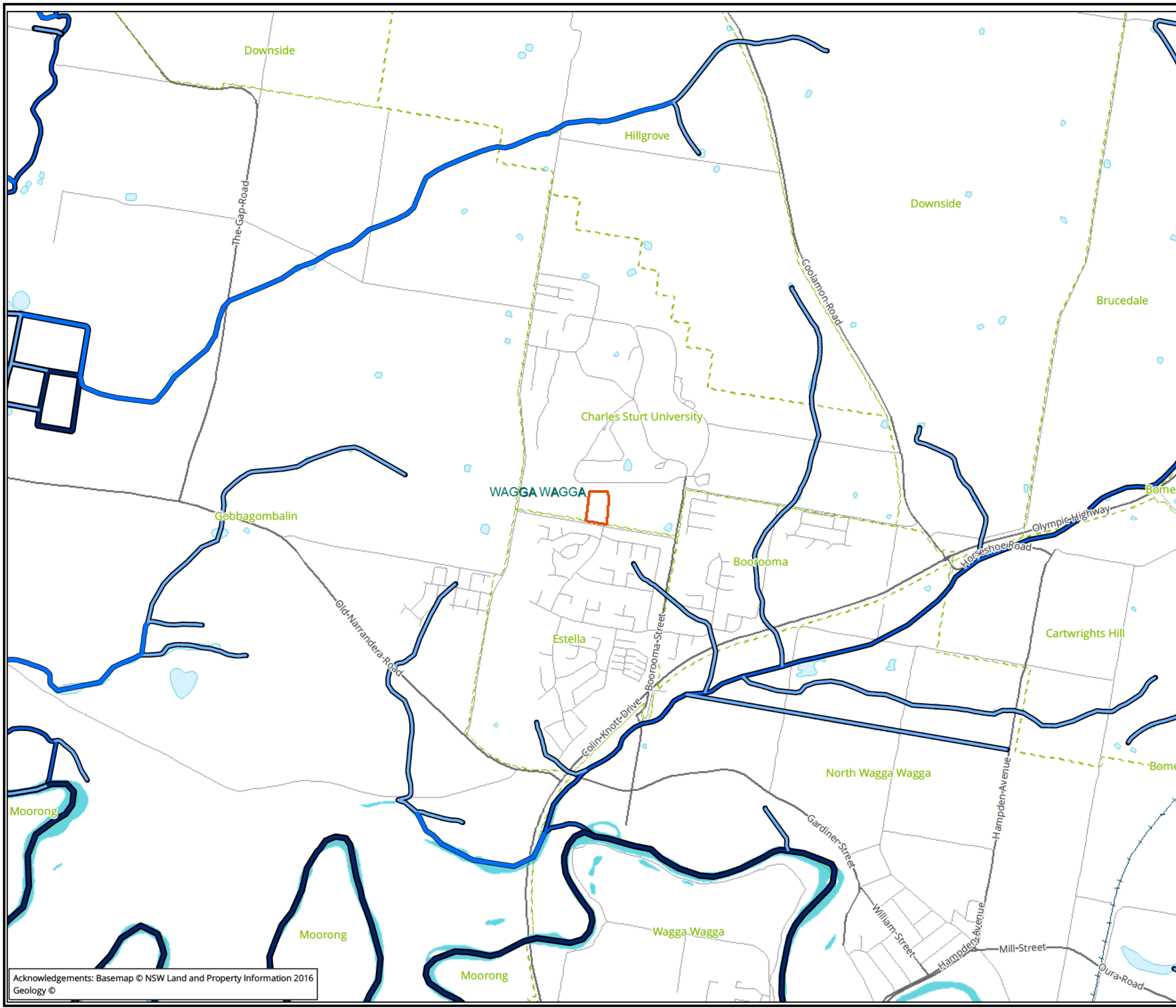
Scale: 1:25,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

biosis
Biosis Pty Ltd

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

Matter: [Matter No.],
Date: 24 September 2018,
Checked by: [Consultant], Drawn by: [GIS], Last edited by: dkazemi
Location: \\bio-data-01\matters\127600s\27668\Mapping\27668_F3_Geology.mxd

Acknowledgements: Basemap © NSW Land and Property Information 2016
Geology ©



Legend

- Study area
- Canal-Drain
- Natural Watercourse

Strahler Order

- 1
- 2

NonPerennial

Perennial

Figure 4: Hydrology in the vicinity of the study area

0 250 500 750 1,000 1,250
Metres

Scale: 1:25,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

biosis
Biosis Pty Ltd

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

Matter: [Matter No.],
Date: 24 September 2018,
Checked by: [Consultant], Drawn by: [GIS], Last edited by: dkazemi
Location: P:\27600s\27668\Mapping\27668_F4_Hydrology.mxd

Acknowledgements: Basemap © NSW Land and Property Information 2016
Geology ©

3.1.2 Soil landscapes

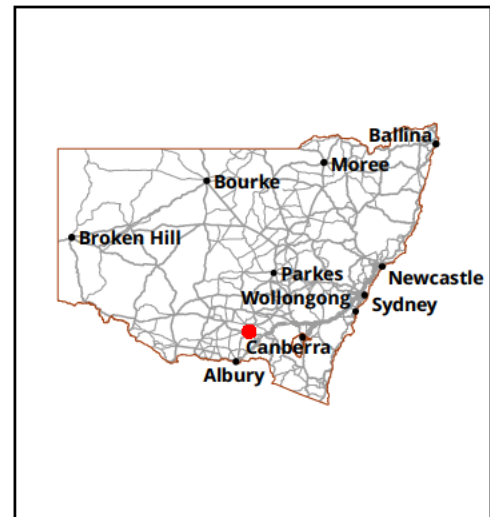
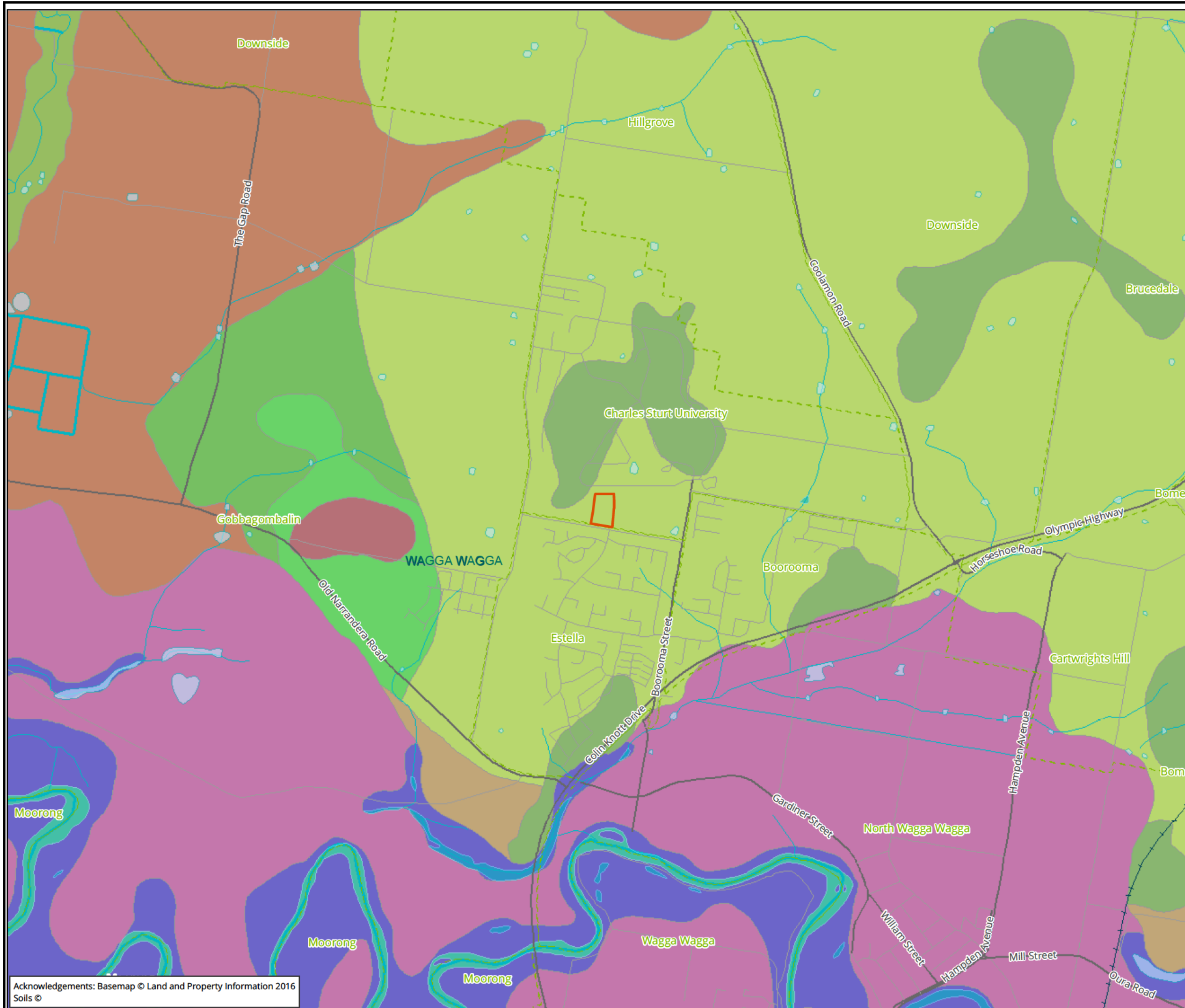
Soil landscapes have distinct morphological and topological characteristics which can assist in determining archaeological potential. They are defined by a combination of soils, topography, vegetation and weathering conditions. Soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure.

The study area is located in the East Bomen soil landscape (Figure 5). It is characterised as fine sandy and sandy clay loams over brown, reddish brown or yellowish clays (Table 2). Soil profiles are shallow to moderately deep, ranging from 40 to 150 centimetres on crests and ridges, 80 to 200 centimetres deep on slopes, and 80 to 15 centimetres deep in drainage lines. Topsoils in this soil landscape tend to be between 10 and 20 centimetres deep.

The landscape is present across the undulating rises and lower slopes north of the Murrumbidgee River, with a local relief of 15 to 40 metres. Common landform elements within this soil landscape include broad crests and ridges, long waning slopes, and shallow drainage lines (Chen & McKane 1997).

Table 2 East Bomen soil landscape characteristics (Chen & McKane 1997)

Soil Material	Description
eb1— Dull loam (topsoil— A ₁ horizon)	Dark to dull, sandy loam to clay loam, massive; field pH 5.0 - 5.5. Moderately acid, low wet bearing strength (localised), salinity (localised), low fertility, sodicity (localised), hardsetting (localised).
eb2— Reddish light clay (B ₁ horizon)	Reddish brown, light clay, massive; field pH 6.0 - 6.5. Salinity (localised), sodicity (localised), low fertility, low wet bearing strength (localised).
eb3— Reddish brown light clay (subsoil— B horizon)	Bright reddish brown to reddish brown, light clay to light medium clay, massive to strongly pedal; field pH 6.0 - 7.5. Low fertility, sodicity.
eb4— Yellowish light medium clay (subsoil— B ₂₂ horizon)	Dull yellow orange to yellowish brown, light medium clay, moderate to strongly pedal; field pH 6.0 - 7.0. Low fertility, low wet bearing strength.
eb5— Bright sandy light clay (subsoil— BC horizon)	Orange to bright yellowish brown, coarse sandy light clay to light clay, moderately pedal; field pH 6.0 - 8.0. Low fertility, low wet bearing strength.



Legend

Study area

Soil Landscapes (1:100,000)

- BECKS LANE
- BELFRAYDEN
- CURRAWARNA
- EAST BOMEN
- FARNHAM
- GLENMORNON
- KURRAJONG PLAIN
- LLOYD
- O'BRIENS CREEK variant b
- PULLETOP
- WATER

Figure 5: Soil landscapes near the study area

0 250 500 750 1,000 1,250
Metres

Scale: 1:25,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55



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

Matter: 27668,
Date: 09 November 2018,
Checked by: JAC, Drawn by: DK, Last edited by: dkazemi
Location: \\bio-data-01\matters\27668\27668\Mapping\27668_F5_Soil.mxd

3.1.3 Landscape resources

The vast majority of the study area has been cleared, with some isolated trees present along its western and southern boundaries. The East Bomen soil landscape supports tree species including white box, grey box, yellow box and white cypress pine. Understorey species supported by the landscape include kangaroo grass, tussock grass, plains grass, spear grass, and wallaby grass. Potential uses of these resources by Aboriginal people are presented in Table 3

Table 3 Aboriginal uses of plants located in the vicinity of the study area (Murrumbidgee Catchment Authority 2008, pp.25–37)

Common name	Uses
White cypress pine (Garraa)	A medium to large tree, reaching more than 20 metres, Garraa is widespread across the Murrumbidgee catchment. Growing in sandy soils Garraa is an ideal food source for Aboriginal people. Branches often start low to the ground and with a rough bark, are easy to climb. Budyaan nests in hollows, such as Gilaa and Widyagala can be raided, where the Gabuga and young can be collected. Larger Budyaan, such as Maliyan also use Garraa to make large stick nests from which they can launch themselves to hunt for prey in the surrounding woodlands and grasslands. The resin produced by the tree is used as glue for binding tools and other implements. To treat broken bones a piece of bark, from the larger roots, can be removed from the tree and while wet, be bound around the broken limb. As the bark dries it moulds to the shape of the limb, acting as a splint and holding the broken bones in place. The bark is also useful for making torches to carry fire or provide light.
Grey box (Birribee)	Birribee is often found in woodlands mixed with Baagang (Yellow Box) and Garraa (White Cypress Pine) and on sandhills or red soils above the floodplain. The bark of Birribee is one of the easiest to remove to make coolamons, shields, canoes and bark slabs for shelters and today many Birribee trees still bear the scars of use by Aboriginal people over many generations. The wood is also considered long lasting and useful in tool making. Hollows in Birribee make excellent hives for native Dharrungarrung and is known by Aboriginal people as a good Warrul yielder.
White box (Birri)	Birri is a common woodland tree. Birri forms a similar role to Birribee (Grey Box) and the rough bark was used to make a range of tools and implements, from small bowls to large canoes. The hollows of older trees are widely used by many Budyaan and Aboriginal people find that Birri is good source of Budyaan and Budyaan Gabuga for food. The resin from Birri could also be used for many purposes including sealing bowls and cups so that they were watertight. Aboriginal people use Birri for medicine as well, some parts of the tree that are used are fresh, young leaves.
Yellow box (Baagang)	Baagang reaches around 25 metres when fully grown and is a tall, graceful tree. The bark is brown, rough and fibrous on the lower trunk but becomes creamy and smooth on the higher branches. The wood is used by Aboriginal people to make a range of tools and implements. Baagang is also known to be used as a medicine tree.

3.1.4 Land use history

Our knowledge of Aboriginal occupation prior to European settlement in the region is scanty. The study area lies within the boundaries of the territory of the Wiradjuri tribal and linguistic group (Tindale, 1974). The Wiradjuri tribal area is situated within the Murray Darling Basin and extends across three general physiographic regions: the highlands or central tablelands in the east, the riverine plains in the west, and the transitional western slopes zone in-between (Read, 1983). The current study area is located within the

Early explorers in the Wagga Wagga district were Hume and Hovell in 1824, Charles Sturt in 1829 and Thomas Mitchell (1836) who sent back positive reports of the farming potential of the region to Sydney (NGH Environmental 2013, p.6). Following initial exploration, the first European settlers in the district began moving in the region in the 1830, with many having taken up grazing runs along rivers and creeklines by 1832 (NGH Environmental 2013, p.6). From 1836 onwards, settlers were able to obtain licenses to depasture stock and early settlements began forming along the Murrumbidgee where water was used for stock water. Violent clashes between new European settlers and Aboriginal people are recorded around the Murrumbidgee, particularly between 1839 and 1941. These clashes were called the “Wiradjuri wars” and included the removal of cattle and spearing of stockmen in response to the killing of Wiradjuri people and the loss of significant sites and fishing grounds (Heritage Office and Department of Affairs and Planning, 1996).

The village of Wagga Wagga was surveyed in 1847 and proclaimed a township in 1849 with the first lots sold (ASSA). Wagga Wagga Township was located on the southern side of the Murrumbidgee River with a smaller settlement called North Wagga located on the more flood prone northern side of the Murrumbidgee River (NGH Environmental 2013, p.6). The location on the Murrumbidgee River meant that Wagga Wagga quickly became an important centre for stock sales. The study area was located within a land grant under Edwin Robert Hedditch designated as Farm 4 on the 1913 parish map.

3.2 Previous archaeological work

A large number of cultural heritage surface (surveys) and sub-surface (excavations) investigations have been conducted throughout the Riverina 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.

3.2.1 Regional overview

There were no previous archaeological studies within 5 kilometres of the study area listed on the AHIMS database. However, while systematic studies have not been undertaken within the immediate vicinity of the study area, a number of archaeological studies have been undertaken across the wider Wagga Wagga region since the 1980s. The majority of these archaeological investigations have been straight line surveys for roads, communications transmission lines and pipelines. As such they incorporate a portion of the Wagga Wagga region but do not provide definitive information with regard to landforms.

Witter (1980; 1982), Hiscock (1983) and Witter and Hughes (1983) identified a number of characteristics that can be related to the frequency and nature of archaeological material across the wider Wagga Wagga region. These characteristics include relationships between the distribution of subsistence resources and areas of repeated or longer term occupation, access to raw materials and landform types.

These archaeological investigations almost uniformly identified the Murrumbidgee River, which lies to the south of the current study area, and its associated flood plain as the most consistent and diverse resource zone within the wider Wagga Wagga Region. Witter (1982, p. 17) provides a summary of this distribution model:

- Major flood channels produce mounds, occupation debris of worked stone, scarred eucalypts and on sand features where cypress pines exist, torch bark scars.
- Minor flood channels and temporary swamps produce scarred eucalypts, clay hearths and occupation debris, particularly where sand features exist.
- Rare isolated artefacts of flaked or abraded stone and scarred eucalypts are found scattered throughout plains.

This model was supported by subsequent surveys conducted by Hiscock (1983) and Witter and Hughes (1983). Hiscock identified 13 isolated artefacts and 9 modified trees during a survey for a proposed transmission line between Wagga Wagga and Darlington Point. The majority of the isolated artefacts were identified in areas located away from reliable sources of potable water. Witter and Hughes conducted a similar surveys between Murrumburrah, Yass and Wagga Wagga. They identified four artefact scatters and one modified tree and concluded that the majority of past Aboriginal activity within the region could be associated with river valleys, largely where diverse vegetation types were available. They further conclude that Aboriginal archaeological material may also be identified on well-drained, raised locations.

However later investigations by Everett (1997) and Officer *et al* (1998) identified only limited archaeological material in this context. Everett identified only one isolated silcrete artefact during a survey for a proposed effluent pond at Bomen.

3.2.2 Local overview

ENSR Australia Pty Ltd (2008) completed an Aboriginal heritage assessment approximately 7.5 kilometres north-east of the study area for an integrated oilseed processing and biodiesel plant. The assessment included background research and archaeological survey. Based on the background research, a number of statements about the archaeological character of the area were formulated:

- *"The archaeological record in this area is dominated by artefact scatters and isolated finds, and to a lesser extent scarred trees. Raw materials within this sites are usually dominated by quartz with lesser components of chert, silcrete and quartzite.*
- *Large sites tend to be located on alluvial flats or creek valleys, while smaller sites occur on ridge tops or mountainous settings.*
- *Several studies note that site distribution is dominated by the presence of extensive and/or permanent water resources. Hence, areas surrounding the Murrumbidgee are considered likely locations for archaeological site occurrence.*
- *Several studies have found that existing activities, specifically agriculture, can have a large negative effect in site identification of preservation.*
- *No AHIMS sites are located in the vicinity of the study area (ENSR Australia Pty Ltd 2008, p.16)."*

The archaeological assessment did not identify any Aboriginal sites or areas of archaeological potential within the survey area. It concluded that Aboriginal sites are more typically located in close proximity to permanent water sources, such as the Murrumbidgee River. It also noted that the survey area had been subject to heavy disturbance.

Kelleher Nightingale Consulting Pty Ltd (2008) were engaged to undertake an Aboriginal heritage assessment to inform the Wagga Wagga Local Environmental Study. The scope of works included a number of areas surrounding the existing town of Wagga Wagga which were proposed to be subject to rezoning. Background research and an archaeological survey of a number of these areas were conducted, with predictive modelling suggesting it was possible for Aboriginal sites to be present across the landscape, however the likelihood of occurrence would be variable based on the access to resources and raw material, with open camp sites having variable potential to occur in certain areas such as:

- *"Major valleys in the region, especially the Murrumbidgee River floodplain, would have been an important source of water and subsistence resources even through drier periods. Elevated, well drained areas associated with these floodplains will potentially demonstrate longer term and more frequent occupation.*
- *Archaeological material along smaller tributaries is likely to represent smaller, more focussed occupation events.*
- *Spur/ridgelines are likely to provide limited archaeological material demonstrating infrequent occupation events possibly associated with the use of these landforms to move across the landscape.*
- *Very limited archaeological material is expected to occur across landforms that are a substantial distance from water and subsistence resources.*
- *Isolated artefacts are likely to occur anywhere across the study area, and may represent areas where further archaeological material remains buried, or areas away from water and subsistence resources where activity was sparse and infrequent.*
- *Scarred trees are likely to occur anywhere across the study areas where there are stands or isolated occurrences of mature trees. Due to extensive tree clearance in the region during the historical period it is difficult to determine the characteristics of scarred tree distribution.*
- *Burials may occur anywhere across the study areas, but are more likely to occur where there are deeper soil deposits, such as sand deposits associated with floodplains and drainage channels (Kelleher Nightingale Consulting Pty Ltd 2008, p.7)."*

Archaeological sensitivity mapping was completed following the survey, with areas of high and moderate sensitivity generally associated with the following landscape conditions:

- proximity to drainage lines/terraces
- gentle slopes or raised above regular floods
- potential artefact raw material present, such as quartz.

The archaeological survey identified one Aboriginal site, an isolated stone artefact, and a number of areas of archaeological sensitivity.

Kelleher Nightingale Consulting Pty Ltd (2009) completed an Aboriginal cultural heritage assessment in advance of the Hume Highway Bypass of the town of Tarcutta, approximately 40 kilometres south-east of the study area. The assessment included archaeological survey and test excavations, with a total of 21 Aboriginal sites being identified by the assessment, 17 of which fell within the bypass corridor. Of these, 13 were artefact scatters, and four were scarred trees.

Test excavations were carried out at four areas of archaeological potential, leading to the identification of four artefact sites Table 4. The results of the test excavations suggested that Tarcutta Creek was the centre of Aboriginal activity in the local area.

Table 4 Tarcutta bypass test excavation results (Kelleher Nightingale Consulting Pty Ltd 2009, pp.18–30)

Site	Area tested (m ²)	Number of artefacts	Artefact density (per m ²)	Landform	Soils	Distance to water
T9	27	180	6.7	Terrace/spur	Erosional soils, mixed clay and degrading bedrock	300-350m to Tarcutta Creek
T12	21	296	14	Hillcrest/ridge	Colluvial/erosional, silty clay loam on weathered bedrock	100-275m to Tarcutta Creek
T20	44	699	15.9	Terrace/spur	Mixed clay and degrading bedrock	150-200m to Tarcutta Creek
T21	18	16	0.9	Floodplain/low terrace	Alluvial soils, silty clay loam	0-100m to Keajura Creek

Archaeological & Heritage Management Solutions (2012) were engaged to complete a baseline archaeological assessment for the Wagga Wagga Base Hospital, around 5.5 kilometres south of the current study area. Similarly to other assessments locally, it was concluded based on the background research the Aboriginal sites have the potential to occur in close proximity to watercourses, particularly permanent water courses, and on flat elevated locations such as ridges and crests. It was determined that the study area was likely to hold a low-moderate archaeological potential.

Based on the results of the archaeological survey, which identified heavy disturbance, it was assessed that there was a low potential for Aboriginal sites to be present within their study area.

OzArk Environmental & Heritage Management Pty Ltd (2012) were engaged to complete an archaeological assessment of the impacts of proposed levee upgrades surrounding the Murrumbidgee River in Wagga Wagga. Background research completed for the project suggested that there was a low potential for Aboriginal sites to be identified in the survey area, owing to high levels of previous disturbance and the narrow survey corridor. Based on the background research, the following predictive statements were made:

- *“Open sites are most likely on elevated features in the vicinity of water courses*

- *Isolated stone artefacts may occur in virtually any landscape context and are thus considered possible.*
- *Culturally modified trees are likely to occur wherever stands of mature native trees of scar-bearing type are extant.*
- *Grinding grooves are likely to occur in locations where there is suitable outcropping rock in the vicinity of creek lines.*
- *Bora / ceremonial grounds are thought unlikely due to the high levels of disturbance on elevated land suitable for such sites (OzArk Environmental & Heritage Management Pty Ltd 2012, p.22)."*

The archaeological survey did not identified any Aboriginal sites or areas of archaeological potential.

OzArk Environmental & Heritage Management Pty Ltd (2018) completed an archaeological assessment for the Enirgi Power Consolidation Project, around 7 kilometres east of the current study area. Background research completed for the project identified some potential for isolated artefacts to be identified in the survey area, however a generally low potential for Aboriginal sites to be present within the study area as outlined in Table 5.

Table 5 Aboriginal site predictive statements (OzArk Environmental & Heritage Management Pty Ltd 2018, pp.23–25)

Site type	Archaeological potential
Isolated finds	As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the project site.
Open artefact scatters	As a majority of the project site is within lower slope landforms distant to permanent water (Section 2.1), this site type is not predicted to be common. The moderate degree of disturbance in the project site will probably mean that any scatter has become displaced. It is likely that any sites associated with such landforms are likely to have a low artefact density and a low complexity of tool types as the sites are either one-off events or only infrequently used. It is noted that the artefact scatters are recorded in the general area (Section 3.2) but the project site lacks the topographic attributes identified in Section 3.4.2 and this lowers the possibility that the area contains sites of this type.
Aboriginal scarred trees	Due to the near total clearance of trees from within the project site, this site type is very unlikely to be recorded.
Quarry sites and stone procurement sites	This site type is recorded in the region, most notably the declared Aboriginal Place: the Bomen Axe Quarry (Section 3.3). However, rock outcropping is absent in the project site and this site type will not be recorded.
Burials	Given the nature of past land-use in the project site, the small size of the project site and the granite-derived soils, recording this site type in the project site will be extremely unlikely.

The results of this predictive model were supported by the archaeological survey, with no Aboriginal sites being identified by the assessment.

3.2.3 AHIMS site analysis

An updated extensive search of the AHIMS database was conducted on 32 January 2020 (Client service ID: 479225). The search identified 95 Aboriginal archaeological sites within a 14 kilometre by 14 kilometre search area, centred on the proposed study area (Table 6). None of these registered sites are located *within* the study area (Figure 6). The mapping coordinates recorded for these sites were checked for consistency with

their descriptions and location on maps from Aboriginal heritage reports where available. These descriptions and maps were relied where notable discrepancies occurred.

Two Aboriginal places, Wiradjuri Reserve & Gobba Beach (AHIMS ID 85) and Bomen Lagoon (AHIMS ID 99) have been declared in the vicinity of the study area. Wiradjuri Reserve & Gobba Beach (AHIMS ID 85) is located on the southern side of the Murrumbidgee River, approximately 2.5 kilometres south-east of the study area. Bomen Lagoon (AHIMS ID 99) Aboriginal place is located next to Bomen Lagoon, approximately 4 kilometres south-east of the study area. Neither Aboriginal places will be impacted by the proposed works.

It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area.

Table 6 AHIMS search results

Site type	Number of occurrences	Frequency (%)
Aboriginal ceremony and dreaming	2	2.11
Aboriginal resource and gathering	2	2.11
Artefact	29	30.53
Artefact, Modified tree	2	2.11
Artefact, Stone quarry	1	1.05
Burial	1	1.05
Modified tree	58	61.05
Total	95	100.00

A simple analysis of the Aboriginal cultural heritage sites registered within 7 kilometres of the study area indicates that the dominant site type is modified trees, present at 60 of the 95 Aboriginal sites identified (63.16%). Artefacts were 32 identified sites (33.68%). The higher frequency of modified trees is likely due to the fact that they are generally the most visible site type.

A number of other site types were identified, including Aboriginal ceremony and dreaming sites (2.11%), Aboriginal resource and gathering sites (2.11%) one burial (1.05%) and one stone quarry (1.05%). These site types all had a relatively low sample size, and were not located in close proximity (2 kilometres) of the study area.

3.3 Discussion

Previous archaeological surveys indicate that proximity to a permanent water supply is a primary factor in the determination of the location for past Aboriginal occupation (*ENSR Australia Pty Ltd 2008, p.16*). There appears to be a high correlation between the permanence of a water source and the complexity of sites. Lithic assemblages identified near permanent water sources suggest a greater range of activity (for example tool use, manufacture and maintenance, food processing and quarrying) while sites located near more ephemeral water sources indicate only transitory occupation (isolated knapping and discarded tools) (Kelleher Nightingale Consulting Pty Ltd 2008, p.7).

The study area is not located in close proximity to any watercourses and is situated on a gentle slope with shallow East Bomen soils present. It is unlikely that the study area was used as an area of occupation as sites are most frequently identified within elevated areas in close proximity to water sources. The study area has also been cleared of vegetation and shallow soils are likely to have been disturbed suggesting that sites such as scarred trees and artefact scatters are unlikely to be present. This evidence indicates that locations on low valley floors were not preferred places of occupation (Green, 2002).

3.3.1 Predictive statements

A series of predictive statements have been formulated to broadly predict the type and character of Aboriginal cultural heritage sites likely to exist/have existed 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 7 below outlines the site types most likely to be encountered during the field investigation across the present study area based on the results of background research. The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 7 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	Moderate: Stone artefact sites have been previously recorded in the region across a wide range of landforms. There is moderate potential that stone artefacts can be found in the study area.
Potential archaeological deposit (PAD)	Potential sub surface deposits of cultural material.	Low: PADs have the potential to be present in undisturbed landforms in close proximity to reliable water sources. These landforms are not present in the study area so there is low potential for this site type to occur.

Site type	Site description	Potential
Modified trees	Trees with cultural modifications	Low: A large number of modified trees have been recorded within 7 kilometres of the study area. There is low potential for modified trees to be located within the study area due tree clearance activities which have occurred in the study area.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Low: Shell midden sites have not been recorded within the study area. There is low potential for shell middens to be located due to absence of permanent water.
Quarries	Raw stone material procurement sites.	Low: There is one record of a stone quarry in the local area, however it is considered that the study area also lacks the geology to support outcrops suggesting low potential.
Axe grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	Low: The geology of the study area lacks suitable horizontal sandstone rock outcrops for axe-grinding grooves. Therefore there is low potential for axe grinding grooves to occur in the study area.
Burials	Aboriginal burial sites.	Low: Aboriginal burial sites are generally situated within deep, soft sediments, caves or hollow trees. One Aboriginal burial has been recorded in the local area. 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: These sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist. Sandstone exposures are not present in the study area so there is low potential
Aboriginal ceremony and Dreaming Sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	Low: There are currently no recorded mythological stories for the study area, however it is noted that there are a number of registered Aboriginal Places in the local 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.

Site type	Site description	Potential
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, however it is noted that there are a number of registered Aboriginal Places in the local area.

4 Archaeological survey

A field survey of the study area was undertaken on 5 October 2018. 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:

- 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 the gentle slope landform which is found across the entire study area. This landform type will be impacted on by the proposed development.

4.2.2 Survey methods

The archaeological survey was conducted on foot with a field team of one member consisting of Biosis Archaeologist William Truscott. Recording during the survey followed the archaeological survey requirements of the code and industry best practice methodology. Information that recorded during the survey included:

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

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

4.3 Archaeological survey results

A total of five transects were walked across the gentle slope landform with the surveyor spacing transects thirty metres apart (Plate 1- Plate 6). Although the methodology set out in Burke and Smith (2004, p.65) states that a single person can only effectively visually survey an area of two linear metres, the coverage of the study area was much lower as a result of dense vegetation which obscured the ground surface. No Aboriginal sites or PADs were identified in the study area. The results of survey have been summarised in Table 8 and Table 9, and in Figure 7 and Figure 8.

Generally the survey was hampered by poor GSV and thick grass cover. Some areas of exposure were observed, particularly in the south-eastern corner of the study area where grass cover had been removed, however these exposures were infrequent. Disturbances in the study area were minimal and primarily associated with vegetation clearance and some surface scouring.



Plate 1 **Transect 1 facing north, with some exposure along vegetation cover**



Plate 2 **Transect 2 facing south, with dense ground cover**



Plate 3 **Transect 3 facing north, with some exposure in the foreground**



Plate 4 Exposure located along the southern end of Transect 3



Plate 5 Transect 4, facing north, with some exposure



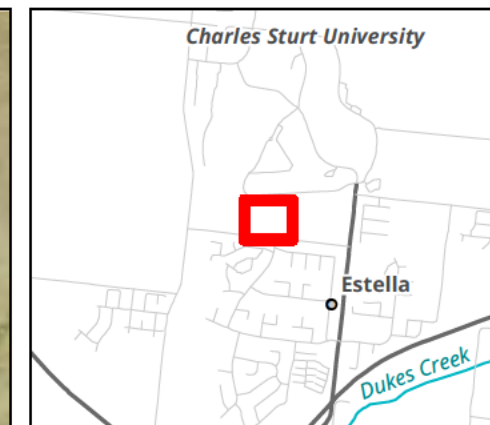
Plate 6 **Transect 5, facing north, with exposure in the foreground**

Table 8 Survey coverage

Survey unit	Start Point (Easting and Northing)	End Point (Easting and Northing)	Landform	Survey unit area (m ²)	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage (%)
Transect 1	E: 5322129 N: 6119383	E: 5322150 N: 6119580	Gentle slope	420	20	20	16.8	4.00
Transect 2	E: 532174 N: 6119575	E: 532143 N: 6119379	Gentle slope	418	5	5	1.04	0.25
Transect 3	E: 532206 N: 6119579	E: 532202 N: 6119582	Gentle slope	420	5	5	1.05	0.25
Transect 4	E: 532233 N: 6119578	E: 532216 N: 6119368	Gentle slope	400	5	5	1	0.25
Transect 5	E: 532242 N: 6119359	E: 532254 N: 6119583	Gentle slope	410	20	20	16.4	4.00

Table 9 Landform summary

Landform	Landform area (m ²)	Area effectively surveyed (m ²)	Landform effectively surveyed (%)	No. of Aboriginal sites	No. of artefacts or features
Gentle slope	40000	36.29	0.09	0	0

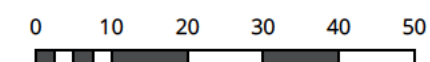


Legend

Study area

Transect

Figure 7 Survey transects

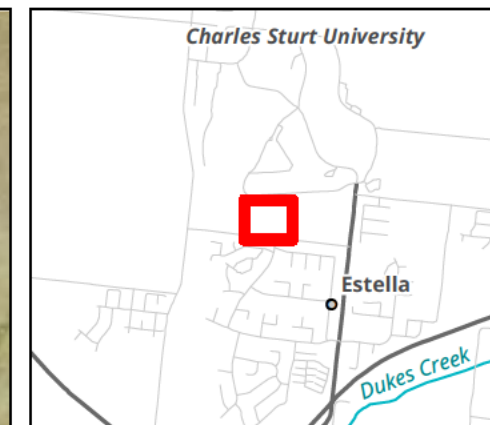


Metres
Scale: 1:1,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56



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

Matter: 27668
Date: 07 November 2018,
Checked by: MLA, Drawn by: DK, Last edited by: dkazemi
Location: \\bio-data-01\matters\27600s\27668\Mapping\27668_F7_SurveyResult



Legend

Study area

Archeological potential

Low

Figure 8 Survey results

0 10 20 30 40 50
Metres

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



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

Matter: 27668
Date: 07 November 2018,
Checked by: MLA, Drawn by: DK, Last edited by: dkazemi
Location: \\bio-data-01\matters\27600s\27668\mapping\27668_F8_SurveyResult

4.4 Discussion of archaeological survey results

The field investigation consisted of five transects in a north south orientation within the study area, all of which were within the gentle slope landform.

No Aboriginal sites, objects or areas of archaeological potential were identified during the archaeological investigation. This is likely due to previous disturbance, and low GSV observed within the study area.

The entire study area has been disturbed by land and vegetation clearance. These disturbances would constitute relatively shallow disturbances to the soil profile; however, review of soil landscapes in the study area indicates that soil profiles are very shallow, with only 10 to 20 centimetres of loam overlying clays. Any potential sites within these areas would be confined to these shallow soils and thus susceptible to disturbances.

A review of previous assessments conducted within the Wagga Wagga region, along with the AHIMS search results, indicates that Aboriginal sites are most likely to be present in close proximity to watercourses, particularly permanent water courses, and on flat elevated locations such as ridges and crests (Archaeological & Heritage Management Solutions 2012). The study area is located in a gentle slope landform which is part of a system of undulating hills. It is located approximately 300 metres from the nearest source of water which consists of a first order drainage line. This source of water is non-perennial and would not provide reliable resources.

The shallow soils combined with disturbances from land clearing are likely to have resulted in disturbances of potential sites while the gently sloped landform and distance from water indicate a less suitable area of occupation. Combined, these factors indicate that the study area contains low archaeological potential. The proposed works will be entirely contained to the study area, and will therefore not impact on any Aboriginal heritage values.

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, OEH, NSW Department of Planning and Environment. The relevant sections of these guidelines are presented below.

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

In addition to the previously outlined heritage values, the OEH 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 (Table 10). Site condition refers to the degree of disturbance to the contents of a site at the time it was recorded (Table 11).

Table 10 Site contents ratings used for archaeological sites

Rating	Description
0	No cultural material remaining.
1	Site contains a small number (e.g. 0–10 artefacts) or limited range of cultural materials with no evident stratification.
2	Site contains a larger number, but limited range of cultural materials; and/or some intact stratified deposit

Rating	Description
	remains; and/or are or unusual example(s) of a particular artefact type.
3	Site contains a large number and diverse range of cultural materials; and/or largely intact stratified deposit; and/or surface spatial patterning of cultural materials that still reflect the way in which the cultural materials were deposited.

Table 11 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 12).

Table 12 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 13.

Table 13 Scientific significance ratings used for archaeological sites

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

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

5.2.1 Statements of archaeological significance

The following archaeological significance assessment is based on Requirement 11 of the code. As there were no Aboriginal sites located during the survey the study area was assessed as having low archaeological potential, and low archaeological significance.

6 Impact assessment

As previously outlined, the project proposes to construct a new public school.

6.1 Predicted physical impacts

The study area does not contain any recorded Aboriginal sites and has been assessed as having low archaeological potential due to disturbances observed in the study area, and the distance of the study area from reliable sources of water. The proposed works will therefore not impact on any Aboriginal heritage values.

6.2 Management and mitigation measures

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

Avoidance of impact to archaeological and cultural heritage sites through design of the development is the primary mitigation and management strategy, and should be implemented where practicable. As part of the management and mitigation measures for the proposed works, an Aboriginal cultural heritage assessment including archaeological survey and consultation with the Aboriginal community was undertaken. This was done to determine the presence and nature of any potential Aboriginal sites so that appropriate management could be undertaken. The survey did not identify the presence of any Aboriginal sites and the study area was assessed with low potential as a result; therefore no further management or mitigation is warranted.

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: No further archaeological investigations required

No Aboriginal sites, objects, or areas of archaeological potential were identified within the study area. The entire study area has been assessed as having low archaeological potential. Therefore, no further investigations are required. This recommendation is conditional upon Recommendations 2 to 4.

Recommendation 2: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the Department of Planning, Industry and Environment.

If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking the proposed development activities, the proponent must:

1. Not further harm the object.
2. Immediately cease all work at the particular location.
3. Secure the area to avoid further harm to the Aboriginal object.
4. Notify the Department of Planning, Industry and Environment as soon as practical on 131555, providing any details of the Aboriginal object and its location.
5. Not recommence any work at the particular location unless authorised in writing by the Department of Planning, Industry and Environment.

If skeletal remains are unexpectedly encountered during the activity, work must stop immediately, the area secured to prevent unauthorised access and contact made with NSW Police and the Department of Planning, Industry and Environment.

Recommendation 3: Continued consultation with the registered Aboriginal stakeholders

It is recommended that the proponent provides a copy of this final report to the Aboriginal stakeholders for their records. 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.

References

- Archaeological & Heritage Management Solutions 2012, *Wagga Wagga Base Hospital Baseline Archaeological Assessment. Report to Weir Phillips*.
- Australia ICOMOS 2013, *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance*, Australia ICOMOS, Burwood, VIC.
- Burke, H & Smith, C 2004, *The Archaeologist's Field Handbook*, Allen and Unwin, Crows Nest.
- Chen, X & McKane, D 1997, *Soil Landscapes of the Wagga Wagga 1:100 000 Sheet*, Department of Land and Water Conservation, Sydney, NSW.
- DECCW 2010a, 'Aboriginal cultural heritage consultation requirements for proponents'.
- DECCW 2010b, 'Code of practice for archaeological investigation of Aboriginal objects in New South Wales'.
- ENSR Australia Pty Ltd 2008, *Aboriginal Heritage Assessment: Integrated Oilseed Processing and Biodiesel Plant. Report to Riverina Oils and Bio Energy Pty Ltd*.
- Geological Survey of New South Wales n.d., *NSWGeologyPlus*, viewed 28 September 2018, <https://api.tiles.mapbox.com/v4/tybion.a0n6d2t9/page.html?access_token=pk.eyJ1ljoidHliaW9uliwiYSI6IkJPWkFIRGMifQ.X8c8fyJg11-BDWz3KcOQBw#12/-35.1139/147.3390>.
- Kelleher Nightingale Consulting Pty Ltd 2008, *Wagga Wagga Local Environmental Study Aboriginal Cultural Heritage Assessment*.
- Kelleher Nightingale Consulting Pty Ltd 2009, *Hume Highway Town Bypass: Tarcutta Aboriginal Cultural Heritage Cultural Heritage Assessment Report. Report to Parsons Brinckerhoff on behalf of the Roads and Traffic Authority of NSW*.
- Marquis-Kyle, P & Walker, M 1994, *The illustrated Burra Charter : making good decisions about the care of important places*, Australia ICOMOS with the assistance of the Australian Heritage Commission, Sydney.
- Murrumbidgee Catchment Authority 2008, *Wiradjuri Plant Use in the Murrumbidgee Catchment compiled by Alice Williams and Tim Sides*, Murrumbidgee Catchment Management Authority, Wagga Wagga, <https://archive.ils.nsw.gov.au/__data/assets/pdf_file/0009/495261/archive-wiradjuri-plant-use.pdf>.
- NPWS 1997, 'Aboriginal Cultural Heritage: Standards and Guidelines Kit'.
- OEH 2011, 'Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW'.
- OzArk Environmental & Heritage Management Pty Ltd 2012, *Aboriginal and Historic Heritage Assessment Wagga Wagga Levee Upgrade Project. Report to GHD Wagga Wagga on behalf of Wagga Wagga City Council*.
- OzArk Environmental & Heritage Management Pty Ltd 2018, *Aboriginal and Historic Heritage Assessment Enirgi Power Storage Consolidation Project, Bomen NSW. Report to GHD Wagga Wagga on behalf on Enirgi Power Storage Recycling*.

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

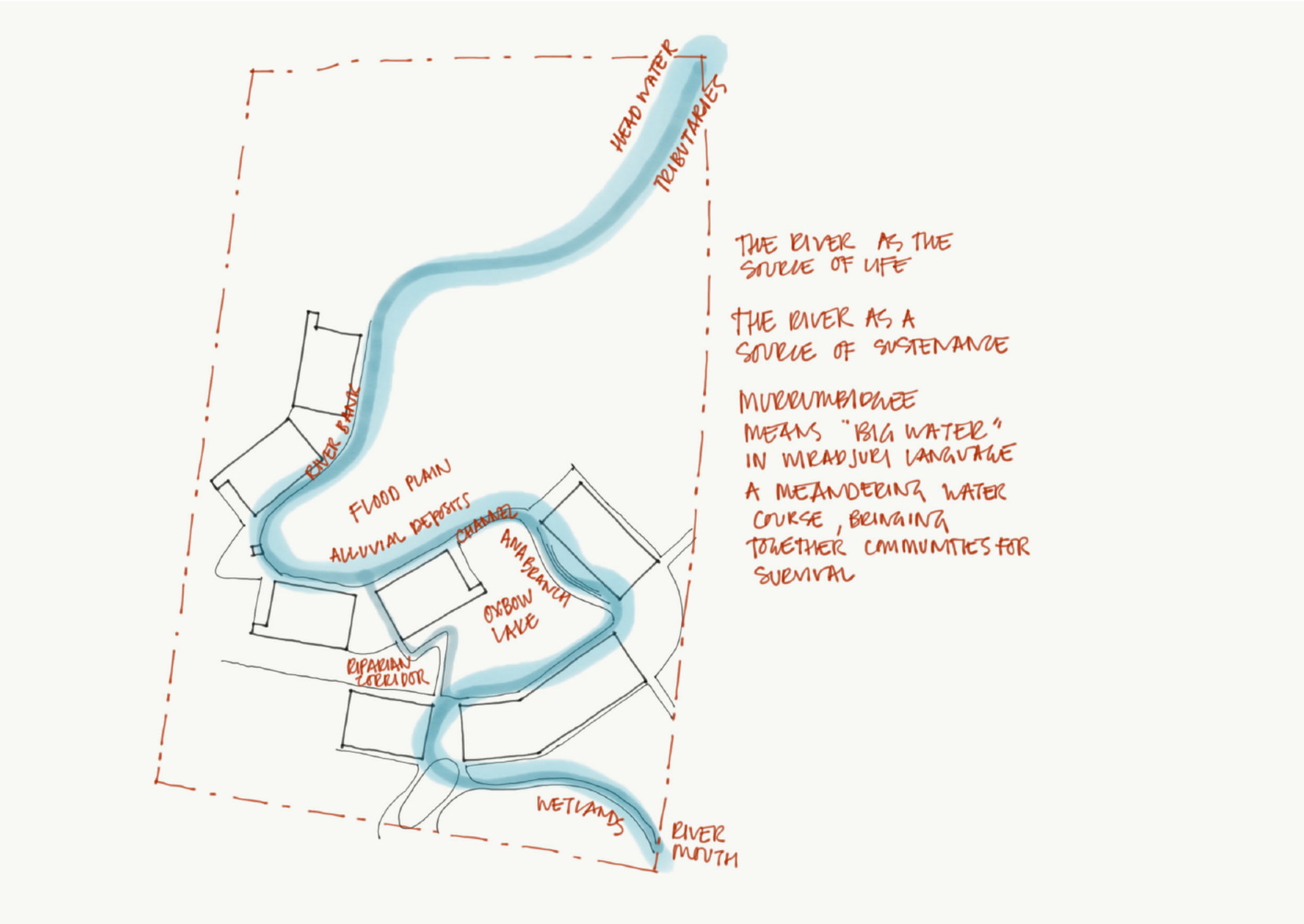
Speight, J 1998, 'Landform', in R McDonald & R Isbell (eds.), *Australian Soil and Land Survey Field Handbook*, Goanna Print, Canberra, Australia, pp.9-57.

Appendices

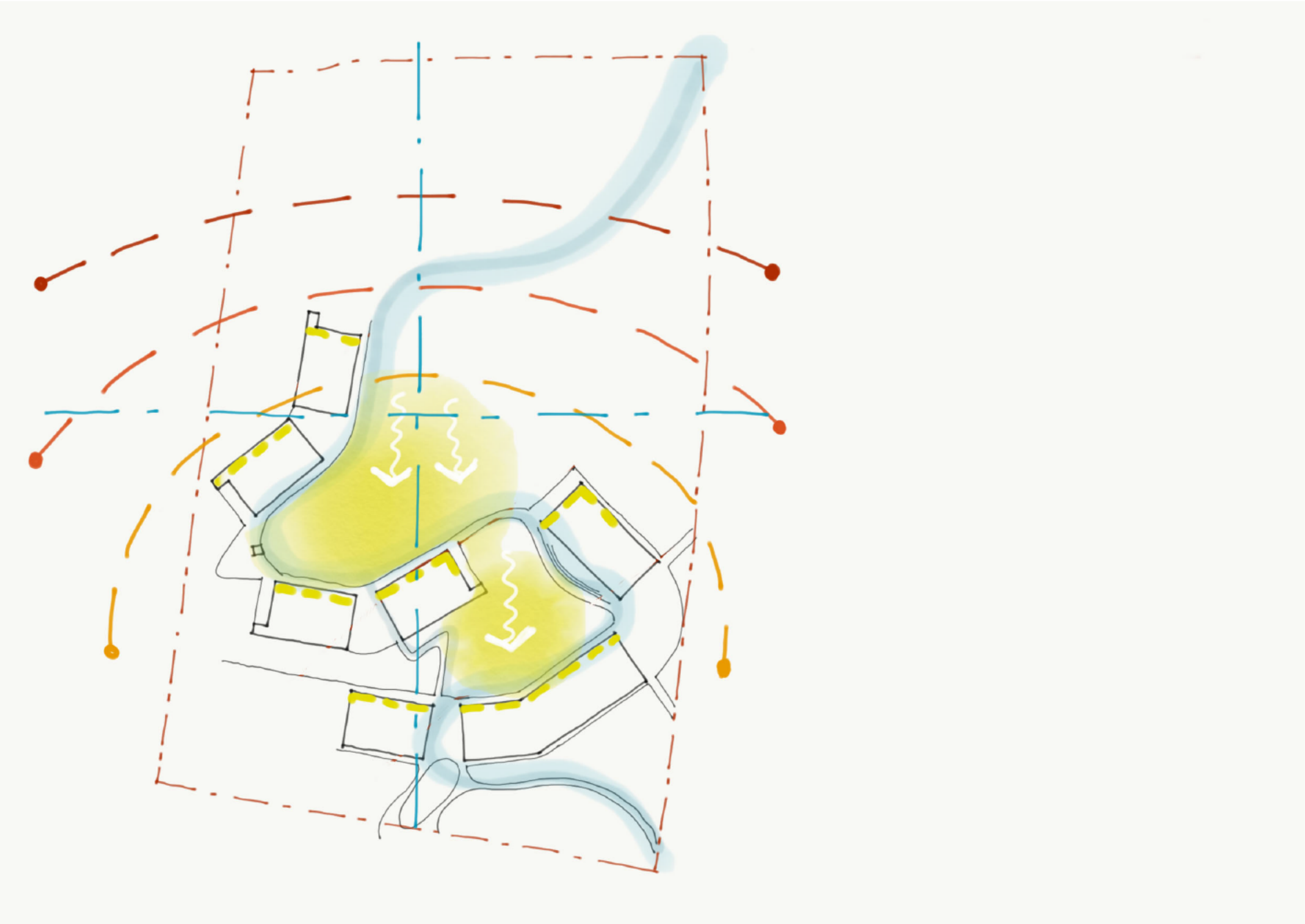
Appendix 1 AHIMS results

THE FOLLOWING APPENDIX IS NOT TO BE MADE PUBLIC

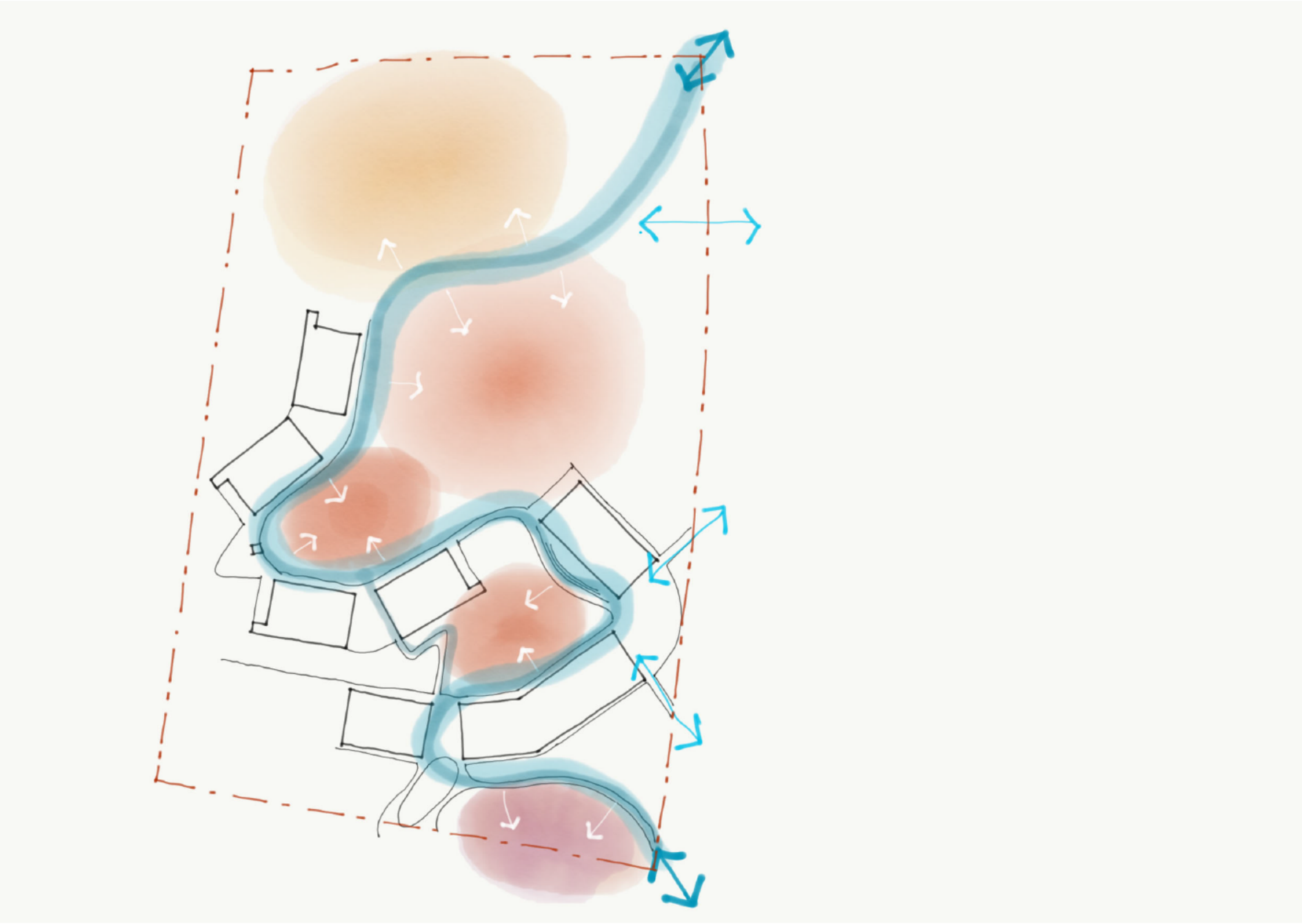
Appendix 2 Proposed development



THE RIVER NARRATIVE



ORIENTATION



DEFINING SPACES



BOUNDARY



TOPOGRAPHY

Rev	Description	Date
-----	-------------	------

hayball

Melbourne	Sydney	Brisbane
4/135 Sturt Street Southbank, VIC 3006 T +61 3 9699 3644	Ground Floor 11-17 Buckingham Street Surry Hills NSW 2010 T +61 2 9660 9329	Level 12, 324 Queen Street, Brisbane Qld 4000 T +61 7 3211 9821

ABN: 84006394201 NSW Nominated Architects Tom Jordan 7521,
Richard Leonard 7522, David Tordoff 8028

Project Title

New Primary School in Estella, Wagga Wagga

Project Address

Estella Road, Estella

Drawing Title

SITE PLANNING PRINCIPLES

Status

PRELIMINARY ISSUE

Drawn By	Checked By	Date Printed	Scale
Author	Checker	12/11/2018 3:05:44 PM	@ A1

Project No	Drawing No	Revision
2280	A00.02	



Builders/Contractors shall verify job dimensions before any job commences. Figured dimensions shall take precedence over scaled work. Work shall also conform to the specification, other drawings and job dimensions. All shop drawings shall be submitted to the Architect/Consultant and manufacture shall not commence prior to the return of inspected shop drawings signed by the Architect/Consultant. © Copyright 2008 All rights reserved



- NOTE: REFER TO LANDSCAPE PLAN FOR SITESWORKS MATERIALS + FINISHES
- SITE BOUNDARY
 - ⊙ NOTABLE TREES TO BE RETAINED WITH TREE PROTECTION ZONES, AS INDICATED T1 - T8 (BLOCK A)
 - NEW TREE
 - ASPHALT
 - CONCRETE PAVEMENT

Rev	Description	Date
-----	-------------	------



Melbourne	Sydney	Brisbane
4/135 Sturt Street Southbank, VIC 3008 T +61 3 9699 3644	Ground Floor 11-17 Buckingham Street Surry Hills NSW 2010 T +61 2 9660 9329	Level 12, 324 Queen Street, Brisbane Qld 4000 T +61 7 3211 9821

ABN: 84006394261 NSW Nominated Architects Tom Jordan 7521,
Richard Leonard 7522, David Tordoff 8028

Project Title

New Primary School in Estella, Wagga Wagga

Project Address

Estella Road, Estella

Drawing Title

PROPOSED SITE PLAN

Status

PRELIMINARY ISSUE

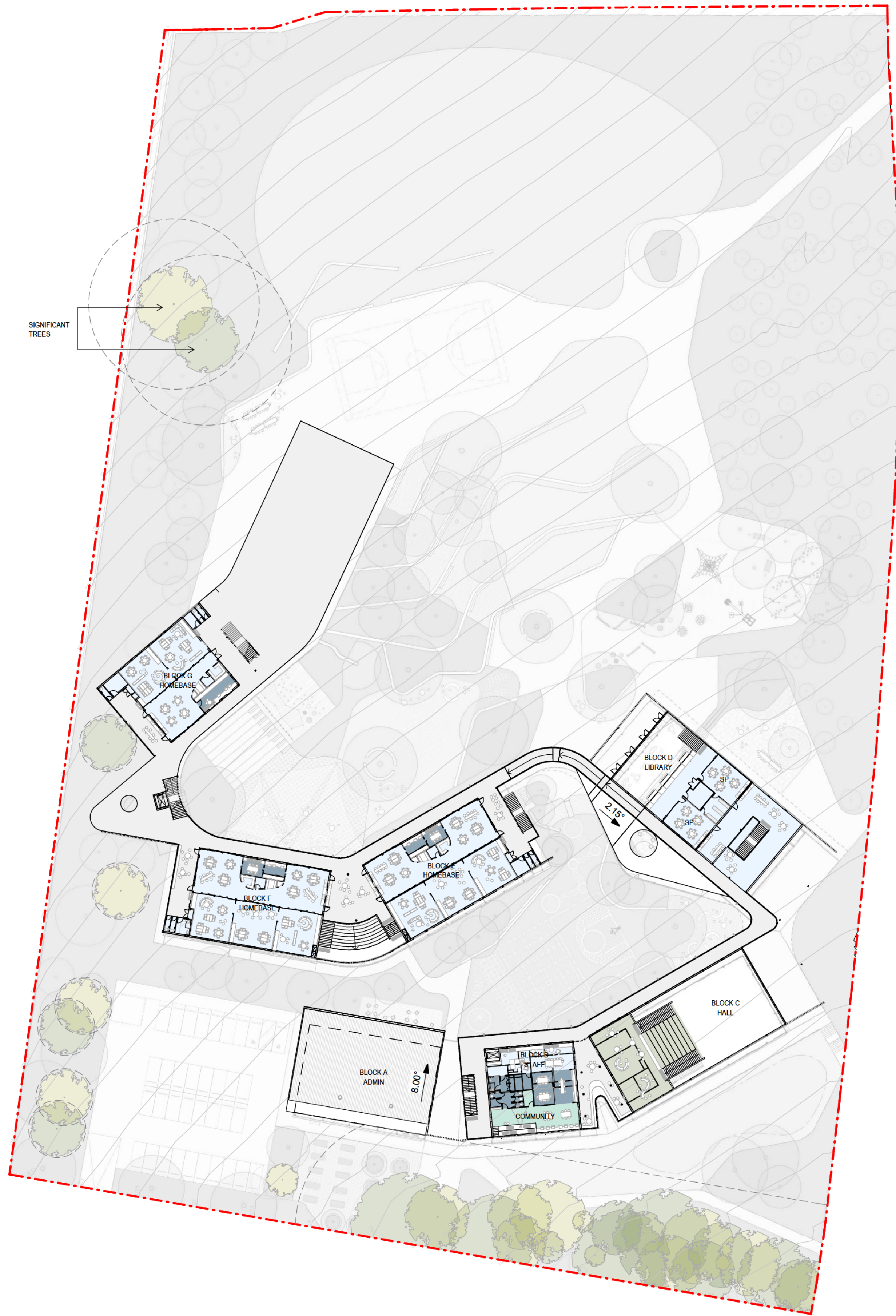
Drawn By	Checked By	Date Printed	Scale
Author	Checker	12/11/2018 3:06:33 PM	1 : 500@ A1

Project No	Drawing No	Revision
2280	A00.04	

Builders/Contractors shall verify job dimensions before any job commences. Figured dimensions shall take precedence over scaled work. Work shall also conform to the specification, other drawings and job dimensions. All shop drawings shall be submitted to the Architect/Consultant and manufacture shall not commence prior to the return of inspected shop drawings signed by the Architect/Consultant. © Copyright 2008 All rights reserved



1 PRECINCT PLAN - GROUND
1 : 500



2 PRECINCT PLAN - LEVEL 1
1 : 500

- COUNCIL JOINT USE
- COUNCIL SHARED USE
- CSU JOINT USE
- CSU SHARED USE
- SCHOOL

Rev	Description	Date
-----	-------------	------



Melbourne	Sydney	Brisbane
4/135 Sturt Street Southbank, VIC 3008 T +61 3 9699 3644	Ground Floor 11-17 Buckingham Street Surry Hills NSW 2010 T +61 2 9660 9329	Level 12, 324 Queen Street, Brisbane Qld 4000 T +61 7 3211 9821

AEN: 84006394201 NSW Nominated Architects Tom Jordan 7521,
Richard Leonard 7522, David Tordoff 8028

Project Title

New Primary School in Estella, Wagga
Wagga

Project Address

Estella Road, Estella

Drawing Title

PRECINCT PLANS - GROUND
FLOOR AND LEVEL 1

Status

PRELIMINARY ISSUE

Drawn By	Checked By	Date Printed	Scale
Author	Checker	12/11/2018 3:08:00 PM	1 : 500@ A1

Project No	Drawing No	Revision
2280	A00.05	

Builders/Contractors shall verify job dimensions before any job commences. Figured dimensions shall take precedence over scaled work. Work shall also conform to the specification, other drawings and job dimensions. All shop drawings shall be submitted to the Architect/Consultant and manufacture shall not commence prior to the return of inspected shop drawings signed by the Architect/Consultant. © Copyright 2008 All rights reserved



1 PRECINCT PLAN - LEVEL 2
1 : 500



2 PRECINCT PLAN - ROOF
1 : 500

- COUNCIL JOINT USE
- COUNCIL SHARED USE
- CSU JOINT USE
- CSU SHARED USE
- SCHOOL

Rev	Description	Date
-----	-------------	------



Melbourne	Sydney	Brisbane
4/135 Sturt Street Southbank, VIC 3008 T +61 3 9699 3644	Ground Floor 11-17 Buckingham Street Surry Hills NSW 2010 T +61 2 9660 9329	Level 12, 324 Queen Street, Brisbane Qld 4000 T +61 7 3211 9821

ABN: 84006394201 NSW Nominated Architects Tom Jordan 7521,
Richard Leonard 7522, David Tordoff 8028

Project Title

New Primary School in Estella, Wagga
Wagga

Project Address

Estella Road, Estella

Drawing Title

PRECINCT PLANS - LEVEL 2 AND
ROOF

Status

PRELIMINARY ISSUE

Drawn By	Checked By	Date Printed	Scale
Author	Checker	12/11/2018 3:08:29 PM	1 : 500@ A1

Project No	Drawing No	Revision
2280	A00.06	

Builders/Contractors shall verify job dimensions before any job commences. Figured dimensions shall take precedence over scaled work. Work shall also conform to the specification, other drawings and job dimensions. All shop drawings shall be submitted to the Architect/Consultant and manufacture shall not commence prior to the return of inspected shop drawings signed by the Architect/Consultant. © Copyright 2008 All rights reserved