Calala Battery Energy Storage System, Calala (SSD – 52786213): Archaeological Report

FINAL REPORT

Prepared for Equis Energy (Australia) Projects (NGUMI4) Pty Ltd (ACN: 657 590 175) as trustee for the Equis Energy (Australia) Ngumi 4 Asset Trust

25 July 2023

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- Mecone: Gannon Cuneo.
- Registered Aboriginal Parties.

Biosis staff involved in this project were:

- Mathew Smith, Nathan Windram and Bronte Baonza (assistance in the field), and Jenny Beckius (mapping).

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Glossary

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AR	Archaeological Report
AC	Alternating Current
BESS	Battery Energy Storage System
Biosis	Biosis Pty Ltd
CBD	Central Business District
CHMP	Cultural Heritage Management Plan
Consultation requirements	*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*
DA	Development Application
DC	Direct Current
DECCW	Department of Environment, Climate Change and Water (now Heritage NSW)
DP	Deposited Plan
EP&A Act	*Environmental Planning and Assessment Act 1979*
Equis Australia	Equis Energy (Australia) Projects (NGUMI4) Pty Ltd (ACN: 657 590 175) as trustee for the Equis Energy (Australia) Ngumi 4 Asset Trust
GPS	Global Positioning System
GSV	Ground Surface Visibility
Heritage Act	*Heritage Act 1977*
Heritage NSW	Heritage NSW, Department of Planning and Environment
ICOMOS	International Council on Monuments and Sites
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
MW	Megawatts
MWh	Megawatt hours
MGA	Map Grid of Australia
NPW Act	*National Parks and Wildlife Act 1974*

NPWS	National Parks and Wildlife Service
NSW	New South Wales
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
SEARs	Secretary Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
Study area	Lot 17 DP 629969 (57 Burgess Lane and also known as 474 Calala Lane, Calala) –BESS footprint; underground transmission cable corridor will run from the BESS at Lot 17 DP 629969 then along: Lot 16 DP 629969, Lot 3 DP 244399, Lot 4 DP 244399, underneath Burgess Lane and then connects to the substation on Lot 6 DP 219993
the Code	*Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*

Summary

Biosis Pty Ltd (Biosis) was commissioned by Equis Energy (Australia) Projects (NGUMI4) Pty Ltd (ACN: 657 590 175) as trustee for the Equis Energy (Australia) Ngumi 4 Asset Trust (Equis Australia) to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed Battery Energy Storage System (BESS) at Lot 17 DP 629969 (57 Burgess Lane and also known as 474 Calala Lane, Calala) –BESS footprint; underground transmission cable corridor will run from the BESS at Lot 17 DP 629969 then along: Lot 16 DP 629969, Lot 3 DP 244399, Lot 4 DP 244399, underneath Burgess Lane and then connects to the substation on Lot 6 DP 219993, Calala, New South Wales (NSW) (the study area). 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 project is to be assessed as a State Significant Development (SSD) (SSD-52786213) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *State Environmental Planning Policy (Planning Systems) 2021* (SEPP). The Secretary Environmental Assessment Requirements (SEARs) (30 January 2023) state that impacts to Aboriginal cultural heritage must be assessed.

The Calala BESS project will include:

- The construction and operation of a BESS with an estimated capacity of up to 300 Megawatts (MW) / 1200 Megawatt hours (MWh).
- Associated infrastructure, including underground grid connection to the Tamworth 330kV substation.

The study area is located approximately 2 kilometres south-east of Calala, and approximately 6 kilometres south-east of the Tamworth central business district (CBD).

There are 106 Aboriginal cultural heritage sites registered with the Aboriginal Heritage Information Management System (AHIMS) register, within an 8.5 kilometres search area (Client Service ID: 790674; 13 June 2023). None of these registered sites are located *within* the study area. The most common site types include artefacts and modified trees.

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).

An initial archaeological survey of the study area was undertaken on 16 August 2022 by Anthea Vella (Biosis, Heritage Consultant); an additional survey was undertaken on 13 December 2022 by Mathew Smith (Biosis, Senior Heritage Consultant), Nathan Windram (Biosis, Graduate Heritage Consultant), and Donny Fermor (Tamworth Local Aboriginal Land Council (LALC), Cultural Sites Officer); and a second additional survey was undertaken on 15 June 2023 by Anthea Vella and Bronte Baonza (Biosis, Graduate Heritage Consultant). No previously unrecorded Aboriginal cultural heritage sites or areas of (archaeological) sensitivity were identified during either survey. Due to the high levels of disturbance identified combined with a lack of suitable landforms it was determined that there is low potential for Aboriginal sites to be present within the study area.

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

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practice, widely considered to include:
  - 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 assessment is required in areas of low potential

No further archaeological work is required in the study area due to the entire study area being assessed as having low archaeological potential. This recommendation is conditional upon Recommendation 2 to 6.

Recommendation 2: Continued consultation with the registered Aboriginal stakeholders

As per the consultation requirements, it is recommended that the proponent provides a copy of this report to the Aboriginal stakeholders 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 3: Heritage induction

Heritage inductions and the inclusion of an unexpected finds procedure should be prepared. These should be provided to all site workers and contractors in order to prevent any unintentional harm to unexpected finds and Aboriginal sites located outside of the study area. This includes the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

Recommendation 4: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW, Department of Planning and Environment (Heritage NSW). Should any unanticipated 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 5: Discovery of unanticipated historical relics

Relics are historical archaeological resources of local or State significance and are protected in NSW under the *Heritage Act 1977* (Heritage Act). Relics cannot be disturbed except with a permit or exception notification. Should unanticipated relics be discovered during the course of the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.

Recommendation 6: Discovery of human remains

If any suspected human remains are discovered during any activity you must:

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

1 Introduction

1.1 Project background

Biosis was commissioned by Equis Australia to undertake an ACHA for the proposed BESS at Lot 17 DP 629969 (57 Burgess Lane and also known as 474 Calala Lane, Calala) –BESS footprint; underground transmission cable corridor will run from the BESS at Lot 17 DP 629969 then along: Lot 16 DP 629969, Lot 3 DP 244399, Lot 4 DP 244399, underneath Burgess Lane and then connects to the substation on Lot 6 DP 219993, Calala NSW (the study area) (Figure 1). The project is to be assessed as an SSD (SSD-52786213) under Part 4 of the EP&A Act and the Planning Systems SEPP. This AR documents the findings of the archaeological investigations conducted as part of the ACHA. The AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

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

1.2 Response to project SEARs requirements

This AR has been prepared in response to the SEARs requirements (SSD-52786213) (30 January 2023) (Table 1). The AR has been prepared in accordance with the Code, consultation requirements and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

Table 1 Response to project SEARs requirements

General requirement	Issue and Assessment requirements	Section of report responding to SEARs
Heritage	• An assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010), including results of archaeological test excavations (if required). • Evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the	Sections 2, 3, 4, 5, 6, 7 of this report, and the ACHA.

General requirement	Issue and Assessment requirements	Section of report responding to SEARs
	Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010).	

1.3 Study area

The study area is located across several lots and also includes Burgmanns Lane (Table 2, see Section 2). It is approximately 2 kilometres south-east of Calala, and approximately 6 kilometres south-east of the Tamworth CBD (Figure 1). The total size of the site area is approximately 36 hectares, with the footprint of the facility covering a total of 8.9 hectares (**note - this figure relates to the footprint of the BESS only and excludes any easements and underground transmission lines). The land is currently zoned as RU4: Primary Production Small Lots.

Table 2 Location of the study area

Proposed work	Lot and DP
BESS footprint	Lot 17 DP 629969
Underground transmission cable corridor	The underground transmission cable corridor will run from the BESS at Lot 17 DP 629969 then along: • Lot 16 DP 629969 • Lot 3 DP244399 • Lot 4 DP244399 • Underneath Burgess Lane • Connecting to the substation – Lot 6 DP219993 The final transmission alignment is aligned with Burgmanns Lane boundary.

The study area is within the:

- Tamworth LGA
- Parish of Calala
- County of Parry (Figure 2).

The study area is bounded by private property fronts Calala Lane and Burgess Lane, and also includes part of Burgess Lane and Burgmanns Lane.

1.4 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:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NPW Act.
- NSW *National Parks and Wildlife Amendment Act 2010.*
- Infrastructure State Environmental Planning Policy (SEPP) 2007.
- SEPP (Planning Systems) 2021.

- Tamworth Regional LEP 2010.
- *Tamworth Regional Development Control Plan 2010*.

1.5 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 Tamworth 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.

1.6 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 3.

Table 3 Investigators and contributors

Name and qualifications	Experience summary	Project role
Maggie Butcher BSc/BA (Hons)	Maggie is a Senior Heritage Consultant and artefact specialist who has been practicing full time since 2015. Maggie has had experience working as an archaeologist on a number of European and Aboriginal heritage projects across NSW and report writing.	• Quality assurance
Mathew Smith BA/BSc (Hons)	Mathew is a Senior Heritage Consultant with over six years of experience in consulting and has successfully completed numerous projects throughout NSW. Mathew has extensive experience in undertaking Aboriginal	• Quality assurance • Technical advice • Survey

Name and qualifications	Experience summary	Project role
	archaeological assessments, archaeological surveys, and large scale archaeological testing and salvage excavation programs across NSW. Mathew has participated in and managed a number of long term archaeological programs and is an expert lithic analyst.	
Anthea Vella B.Arch, M.AHM	Anthea is a Heritage Consultant with over 5 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 • Survey • Reporting
Ashley Bridge BA Archaeology, MArchSci (Advanced)	Ashley is a Heritage Consultant with 5 years' experience. She has experience in conducting Aboriginal and historical heritage assessments, surveys and archaeological test excavations for a variety of projects throughout NSW, particularly in the Sydney region. Ashley possesses specialist skills in the identification of human remains, while also having experience in zooarchaeological analysis. She also has experience in project management for a number of Aboriginal heritage projects, including test excavations, throughout Sydney and Western Sydney.	• Background research • Reporting
Crystal Garabedian BA (Hons)/BSc	Crystal joined Biosis in the Sydney office in 2021 as a Heritage Research Assistant and is now a Heritage Consultant. She has experience in conducting archaeological surveys, test excavations, Aboriginal consultation and desktop assessments for a variety of projects throughout NSW.	• Aboriginal community consultation
Nathan Windram BA	Nathan joined Biosis in the Wollongong office in 2022 as a Graduate Heritage Consultant. Nathan has experience in Aboriginal community consultation, surveys, salvage and test excavation sites for a variety of projects in NSW.	• Survey

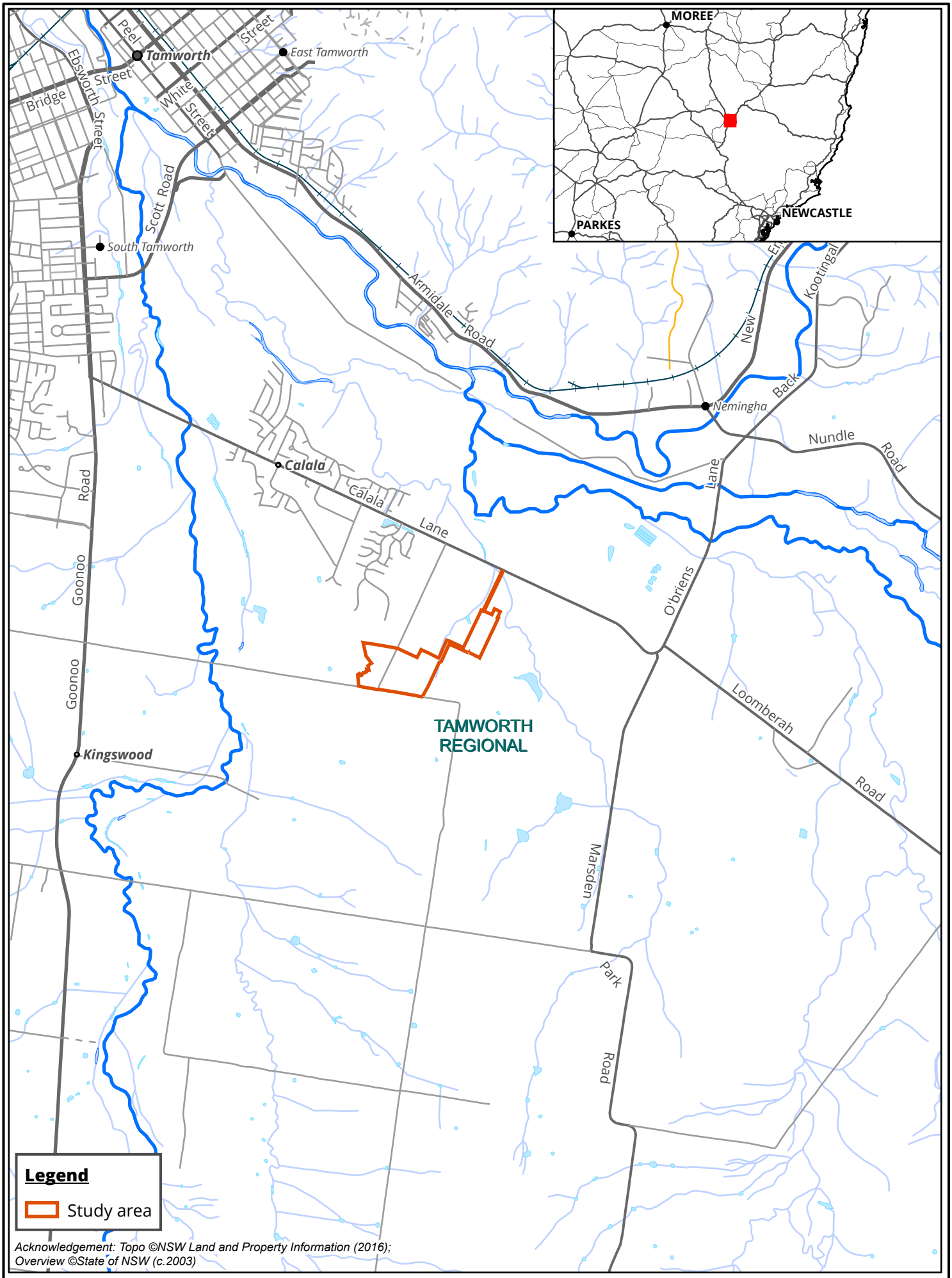

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Figure 1 Location of the study area

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Date: 20 July 2023,
Drawn by: JB, Checked by: AB, Last edited by: jbeckius
Location:P:\37800s\37807\Mapping\
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0 400 800 1,200 1,600 2,000
Metres
Scale 1:50,000@ A4, GDA 1994 MGA Zone 56

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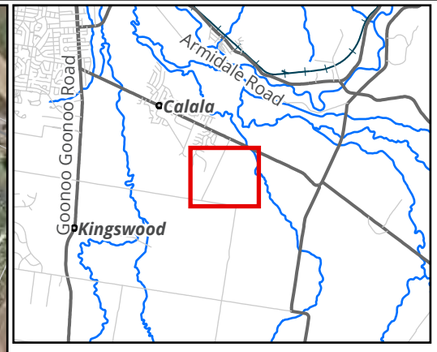

Legend

- Study area
- Lot

Figure 2 Study area detail

0 50 100 150 200

Metres

Scale: 1:5,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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Matter: 37807, Date: 20 July 2023,
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2 Proposed development

Equis Australia are proposing to develop a large-scale BESS within the study area (Photo 1 and Figure 3). The project involves the construction and operation of a large-scale BESS at Calala, NSW. The BESS will have a capacity up to 300 MW and would provide up to 1200 MWh of battery storage capacity or up to 4 hours of storage duration. The proposal will comprise the following:

- Large-scale BESS including battery enclosures, inverters, direct current (DC) and alternating current (AC) combiner boxes, transformers and auxiliary components.
- 33/330 kV switchyard.
- Underground transmission line connection between the BESS and the nearby TransGrid Tamworth 330 kV substation.
- Ancillary elements including site access from Calala Lane, internal access roads and parking, control room and staff amenities, warehouse, stormwater and fire management infrastructure, utilities, signage, fencing, security systems, four and five meter high noise attenuation wall and landscaping.

The final transmission alignment is aligned with Burgmanns Lane boundary. Therefore this assessment has assessed the entire study area.

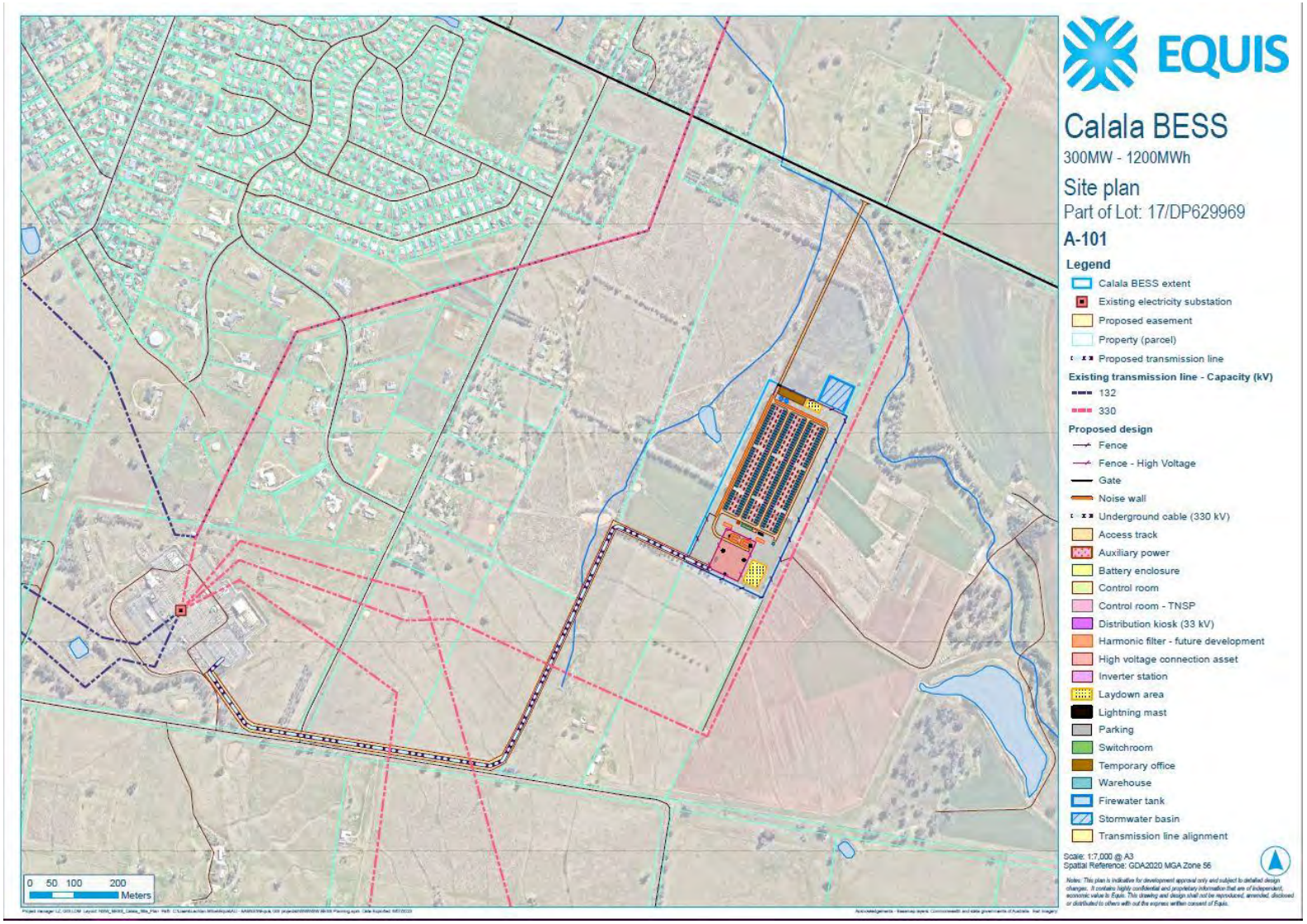
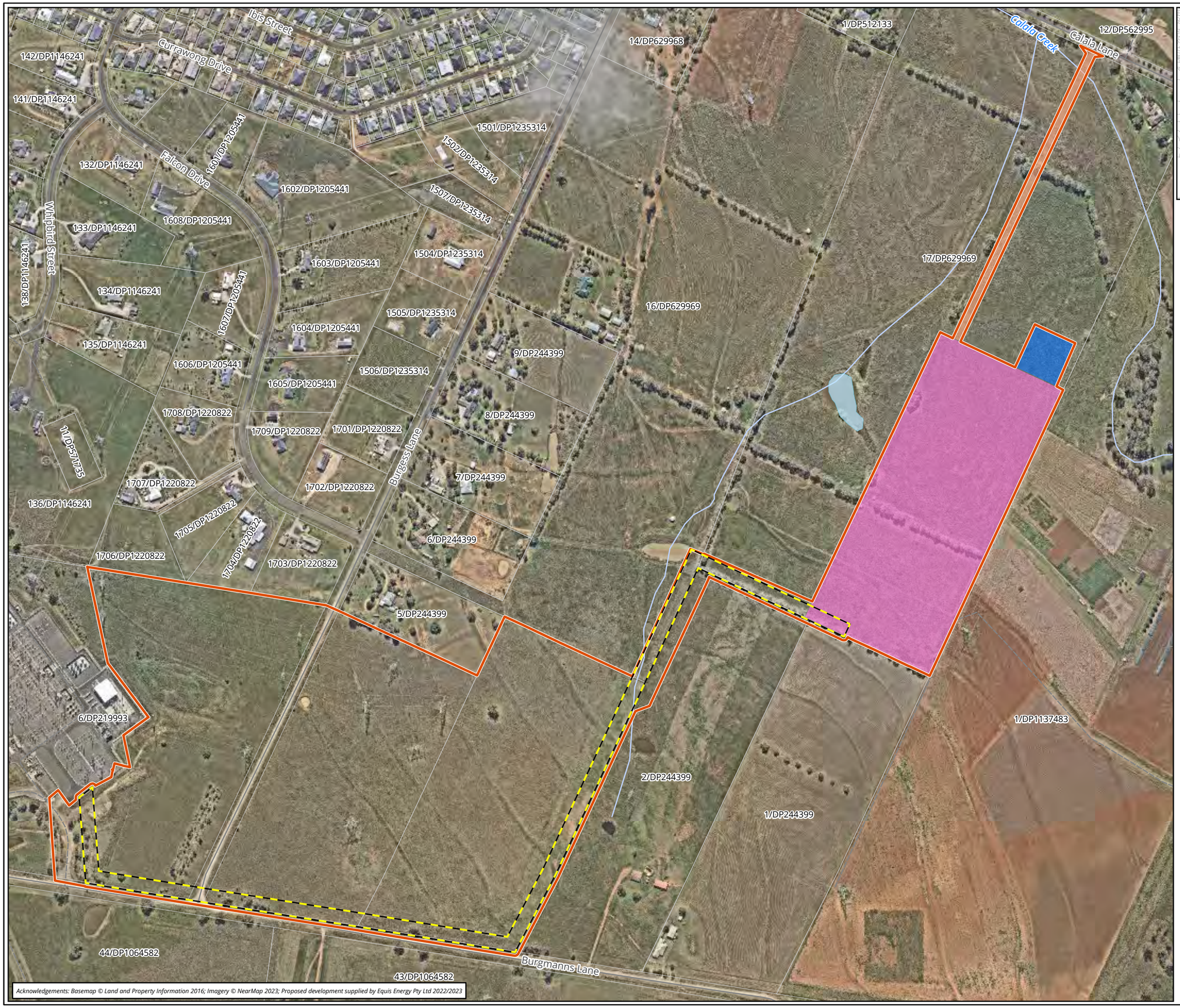
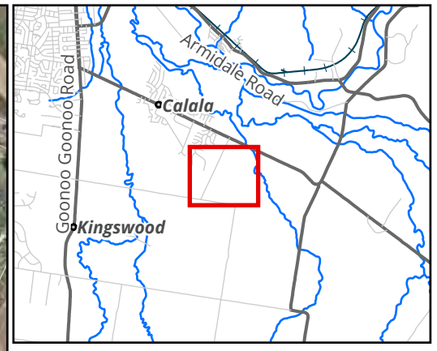


Photo 1 Site plan (Source: Equis Australia, 2023)





Legend

- Study area
- Lot

Proposed development

- BESS Footprint
- Access track
- Stormwater basin
- Transmission line

Figure 3 Proposed development

0 50 100 150 200

Metres

Scale: 1:5,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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3 Desktop assessment

The desktop assessment involves researching and reviewing existing archaeological studies and reports relevant to the study area and 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 study area contains two geological units, the Mandowa Mudstones (within the Devonian unit), and Noumea beds (Figure 4). The Mandowa Mudstones includes lithic formations of arenite, polymictic conglomerate, greywacke and mudstone. They are grey, thinly bedded, laminated and massive mudstone with subordinate, thin siltstone and fine sandstone. The Noumea beds includes interbedded massive and andesitic lithic wacke, pebbly wacke, laminated siltstone and mudstone (Geoscience Australia 2022).

The topography of the study area consists of extensive rolling to undulating hills, radiating from the north-eastern corner to the south-western corner (Figure 5). Part of the study area broadly slopes towards the south-west (within part of Lot 6 DP 219993).

Stream order is recognised as a factor which aids in the development of predictive modelling for Aboriginal archaeology. Predictive models which have been developed for the region have a tendency to favour permanent water courses as the locations of complex sites that have been continuously occupied. These sites 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. This correlation between strahler order and site complexity is confirmed via predictive modelling completed in the Tamworth locality (Wilson & McAdam 2000, AREA Environmental Consultants & Communications Pty Ltd 2019).

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 2. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

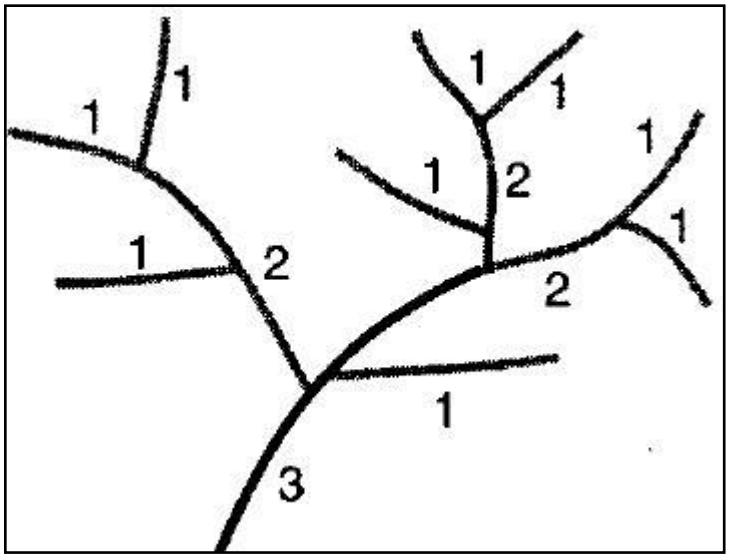


Photo 2 Diagram showing Strahler stream order (Ritter et al. 1995, p.151)

The study area contains to two creek lines; Calala Creek, a second order non-perennial watercourse located in the northern portion and a first order, non- perennial tributary of Calala Creek, located in the central portion (Figure 5). A large man made dam is present directly adjacent to the north-western corner of the study area, coming off of the tributary of Calala Creek. The study area is also approximately 1.1 kilometres south of Peel River, a seventh order perennial watercourse, and Goonoo Creek, a seventh order perennial watercourse is also located approximately 1.2 kilometres west.

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.

Soils within the study area are contained within three soil landscapes, Duri, Warral Station, and Fullwoods Hill (Figure 6). The Duri soil landscape consists of extensive rolling to undulating hills and low hills. It is an extremely complex landscape due to rapid changes in underlying lithology (Banks 2001, p.33). Generally, soil within this landscape comprise of moderately deep, moderately well-drained red and brown chromosols, with minor occurrences of shallow, very well-drained rudosols around rock outcrops (Banks 2001, p.33). Deep, imperfectly drained red clays and deep to very deep, imperfectly drained non-calcic brown soils occur along drainage lines and on sodic bedrock. This soil landscape has a long history of cropping and features extensive sheet erosion, with topsoils likely to have been removed. The Duri soil landscape characteristics are described below in Table 4. Soil erosion is an issue with areas utilised for cropping or grazing, suggesting that artefact bearing deposits if present, are likely to be highly disturbed as a result.

Archaeological assessments conducted by Everick Heritage within the Duri landscape led to the location of a small site containing 3 silcrete artefacts between 50-150 millimetres below the surface (AHIMS 29-2-0412 / Barnes Gully 1). Testing indicated the culturally sterile clay layer to be present between 100-200 millimetres from the surface. Soils were found to be unable to retain in situ artefacts and sites, particularly in areas impacted by historic tilling and pasture improvement due to disturbances of shallow soils (Everick Heritage 2021, p.54, 62).

Table 4 Duri soil landscape characteristics (Banks 2001, pp.33–34)

Soil landscape	Description
du1 – Hard setting brown clay loam (A1 horizons)	Reddish brown to brown (5YR 4/4 to 7.5YR 3/4 to 5/4, occasionally 4/6) sandy clay loam to silty clay loam (clay loam dominant); predominantly massive, earthy, occasionally weak pedality, polyhedral (2 to 5 millimetres) smooth-faced peds; field pH 5.5 to 7.0; gravels and fine gravels absent to common (0 to 20%); some localities have few small manganiferous nodules.
du2—Structured heavy clay topsoils (A1 horizons)	Dark reddish brown to dark brown (5YR 3/4 to 7.5YR 3/4) light to heavy clay; strong pedality with polyhedral (2 to 5 millimetres) to angular blocky (10 to 20 millimetres) smooth-faced peds; field pH 6.0 to 8.0; fine gravels absent to many (0 to 50%).
du3—Bleached silty clay (A2, A2e horizons)	Yellowish red (5YR 5/6) (dry: bleached (5YR 6/4)) silty clay; massive, earthy; field pH 7.0.
du4—Brown light to medium clay (B1, B2, B22 and BC horizons)	Dark brown to dark yellowish brown (7.5YR 3/4 to 10YR 4/6) light to medium clay; weak to strong pedality with sub-angular to angular blocky (5 to 50 millimetres) smooth-faced peds; field pH 6.0 to 8.0; gravels and fine gravels very few to abundant (<2 to 90%).
du5—Red medium heavy clay (B2, B22 horizons)	Dark reddish brown to yellowish red (2.5YR 3/4 to 5YR 5/6) light to heavy clay; strong pedality with angular blocky, occasionally prismatic (10 to 50 millimetres) smooth-faced peds; field pH 6.0 to 7.0; gravels common to many (10 to 50%), fine gravels and cobbles very few (<2%); some localities have very few to few (<2 to 10%) manganiferous nodules.
du6—Red heavy clay (B2 horizon)	Yellowish red (5YR 3/6) heavy clay; strong pedality with prismatic (100 to 200 millimetres) smooth-faced peds; field pH 8.5; gravels and fine gravels very few to few (<2 to 10%).

The Warral Station soil landscape is a transferral landscape and is located on drainage plains, alluvial plains and fans. Soils across this landscape are diverse and are virtually random in distribution according to stream deposition patterns. Individual soil types are normally locally extensive (over hundreds of metres), but some areas are more variable. Soil types included in this landscape range from very deep, moderately well-drained loam to clay; to very deep, poorly drained clays and very deep, imperfectly drained clay (Banks 2001, p.176). The Warral Station soil landscape characteristics are described below in Table 5. This soil landscape does feature erodibility and erosion in areas of cropping or grazing. As such, areas which have been subject to higher levels of disturbance via these activities are likely to contain shallowed profiles and not be suitable for artefact retention.

Table 5 Warral Station soil landscape characteristics (Banks 2001, pp.177–178)

Soil landscape	Description
ws1—Hardsetting loamy topsoils (A1 horizons, Ap horizons)	Dark brown to brown (7.5YR 3/2 to 4/4) and very dark greyish brown to brown (10YR 3/2 to 3/3) clay loam, sandy to silty clay loam and silty clay; massive, earthy; weak to moderate pedality, crumb (2 to 5 mm) polyhedral (2 to 5 millimetres) and angular blocky (20 to 50 millimetres) smooth-faced peds; field pH 5.5 to 7.0.
ws2—Clay topsoils (A1, ABk horizons)	Very dark greyish brown to dark brown and brown (10YR 3/2 to 3/3 and 7.5YR 3/3 to 4/3) clay loam and silty clay loam to medium heavy clay and medium silty clay; strong pedality, polyhedral (<2 – 20 millimetres) smooth-faced peds; absent to common (0 to 20%) fine gravels; some localities have very few (<2%) calcareous nodules; field pH 6.0 to 9.6.

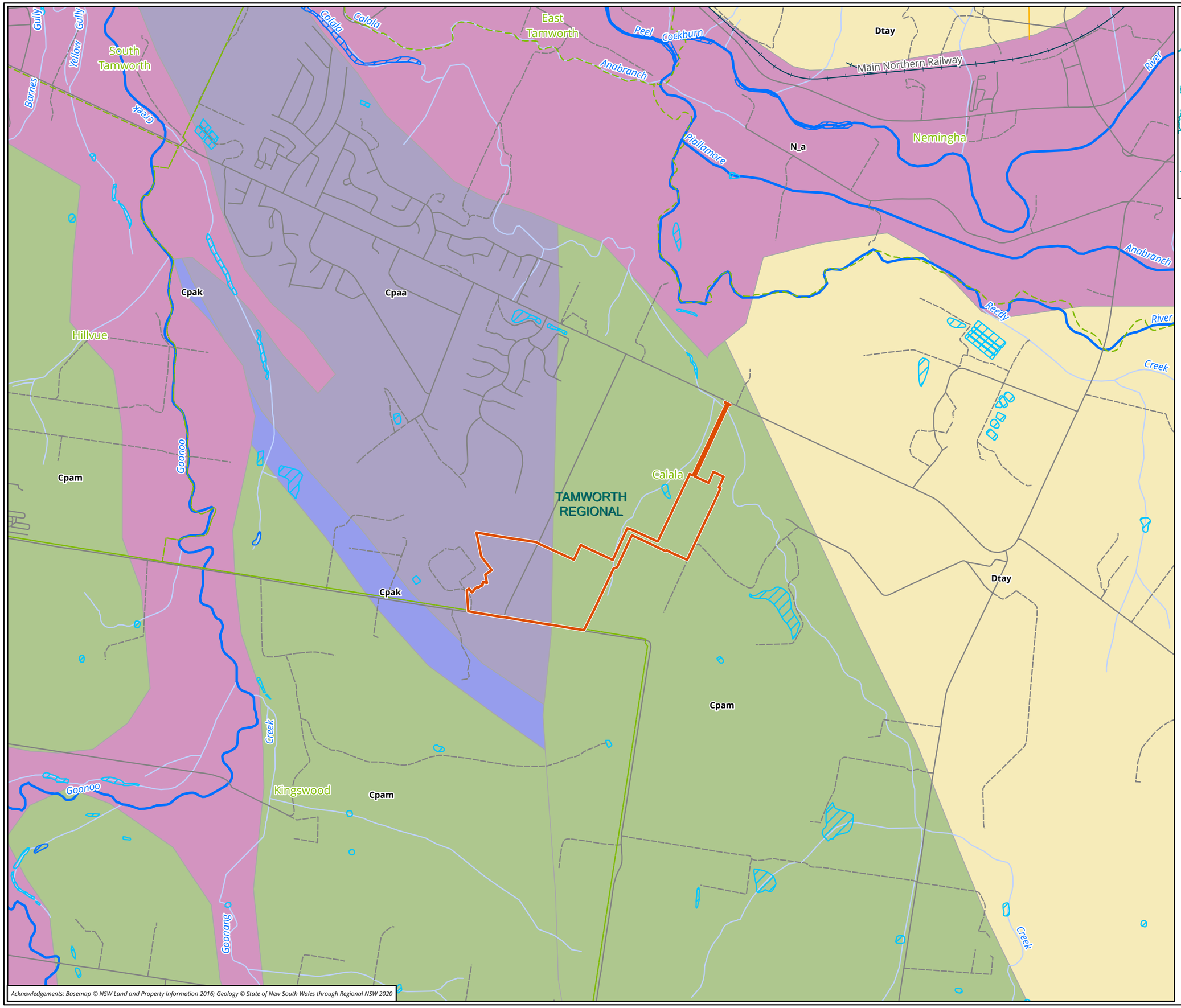
Soil landscape	Description
ws3—Clayey Red topsoil (A1 horizon)	Yellowish red (5YR 4/6) medium clay; strong pedality, angular blocky (20 to 50 mm) smooth-faced peds; field pH 6.0.
ws4—Bleached A2 horizons (A2e horizons)	Brown to light grey (10YR 4/3 to 7/2) (dry colours bleached) silty loam to silty clay loam and clay loam, sandy; massive, earthy; occasionally moderately pedal, polyhedral (2 to 5 millimetres) smooth-faced peds; very few to few (<2 to 10%) gravels; field pH 5.5 to 6.5.
ws5—Highly structured Euchrozem subsoils (A2, B2, 2B2, 3B2 horizons)	Yellowish red (5YR 3/6 to 5/8) light to light medium clay; strong pedality, polyhedral to angular blocky (5 to 50 millimetres) smooth-faced peds; absent to abundant (0 to 90%) fine gravels; field pH 6.5 to 8.5.
ws6—Cracking clay subsoil (B2 horizons)	Brown (7.5YR 4/3 and 10YR 4/3) medium heavy to heavy clay; strong pedality, prismatic (100 to 500 millimetres) smooth-faced peds; many to abundant (20 to 90%) fine gravels; field pH 9.5.
ws7—Red-brown earth and Solodic subsoils (B1, B2, B21, B22, B23, 2B2 b, 3B2 b, 2B2 k, 2D horizons)	Black (7.5YR 2/1), dark brown (7.5YR 3/2 to 3/3 and 10YR 3/3), brown (7.5YR 4/3 to 4/4 and 10YR 4/3), strong brown (7.5YR 4/6 to 5/8) and yellowish brown (10YR 4/6 to 5/8) medium to heavy clay; strong pedality, lenticular (5 to >500 millimetres), prismatic (10 to 500 millimetres) and angular blocky (10 to 50 millimetres) smooth-faced peds; few to abundant (2 to 90%) gravels and fine gravels; in some localities, few to common (2 to 20%) calcareous nodules and very few (<2%) manganiferous nodules.

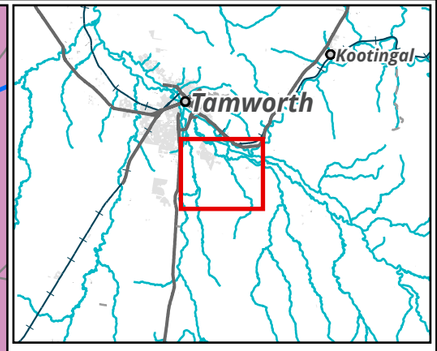
The Fullwoods Hill soil landscape is an erosional landscape located on rocky crests and steeper sideslopes of hills and low hills. This soil landscape is a steeper and rockier version of the Duri soil landscape described above (Banks 2001, p.86). The Fullwoods Hill soil landscape characteristics are described below in Table 6. Sheet erosion is common across this soil landscape, with shallow soils present across some locations. Artefacts within this landscape are likely to become displaced from their original context due to these erosional mechanisms.

Table 6 Fullwoods Hill soil landscape characteristics (Banks 2001, p.87)

Soil landscape	Description
fh 1—Hardsetting silty loam topsoil (A1, A2 horizons)	Very dark brown to brown (10YR 2/3 to 5/3) (dry colours bleached (10YR 6/3)); massive, earthy; field pH 6.5; few (2 to 10%) cobbles and common to many (10 to 50%) coarse gravels.
fh 2—Hardsetting structured clay loam topsoils (A1 horizons)	Dark reddish brown (5YR 3/3) and dark brown to brown (7.5YR 3/3 to 4/4) clay loam to silty clay loam; massive to weak pedality, sub-angular blocky (2 to 10 millimetres) smooth-faced peds; field pH 6.0 to 7.0.
fh 3—Seasonal cracking silty clay loam (A1 horizons)	Dark brown (7.5YR 3/3) silty clay loam; strong pedality, polyhedral (2 to 5 millimetres) smooth-faced peds; field pH 7.0.
fh 4—Yellowish brown heavy clay subsoils (B2, B22 horizons)	Dark yellowish brown to yellowish brown (10YR 4/4 to 5/4) medium heavy to heavy clay; strong pedality, with prismatic (50 to 100 millimetre) smooth-faced peds; field pH 8.0 to 9.0.
fh 5— Brown heavy clay subsoils (B1, B2, C horizons)	Dark brown to brown (7.5YR 3/3 to 4/4) medium heavy to heavy clay; strong pedality, prismatic (100 to 200 millimetre) and angular blocky (20 to 50 millimetre) smooth-faced peds; field pH 6.5 to 8.5.

Soil landscape	Description
fh 6—Yellowish red structured clay subsoils (B2, B3 horizons)	Yellowish red (5YR 3/6 to 5/6) light to medium clay; moderate to strong pedality, sub-angular blocky (20 to 50 millimetre) smooth-faced peds; common to abundant (10 to 90%) coarse gravels; field pH 6.5 to 8.5.





Legend

Study area

Geological units

- Cpaa,Noumea beds
- Cpak,Keepit Conglomerate
- Cpam,Mandowa Mudstone
- Dtay,Yarrimie Formation
- N_a,Alluvium

Figure 4 Geological units in the vicinity of the study area

0 200 400 600 800

Metres

Scale: 1:20,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37807, Date: 22 June 2023,
Drawn by: JB, Checked by: AB, Last edited by: jbeckius
Location: P:\37800s\37807\Mapping\
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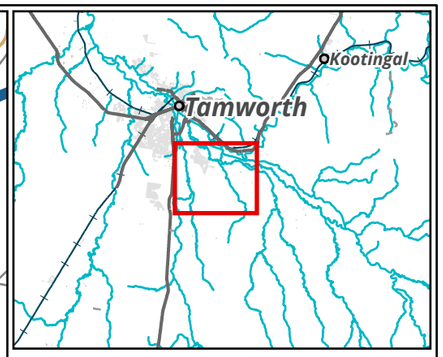

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- Study area
- Contour (10m)

Strahler Order

- 1
- 2
- 3
- 4
- 6
- 7
- > 7

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

0 200 400 600 800

Metres

Scale: 1:20,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

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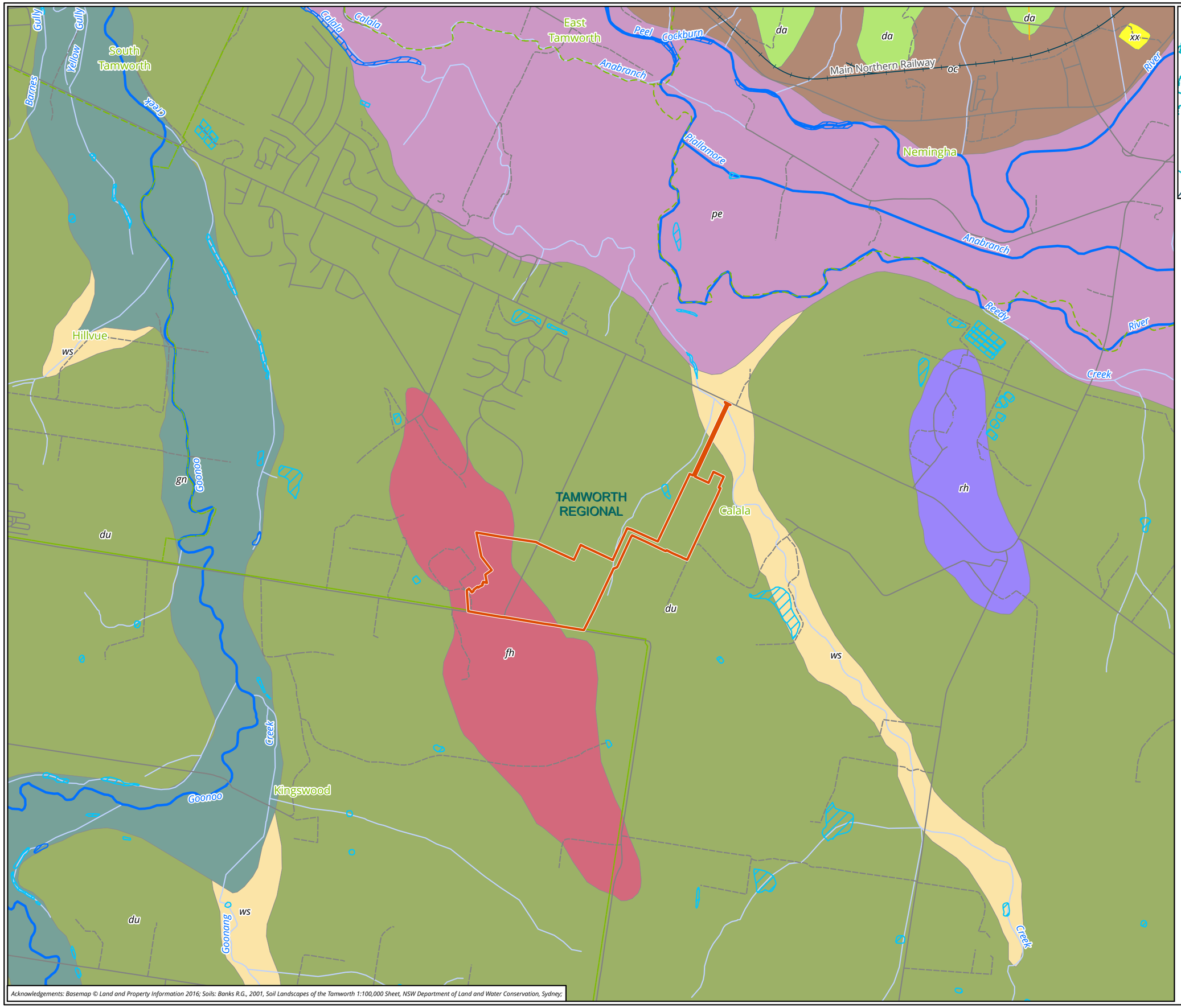

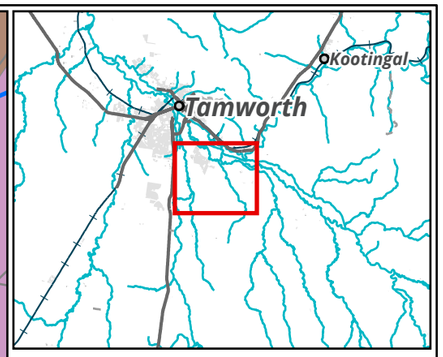

Legend

Study area

Soil landscape units

- da - DARUKA
- du - DURI
- fh - FULLWOODS HILL
- gn - GOONOO GOONOO
- oc - ORCHARD CREEK
- pe - PEEL
- rh - ROUND HILL
- ws - WARRAL STATION
- xx - DISTURBED TERRAIN

Figure 6 Soil landscapes in the vicinity of the study area

0 200 400 600 800

Metres
Scale: 1:20,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37807, Date: 22 June 2023,
Drawn by: JB, Checked by: AB, Last edited by: jbeckius
Location: P:\37800s\37807\Mapping\
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Acknowledgements: Basemap © Land and Property Information 2016; Soils: Banks R.G., 2001, Soil Landscapes of the Tamworth 1:100,000 Sheet, NSW Department of Land and Water Conservation, Sydney;

3.1.3 Landscape resources

Aboriginal people used plant resources in a variety of ways. Fibres were twisted into string, which was used for many purposes, including the weaving of nets, baskets and fishing lines. String was also used for personal adornment. Bark was used in the provision of shelter; a large sheet of bark being propped against a stick to form a gunyah (Attenbrow 2002).

The Duri, Warrral Staton and Fullwoods Hill soil landscapes would have typically supported the following species (Banks 2001, pp.33, 86–87, 177):

- White box *Eucalyptus albens*
- Blakely's Red gum *E. blakelyi*
- Rough-barked apple *Angophora floribunda*
- Native olive *Notelaea macrocarpa*
- Poison pimelea *Pimelea neo-anglica*
- Western golden wattle *Acacia decora*
- Sticky daisy bush *Olearia elliptica*
- Wilga *Geijera parviflora*
- Yellow berry bush *Maytenus cunninghamii*
- Turkeybush *Eremophila deserti*
- Kangaroo grass *Themeda australis*
- Yellow box *E. melliodora*
- River red gum *E. camaldulensis*
- Tumbledown red gum *E. dealbata*
- White cypress pine *Callitris glaucophylla*
- Silver senna *Senna artemisioides*
- Blackthorn *Bursaria spinosa*
- Cough bush *Cassinia laevis*
- Kurrajong *Brachychiton populneus*
- Smooth senna *S. barclayana*
- Plains grass (dominates grassland) *Stipa aristiglumis*

Native fauna that would have been present in the vicinity of the study area include (Atlas of Living Australia 2022):

- *Tachyglossus aculeatus* Short-beaked echidna
- *Wallabia bicolor* Swamp wallaby
- *Eolophus roseicapilla* Galah
- *Pseudonaja textilis* Eastern brown snake
- *Chelodina longicollis* Snake necked turtle
- *Trichosurus vulpecula* Common brushtail possum
- *Macropus giganteus* Eastern grey kangaroo
- *Gymnorhina tibicen* Australian magpie
- *Tiliqua scincoides* Eastern blue tounge

Stone tool resources with the Tamworth area also included a green-grey stone that was used in the manufacture of axes (Binns & McBryde 1972, McBryde 1974, Wilson 1994). A quarry site is located on Mt Daruka, located approximately 18.6 kilometres north of the study area (Wilson & McAdam 2000).

The Peel and Cockburn rivers were also a source for raw material. Pebbles and cobbles of chert, cherty argillite, andesitic greywacke, quartz, hornfels, basalt and small amounts of chalcedony and petrified wood could also be sourced from the banks of the rivers (Wilson & McAdam 2000).

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

and under the other. Kangaroo teeth were incorporated into decorative items, such as head bands (Attenbrow 2002).

3.1.4 Land use history

The historical land use of the study area has been described in the Historical Archaeological Impact Statement (Biosis Pty Ltd 2023). Reports of the rich pastures of the Liverpool Plains region was reported to England in 1817 and 1818 by Surveyor General, John Oxley, though was not occupied until 1824 when Henry Danger was able to effectively navigate through the Liverpool Ranges. Throughout the 19th century the landscape was primarily used as grazing land.

In 1824, The AACo was formed in order to raise and farm sheep for merino wool to sell in London, and in 1828, they acquired one million acres (404,685 hectares) in the Port Stephens area (Australian National University, Archives 2012). In 1832 the pastoral pursuit was expanded, and the AACo acquired an additional 316,000 acres (130,000 hectares) of land along the Peel River, extending from what became Tamworth to Nundle, Attunga and Duri (Photo 3) (likely including the study area). Historical parish maps containing the study area can be traced back to 1909. Mapping from 1909 illustrates that the land grant belonging to the AACo has since been subdivided into several lots, with the study area falling within parish portions 28, 29, and 30 (Photo 4). No structures are visible on the map and it is likely that the study area continued to be used for agricultural purposes during this time.

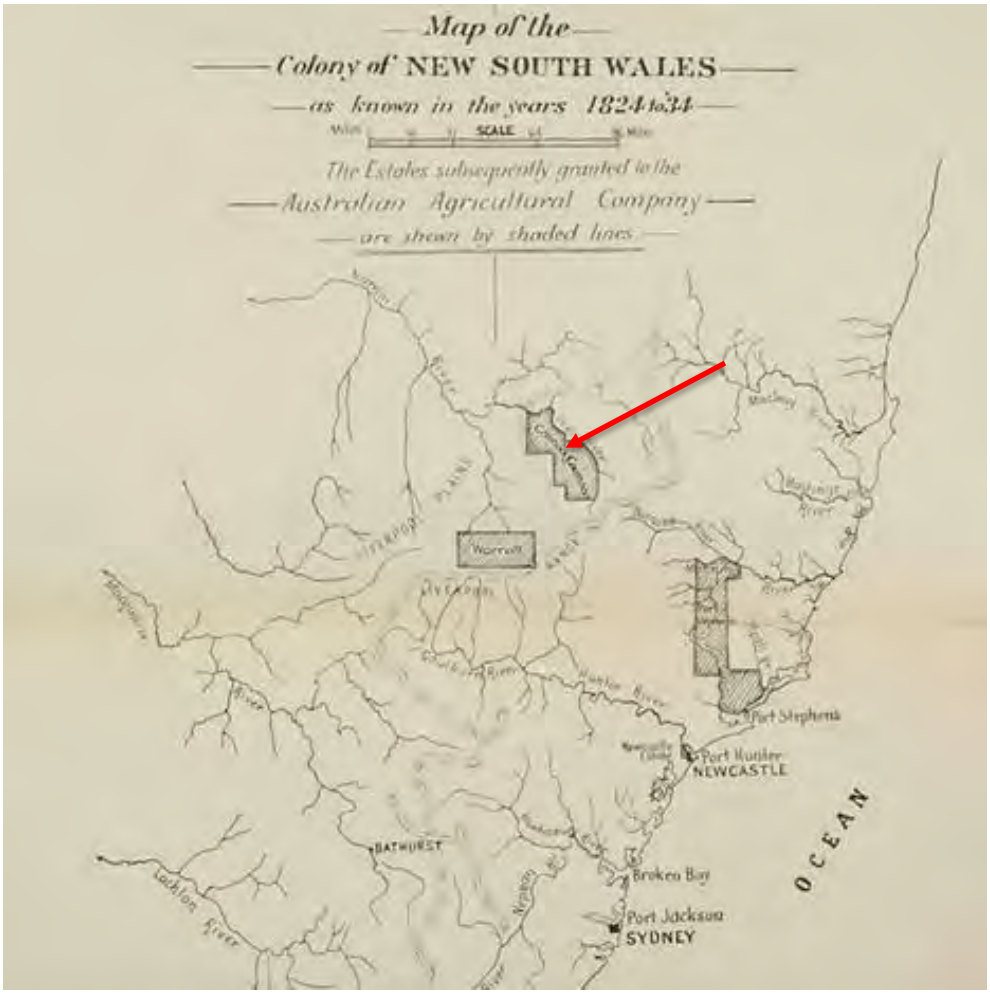


Photo 3 **Map showing grants awarded to Australian Agricultural Company, shown in shaded areas; approximate location of the study area indicated by the red arrow (Source: Goonoo Goonoo Station n.d.)**

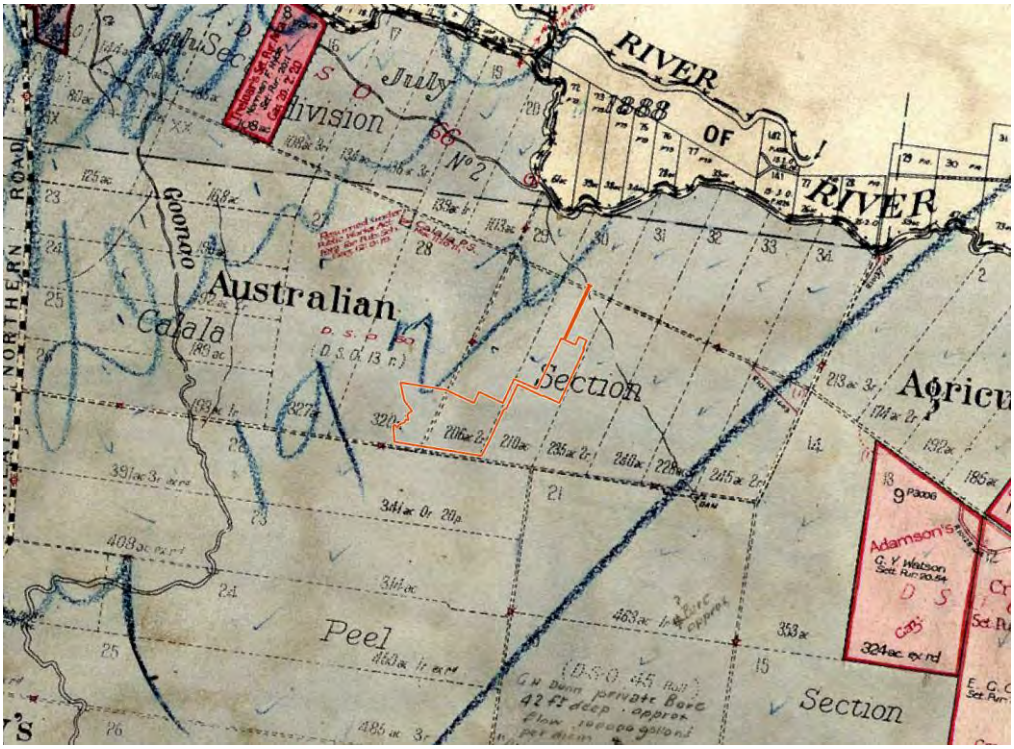


Photo 4 1909 Parish map showing study area, illustrated in red (Source: HLRV, 2022)

Historical aerial photographs assist in identifying modern developments that occurred within the study area. An aerial photograph dated to 1976 shows that the land within the study area has been subject to extensive vegetation clearance and terracing, with the area being utilised as paddocks (Photo 5). Two small artificial dams are present approximately 100 metres north-west of the study area, transecting with the tributary of Calala Creek. Terracing can be seen throughout the study area, likely to assist with drainage, and Burgess Lane has also been constructed. The faint beginnings of a dirt track can be seen through the northern portion of the study area, however no structures are visible at this time. Construction also appears to have commenced for the substation to the west of the study area. There are also several transmission line present in the south-western corner of the study area.

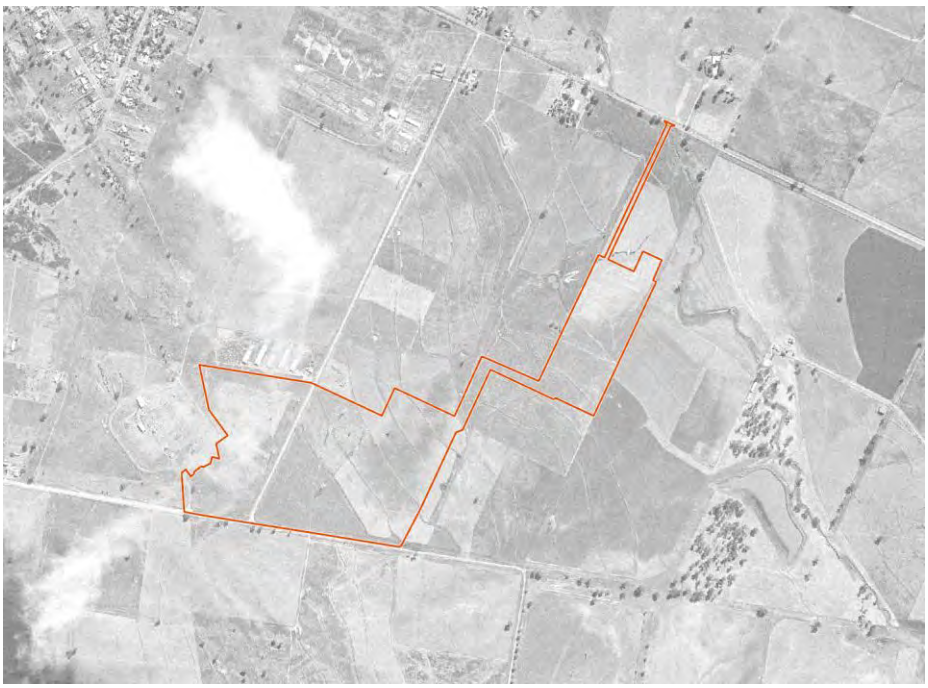


Photo 5 Aerial photograph dated to 1976, with the study area indicated by the red boundary (Source: NSW Spatial Services)

Historical aerials from 1989 show an increase in development throughout the surrounding region. East of the study area (in the north-eastern corner of Lot 17 DP 629969) there is evidence of a residential development, which contains two structures, a round-a-bout driveway and landscaping efforts (Photo 6). The previous two small dams from the 1976 aerials, have been expanded into one large dam. Throughout the study area itself, continued terracing and potential excavation of soils can be seen throughout the extent of the site. No structures are visible within the study area.

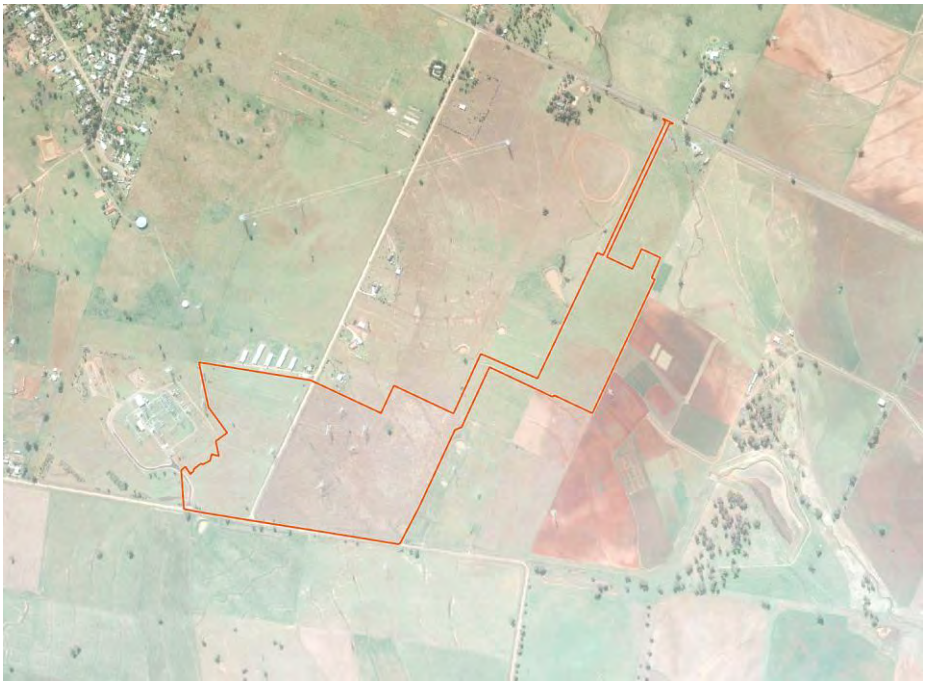


Photo 6 Aerial photograph dated to 1989, with the study area indicated by the red boundary (Source: NSW Spatial Services)

Aerials dating to 1997 show no significant changes to the study area (Photo 7).

Photo 7 Aerial photograph dated to 1997, with the study area indicated by the red boundary (Source: NSW Spatial Services)

Current aerial imagery shows heavy ploughing and excavation of soils in the southern portion of the study area, with planted trees along a fence line (Figure 2). Two shed structures are present in the central portion of the study area, with the fence line extending from one of the sheds. A dirt track is also visible in the northern portion of the site. Landform modification throughout the southern portion of the site is present. No other structures or development are visible to date.

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.

3.2.1 Regional overview

There have been limited Aboriginal cultural heritage investigations conducted within the Tamworth region. The regional context includes studies that occur within 60 kilometres of the study area. This is due to the absence of extensive Aboriginal research conducted in this area, presenting a gap in the literary resources. Of the investigations that have been conducted, most were undertaken as part of Environmental Impact Statement (EIS) for SSD projects and included surface and subsurface investigations. These investigations are summarised below.

Westdale Alliance (2010) undertook salvage excavations and relocation of five scar trees in preparation of the proposed Tamworth Sewerage Augmentation Project and 100% Reuse Scheme at the Westdale Waste Water Treatment Plant in 2010. This was located approximately 14.5 kilometres north-west of the study area. An Aboriginal Heritage Impact Permit (AHIP) was approved by the Department of Environment, Climate Change and Water (DECCW) (now Heritage NSW) in 2009, and the scar trees were excavated and relocated to the Tamworth Botanical Gardens. A shelter was

erected over the trees to protect them, and they are now used as an educational tool for tours. No stone artefacts were recovered during the salvage excavations.

AREA Environmental Consultants & Communications (2019) undertook an ACHA to support an SSD application (SSD-9264) for the Tamworth Solar Farm located at Somerton, approximately 33 kilometres north-west of the study area. The ACHA included background research, surveys and Aboriginal community consultation. Predictive statements from the archaeological context in the ACHA concluded the following (AREA Environmental Consultants & Communications Pty Ltd 2019, pp.42–43):

- *Consultation with the Registered Aboriginal Parties participating in the field assessment identified known significant cultural (non artefact type) sites on elevated landforms in sight distance north and south of the Development Sites [proposed solar farm]. These landforms are about 10 kilometres from the Development Areas [proposed solar farm]. The Peel River was identified as a significant cultural landform / resource gathering area.*
- *Artefact sites are more likely to be recorded near drainage lines and the higher the Strahler Order the more likely they will be to occur and the more likely they will be more complex.*
- *Culturally modified trees can occur anywhere on old growth box trees on the hills or redgums near waterways.*
- *Non-physical cultural sites can occur anywhere and without traditional cultural knowledge these will be undetectable in the landscape*."

In total there were 22 sites recorded within their project area, and included isolated artefacts, artefact scatters, and modified trees. It was also noted to have high ground surface visibility due to the property having been used for intensive agricultural purposes. This also determined that the likelihood for sub-surface archaeological deposits would be low due to ploughing and the depth of surface soils. There were eleven sites that would be unable to be avoided by the proposed works, and a consultation meeting was held to discuss a cultural heritage management plan (CHMP) for the project. The ACHA recommended that a CHMP be developed for the project to manage and mitigate impacts to all sites within the project area.

KNC (2020) undertook an ACHA to support a SSD application (SSD-9679) for a proposed windfarm located on a property called the Hills of Gold in Nundle, located approximately 57 kilometres south-east of the study area. The ACHA included background research, surveys and Aboriginal community consultation. The Hills of Gold project area was located across a prominent ridgeline that forms the boundary between the Tamworth and Upper Hunter LGAs, and into the Liverpool Plains LGA. The assessment combined the results of the survey with the background research to develop the following statements (KNC 2020, p.34):

- "*Soils on the flatter crest landforms of the main ridgeline were found to be more disturbed by land use practices, as these have been the focus for agriculture.*
- *On steeper gradient slopes, subsurface deposits are unlikely, particularly in rocks areas where poorly developed Lithosols occur.*
- *The valley side slopes are also affected by colluvial movement and soil transfer accelerate by European vegetation clearance, logging, establishment of pine plantations and increased water runoff.*
- *In the alluvial valley, potential for subsurface deposit depends on strongly on the nature and extent of flooding along the river and its tributaries, with elevated landforms bordering the flood zone considered to display better archaeological potential.*

- *The valley has also been more intensively settled than the surrounding ridge system and is more affected by European land use disturbance including agriculture, various drainage modifications and infrastructure such as roads."*

In total seven Aboriginal archaeological sites (four artefact scatters and three isolated artefacts) and one PAD of moderate potential was identified. Re-design of some sections of the impact areas was able to be undertaken and recommendations included collection of surface artefacts and archaeological salvage prior to impact.

3.2.2 Local overview

A limited number of Aboriginal cultural heritage investigations have been conducted within Tamworth (within approximately 10 kilometres of the study area). These investigations are summarised below.

Davies (1991) undertook an archaeological survey of the proposed optic fibre cable route that was to be constructed between Tamworth and Scone. The route would reach a length of 138.3 kilometres and would transect the town of Tamworth at its completion, approximately 6.5 kilometres north-west of the study area. The survey was divided into four sections, with Section 4 covering 39.95 kilometres between Rock Hill and Tamworth. Only one Aboriginal site was discovered in this section of the route. Two flakes, one basalt and one made of fine grained siliceous material, was found within an extremely disturbed portion of the northern bank of Ainstays Creek. It was noted that in this section, portions of the survey were hampered by low ground surface visibility as well as extensive disturbances in the form of European horticultural activities. Recommendations stated that the project could proceed with caution, however a representative of the Nungaroo LALC should be present during excavations in areas where this low visibility occurred.

Wilson and McAdam (2000) undertook an Aboriginal archaeological site study for the Tamworth City Council LGA, commissioned by Tamworth Council. The aim of the assessment was to assist Tamworth Council in assessing impacts to Aboriginal cultural heritage during land use planning under the EP&A Act. The assessment included a preliminary predictive model, survey, and determination of significance for sites for the preservation of future sites. The surveys were limited by the available access to properties. The results of the predictive model have been included below (Wilson & McAdam 2000, pp.161 and 170–172):

- *"Isolated finds are most likely to be found on the lower to midslopes in all sectors. These areas can have gradients from <1 to 25 degrees, however, in the case of the steeper gradients, it is probable that the artefacts will be eroding and washing downslope from level areas above.*
- *Isolated find sites are most likely to be located within 300 metres of a watercourse (often the upper reaches of a watercourse).*
- *Isolated find sites are most likely to contain large artefacts or artefacts manufactured from highly distinctive raw materials.*
- *The largest artefact scatters are most likely to be found on the creek terraces and lower slopes on red brown soils and above flood level. Artefact scatters will also be found on level areas associated with saddles, ridgetops and crests, especially in areas that provide good views across wide areas. Occasionally artefact scatters will be located in areas of steep gradient but these will normally be found to be eroding and washing downslope from level areas above.*
- *The size of the artefact scatters will be dependent on the availability of water. The largest sites will be in area close to large waterholes on the major watercourses, the next largest sites will be in close proximity to a spring or swamp. The smallest sites will generally be located on the intermittent watercourses.*

- *Scarred trees can be located in any topographic zone but are most likely to within a short distance of a water course. This may be a major watercourse down to a minor feeder tributary.*
- *Scarred trees located on the flood plain of the major watercourses will often have had bark removed to manufacture a canoe*.
- *Scarred trees away from the major watercourses and on the minor tributary systems are more likely to have had bark removed to manufacture coolamons or shields."*.

OzArk Environmental and Heritage Management Pty Ltd (2010) was commissioned by TransGrid to undertake an assessment of Aboriginal and non-Aboriginal heritage for the proposed Tamworth to Gunnedah Transmission Line 875 Dismantling project, located approximately 7.2 kilometres west of the study area. Previous investigations by Djekic 1984 resulted in the recording of five scarred trees along the proposed transmission line; three confirmed and two potential. The survey undertaken in 2010 identified two new Aboriginal sites; an open camp site (ETL 875-OS1) and a scar tree (ETL 875-ST1). No local or state heritage items were identified as part of this survey. As the Aboriginal sites (inclusive of the five previously recorded scarred trees) were not located within the proposed development footprint, no further works were required and the works could proceed with caution.

Gaynor (2011) undertook an archaeological survey for Brown and Krippner Pty Ltd for a proposed subdivision at Part Lot 191 DP 1107583, near Calala Creek in Calala. This is located approximately 1.5 kilometres north-west of the study area. Two areas were surveyed as part of this investigation. Dense vegetation obscured the ground surface throughout majority of area, however one grey rotated chert core was found on a track within a previously registered PAD (AHIMS 25-2-0006/Redbank IP/1). Along the creek line a stand of trees with a potential scar tree was identified, however it was later determined to not be modified by Aboriginal people by a representative of the Tamworth LALC. The stone artefact and potential scarred tree was located outside of the proposed development works, and therefore it was recommended that they remain in situ and the works proceed with caution.

3.2.3 AHIMS site analysis

A search of the AHIMS database on 13 June 2023 (Client Service ID: 790674) identified 106 Aboriginal archaeological sites within an 8.5 kilometre search area, centred on the proposed study area. None of these registered sites are located *within* the study area (Figure 7). There is one restricted AHIMS site located within the search results, and AHIMS has confirmed that this site is not located in the study area or the vicinity (pers comm 17/10/2022- a previous AHIMS searches was completed on 9 August 2022). This site has also been excluded from the search results below. AHIMS search results are provided in Appendix 1. Table 7 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 a modified tree, however for the purposes of this breakdown and the predictive modelling, all individual site types will be studied and compared. This explains why there are 111 results presented here, compared to the 106 sites identified in AHIMS.

Table 7 AHIMS site type frequency

Site type	Number of occurrences	Frequency (%)
Artefact	87	78.38
Modified tree	19	17.12
Stone Quarry	2	1.80
Water hole	1	0.90
Art (Pigment or Engraved)	1	0.90
Shelter with Deposit	1	0.90
Total	**111**	**100.00**

A simple analysis of the Aboriginal cultural heritage sites registered within the 8.5 kilometre buffer of the study area indicates that the most dominant site type is artefacts with 78.38% (n=87). This was followed by modified tree with 17.12% (n=19) and stone quarry with 1.80% (n=2). Water hole, art (pigment or engraved), and shelter with deposit consisted of 0.90% each (n=1 each). One restricted site was listed within the AHIMS search results and has been excluded from Table 7 above. Biosis has confirmed with AHIMS that the restricted site is not located in the study area or in the vicinity (pers. comm. 17/10/2022 – this correspondence can be provided upon request).

Figure 7 AHIMS within the vicinity of the study area

****FIGURE 7 HAS BEEN REMOVED FROM THIS DOCUMENT FOR PUBLIC EXHIBITION**

3.3 Discussion

The topography of the study area consists of extensive rolling to undulating hills, radiating from the north-eastern corner to the south-western corner. Part of the study area broadly slopes towards the south-west (within part of Lot 6 DP 219993). The study area contains to two creek lines; Calala Creek, a second order non-perennial watercourse located in the northern portion and a first order, non-perennial tributary of Calala Creek, located in the southern portion. A large man-made dam is present directly adjacent to the north-western corner of the study area, coming off of the tributary of Calala Creek. The study area is also approximately 1.1 kilometres south of Peel River, a seventh order perennial watercourse, and Goonoo Creek, a seventh order perennial watercourse is also located approximately 1.2 kilometres west.

The study area contains two geological units, the Mandowa Mudstones (within the Devonian unit), and Noumea beds. Stone tool resources within the Tamworth area also included a green-grey stone that was used in the manufacture of axes (Binns & McBryde 1972, McBryde 1974, Wilson 1994). A quarry site is located on Mt Daruka, located approximately 18.6 kilometres north of the study area (Wilson & McAdam 2000). The Peel and Cockburn rivers were also a source for raw material. Pebbles and cobbles of chert, cherty argillite, andesitic greywacke, quartz, hornfels, basalt and small amounts of chalcedony and petrified wood could also be sourced from the banks of the rivers (Wilson & McAdam 2000).

Soils within the study area are contained within three soil landscapes, Duri, Warral Station, and Fullwoods Hill. Overall these soil landscapes have a long history of cropping and feature extensive sheet erosion, with topsoils likely to have been removed. Soil erosion is an issue with areas utilised for cropping or grazing, suggesting that artefact bearing deposits if present, are likely to be highly disturbed as a result.

An extensive search of AHIMS identified 106 Aboriginal archaeological sites within an 8.5 kilometre search area, centred on the study area. None of these registered sites are located within the study area, with artefacts and modified trees the most common site types in the search results. Predictive modelling completed in the Tamworth region indicates that there is a correlation between strahler order and site complexity (Wilson & McAdam 2000, AREA Environmental Consultants & Communications Pty Ltd 2019). Larger sites will be in area close to large waterholes on watercourses, with the next largest sites in close proximity to a spring or swamp. Landforms such as creek terraces and level areas associated with saddles, ridgetops and crests are also favourable for artefact scatters. These landforms are not present within the study area.

Overall, current aerial imagery indicates that the study area has been extensively cleared for agricultural and pastoral purposes, with development of shed structures visible in the northern portion of the site. Extensive terracing throughout the southern portion of the study area is likely to have removed soils from the site. The clearing across the remaining areas of the study area has likely caused significant disturbance to the soil profile.

3.3.1 Predictive statements

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

These statements are based on:

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

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

Table 8 indicates the site types most likely to be encountered across the 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 8 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.	Low: Stone artefact sites have been previously recorded in the region across a wide range of landforms. However, the study area has been extensively disturbed and topsoils are likely to have been removed through erosional processes, therefore there is low potential for artefacts to be present.
PADs	Potential sub surface deposits of cultural material.	Low: PADs have been previously recorded in the region across a wide range of landforms. However, the study area has been extensively disturbed and topsoils are likely to have been removed through erosional processes, therefore PADs have a low potential to be within 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 vicinity of study area. There is a low potential of shell middens being present within the study area.
Quarries	Raw stone material procurement sites.	Low: Two quarries have been located within 10 kilometres of the study area, however there are no records of the study area containing a quarry site. The study area has been extensively disturbed therefore there is low potential for quarry sites to be located within the study area.
Modified trees	Trees with cultural modifications	Low: The study area has been extensively cleared of vegetation. There is low potential for modified trees to be present within the study area.
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

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

4 Archaeological survey

An initial archaeological survey of the study area was undertaken on 16 August 2022 by Anthea Vella (Biosis, Heritage Consultant); an additional survey was undertaken on 13 December 2022 by Mathew Smith (Biosis, Senior Heritage Consultant), Nathan Windram (Biosis, Graduate Heritage Consultant), and Donny Fermor (Tamworth Local Aboriginal Land Council (LALC), Cultural Sites Officer); and a second additional survey was undertaken on 15 June 2023 by Anthea Vella and Bronte Baonza (Biosis, Graduate Heritage Consultant). 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 Aboriginal archaeological and cultural sensitivity.

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 all landforms that will potentially be impacted and was conducted in six meandering transects over the course of the three surveys.

4.2.2 Survey methods

The initial archaeological survey was conducted on foot with a field team of one on 16 August 2022; the additional archaeological survey was conducted on foot with a field team of three members on 13 December 2022; and the final survey conducted with a field team of two members on 15 June 2023. 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 Constraints to the survey

With any archaeological survey there are several factors that influence the effectiveness (the likelihood of finding sites) of the survey. The factors that contributed most to the effectiveness of the survey within the study area were extensive crop and vegetation coverage, landform modification, and the presence of horses in the paddocks.

4.4 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). The central portion of the study area was unable to be inspected at the time of the initial survey, as it had been recently cultivated for the production of oats (Photo 8). This area was inspected during the second additional survey (Photo 9). Historical aerials clearly demonstrate that this portion of the study area has been extensively modified through terracing and agricultural practices (Photo 5 and Photo 6), therefore it is unlikely that subsurface deposits would remain intact in these areas. The surveys determined that this area had a GSV of 0-5%.

Within the northern portion of the study area, overall visibility was poor (5%), with heightened areas of visibility associated with areas of exposure, vehicle tracks and around sheds (Photo 10). The southern portion of the study area had an overall visibility of 5% due to extensive grass coverage (Photo 11).Over the three surveys GSV was noted to be poor with little change to conditions.

Photo 8 **Typical GSV throughout central portion of the study area, with photo showing interface between the north and south sections where cropping occurs. Photo taken during initial survey. Facing west**

Photo 9 **Typical GSV throughout central portion of the study area, with photo showing crops. Photo taken during additional survey. Facing north**

Photo 10 **Typical GSV throughout northern portion of the study area. Facing north**

Photo 11 **Typical GSV throughout southern portion of the study area, facing north-east**

4.5 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). Within the study area exposure was typically poor (5%), with areas of heightened areas of exposure typically identified along fence lines, adjacent to access gates, and within vehicle tracks (Photo 12, Photo 13 and Photo 14). Higher levels of exposure were present near the substation (20%) (Photo 15).

Photo 12 **Exposure throughout the northern portion of the study area, facing east**

Photo 13 **Exposure adjacent to fence lines and interface for cropping, facing west**

Photo 14 **Exposure within vehicle tracks, facing east**

Photo 15 **Exposure near the substation, facing west**

4.6 Disturbance

Disturbance within the study area is associated with human agents. The study area contains extensively modified soils, due to the construction of two shed structures, fencing along the paddock boundaries, landform modification for drainage channels, vehicle tracks and the use of machinery for cultivation and agricultural purposes (Photo 14, Photo 16, Photo 17 and Photo 18). The study area has also been disturbed from the construction and use of the transmission station (Photo 19 and Photo 20). The transmission station was highly disturbed including extensive bulk earthworks evidenced by a large spoil mound surrounding the transmission station; and a high degree of imported road base material on the disturbed surfaces. This has impacted the intactness of any potential subsurface Aboriginal deposits within the study area. Within the southern portion, extensive terracing (shown through historical aerial imagery) has resulting in large scale landscape modifications (Section 3.1.4 and Figure 2).

Photo 16 **Typical disturbances throughout the northern portion of the study area, facing east**

Photo 17 **Cropping in the southern portion of the study area, facing west**

Photo 18 **Redeposition of soils within the study area, facing south**

Photo 19 **Large area of gravel associated with the transmission station, facing south**

Photo 20 **Area of disturbance associated with the transmission station, facing east**

4.7 Archaeological survey results

The archaeological investigation consisted of six meandering transects walked across the entire study area over three surveys undertaken on 16 August 2022, 13 December 2022, and 15 June 2023. The results from the field survey have been summarised in

Table 9, Table 10, Figure 8, and Figure 9.

Background research undertaken has identified that the study are contains the Mandowa Mudstones and Noumea beds geological units, and the topography of the study area slopes broadly. Soils within the study area are contained within three soil landscapes, Duri, Warral Station, and Fullwoods Hill. Overall, these soil landscapes have a long history of cropping and features extensive sheet erosion, with topsoils likely to have been removed. Soil erosion is an issue with areas utilised for cropping or grazing, suggesting that artefact bearing deposits if present, are likely to be highly disturbed as a result. Evidence of the correlation between poor artefact retention and Duri soils specifically was demonstrated in Everick Heritage (2021) test excavations outlined in Section 3.1.2.

An extensive search of AHIMS identified 106 Aboriginal archaeological sites within an 8.5 kilometre search area, centred on the proposed study area. None of these registered sites are located within

the study area with artefacts and modified trees the most common site types in the search results. The study area has been extensively cleared and disturbed from agricultural and landform modification processes. Therefore, there is low potential for these sites to exist within the study area. Predictive modelling completed in the Tamworth region indicates that there is a correlation between strahler order and site complexity (Wilson & McAdam 2000, AREA Environmental Consultants & Communications Pty Ltd 2019). Larger sites will be in areas close to large waterholes on watercourses, with the next largest sites in close proximity to a spring or swamp. Landforms such as creek terraces and level areas associated with saddles, ridgetops and crests are also favourable for artefact scatters. These landforms are not present within the study area.

Current aerial imagery indicates that the study area has been extensively cleared for agricultural and pastoral purposes and has had a long repeated history of ploughing and cropping, with development of shed structures visible in the northern portion of the site. Extensive terracing throughout the southern portion of the study area is likely to have removed soils from the site. The clearing across the remaining areas of the study area has likely caused significant disturbance to the shallow soils present across the study area. The transmission station was highly disturbed including extensive bulk earthworks evidenced by a large spoil mound surrounding the transmission station; and a high degree of imported road base material on the disturbed surfaces.

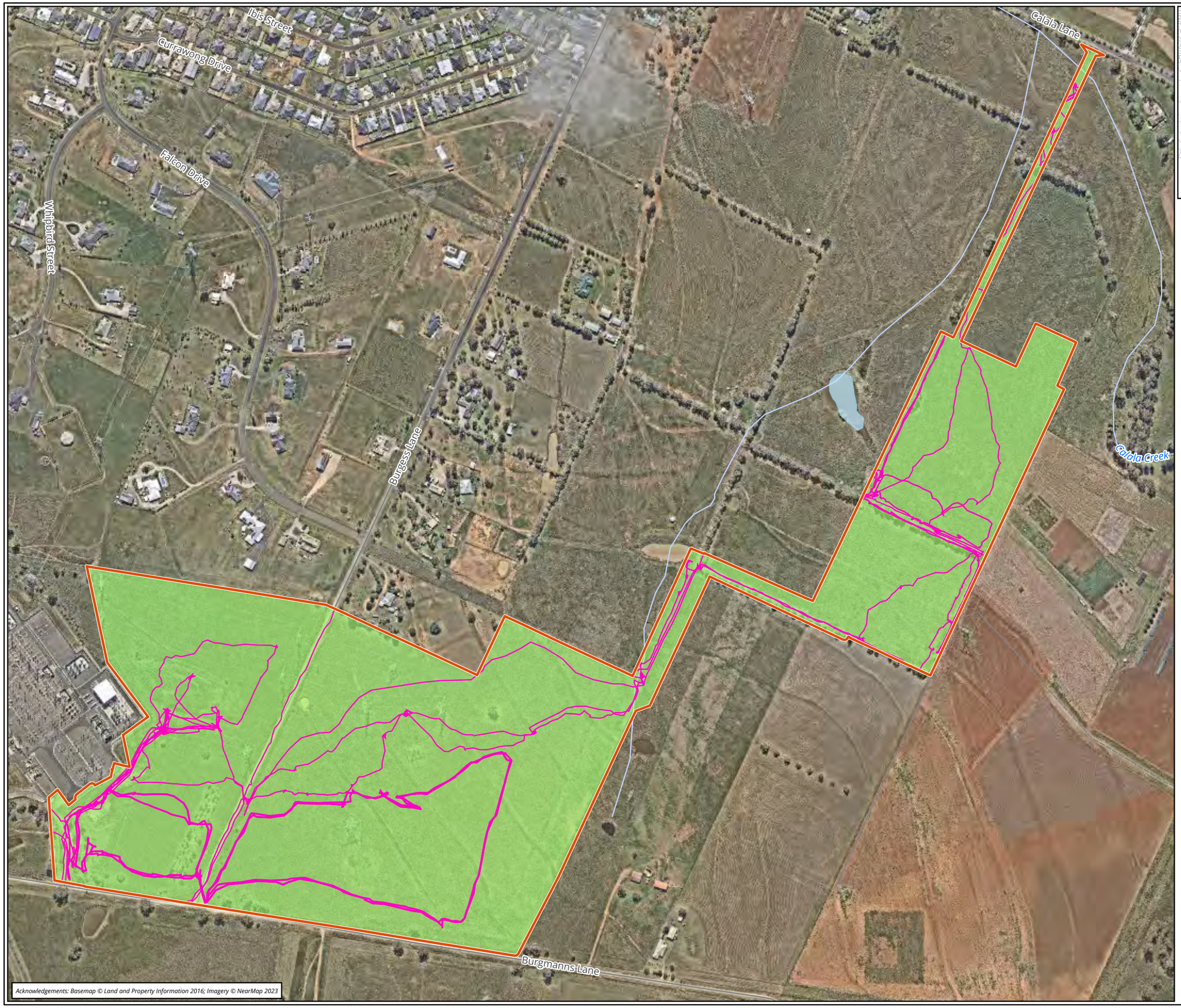
The surveys undertaken as part of this assessment have confirmed the results of the background research. No Aboriginal sites or objects were identified within the study area. During the surveys the study area was noted to have been heavily disturbed by agricultural practices (including modified soils with topsoils likely to have been removed and the use of machinery for cultivation and agricultural purposes), landform modification for drainage channels, and vehicle tracks, and the construction and use of the transmission station. This has impacted the intactness of any potential subsurface Aboriginal deposits within the study area. The study area also contains a broadly sloping landform that a review of previous assessments and predictive modelling has indicated is not likely to contain sites or objects and combined with disturbances has low potential for sites to be present or preserved in-situ. Therefore, this assessment has determined that the study area contains low archaeological potential.

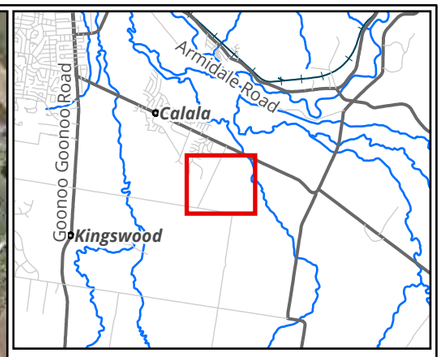
Table 9 Survey coverage

Landform	Survey unit area (m²)	Visibility (%)	Exposure (%)	Effective coverage area (m²)	Effective coverage (%)
Broad slope	424,218	5	5	46,718	11.02

Table 10 Landform summary

Landform	Landform area (m²)	Area effectively surveyed (m²)	Landform effectively surveyed (%)	No. of Aboriginal sites	No. of artefacts or features
Broad slope	424,218	46,718	11.02	0	0





Legend

- Study area
- Low archaeological potential
- Survey tracks

Figure 8 Survey effort and result

0 50 100 150 200

Metres

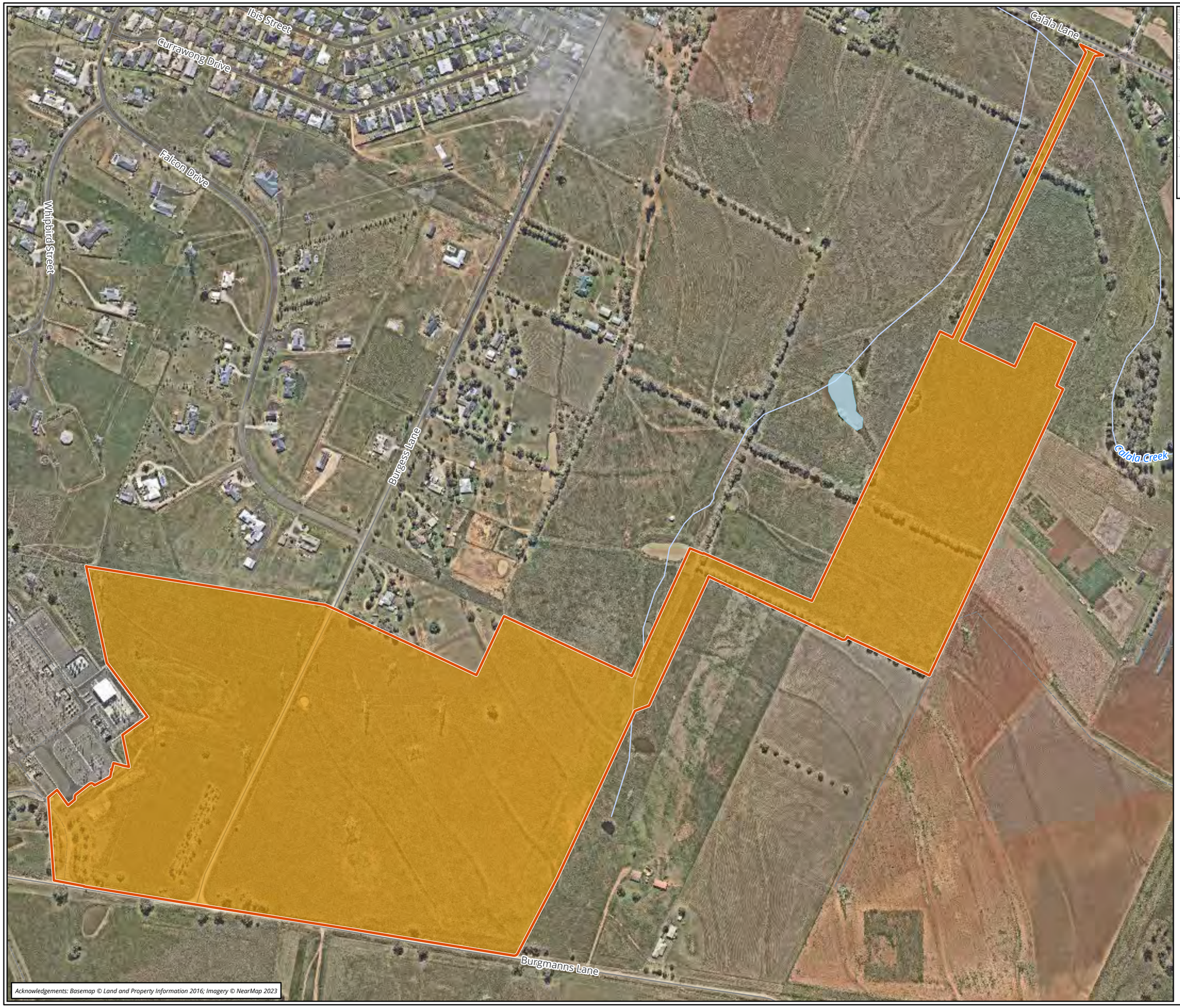
N

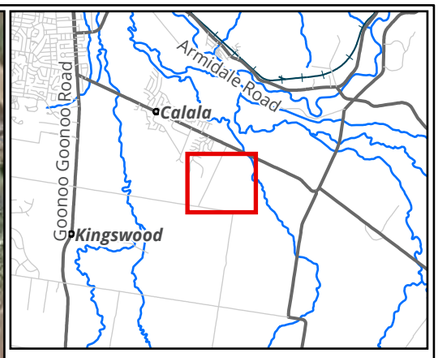
Scale: 1:5,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

biosis

Matter: 37807, Date: 20 July 2023,
Drawn by: JB, Checked by: AB, Last edited by: jbeckius
Location: P:\37800s\37807\Mapping\
37807_CalalaBESS_Constraints_ACHA, Layout: 37807_ACHA_F8_SurveyResults





Legend

Study area

Landform

Broad slope

Figure 9 Landforms within the study area

0 50 100 150 200

Metres

Scale: 1:5,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37807, Date: 22 June 2023,
Drawn by: JB, Checked by: AB, Last edited by: jbeckius
Location: P:\37800s\37807\Mapping\
37807_CalalaBESS_Constraints_AR, Layout: 37807_AR_F9_Landforms

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 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 11 and Table 12 outline the site content and site condition rating used for archaeological sites.

Table 11 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 12 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 study area. The significance of the study area 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 the study area is 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 13 outlines the site representativeness ratings used for archaeological sites.

Table 13 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 14.

Table 14 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.

5.2.1 Statements of archaeological significance

No Aboriginal sites or objects were identified during the survey. Consultation with the Aboriginal community has indicated that the study area has high cultural significance. The background research and survey confirmed that the study area has been heavily disturbed by previous and current land uses. This assessment has therefore determined that there is no archaeological significance within the study area.

6 Impact assessment

As previously outlined, Equis Australia are proposing to develop a large-scale BESS within the study area. The project will comprise the following:

- Large-scale BESS including battery enclosures, inverters, DC and AC combiner boxes, transformers and auxiliary components.
- 33/330 kV switchyard.
- Underground transmission line connection between the BESS and the nearby TransGrid Tamworth 330 kV substation.
- Ancillary elements including site access from Calala Lane, internal access roads and parking, control room and staff amenities, warehouse, stormwater and fire management infrastructure, utilities, signage, fencing, security systems, four and five meter high noise attenuation wall and landscaping.

The final transmission alignment is aligned with Burgmanns Lane boundary. Therefore this assessment has assessed the entire study area.

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 combined with a landform that predictive modelling and survey has suggested is unlikely to contain evidence of Aboriginal occupation. The proposed works will therefore not impact on any Aboriginal heritage values (Figure 10).

6.2 Ecologically Sustainable Development

One of the primary aims of the NPW 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 Ecologically Sustainable Development (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. Regarding 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 Heritage NSW 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 (State of NSW and Office of Environment and Heritage NSW 2011, p.26)."

The results of this assessment have identified that the land within the study area represents part of a complex Aboriginal cultural landscape. As identified in the background research and through Aboriginal community consultation, the region surrounding the study area, particularly to the north-east, contains several sites, landforms and landscapes that are significant to local Aboriginal groups. Therefore, this assessment has been able to further our knowledge of Aboriginal archaeology in the area, by highlighting the environmental and cultural significance of the surrounding landscape and how this may have been intertwined with the current study area.

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).

Consideration has been given to the principles of Ecologically Sustainable Development (ESD), outlined in section 6.2, in order to minimise impacts. 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 ACHA 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 due to high levels of disturbances present. Consultation undertaken has resulted in the following management strategies:

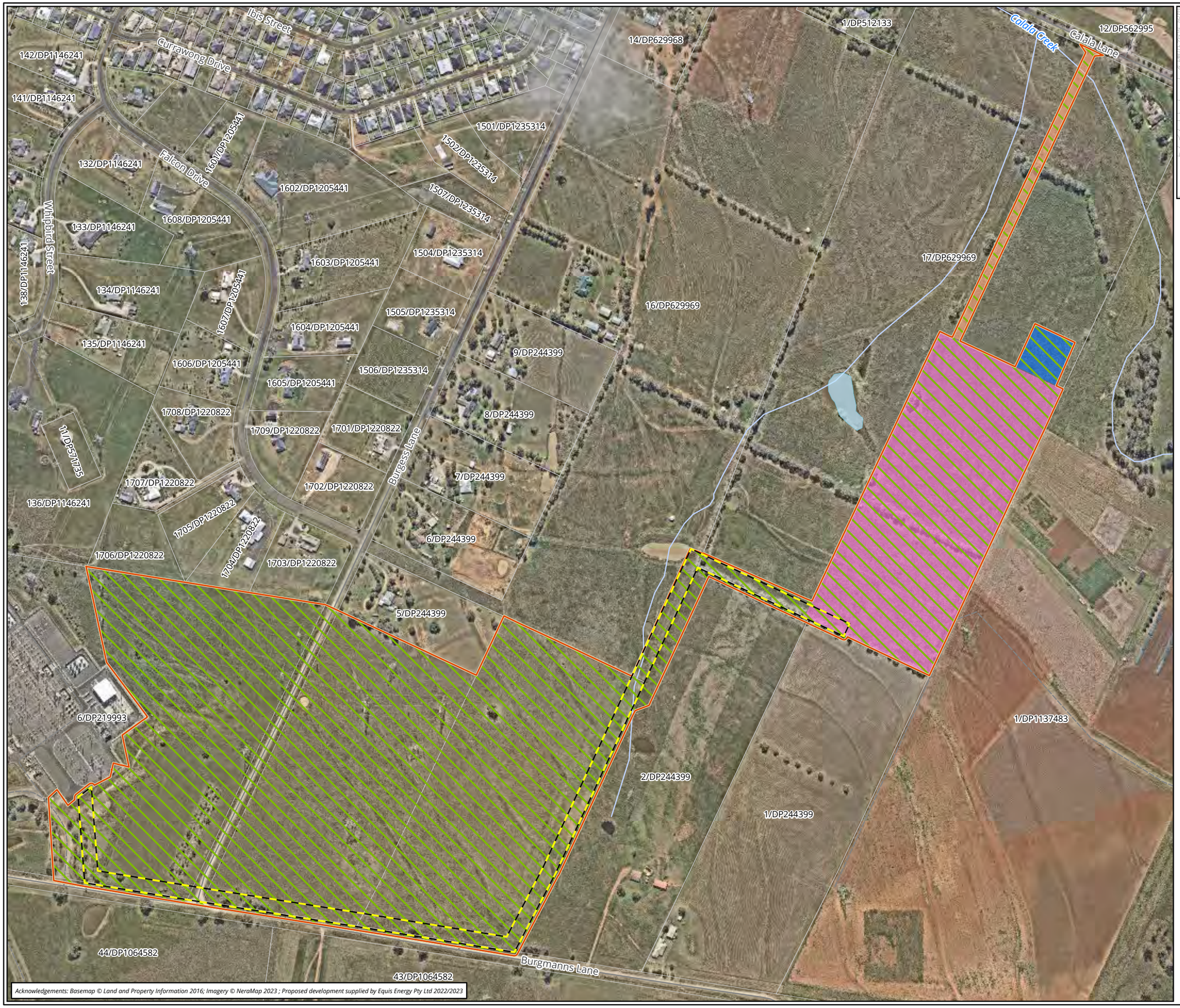
Heritage induction

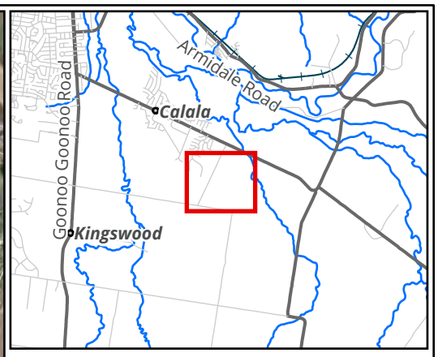
Heritage inductions and the inclusion of an unexpected finds procedure should be prepared. These should be provided to all site workers and contractors in order to prevent any unintentional harm to unexpected finds and Aboriginal sites located outside of the study area. This includes the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

Continued consultation with the RAPs

As per the consultation requirements it is recommended that the proponent provides a copy of this report to the RAPs. It is also recommended that the proponent should continue to inform RAPs about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.





Legend

- Study area
- Lot
- Low archaeological potential

Proposed development

- BESS Footprint
- Access track
- Stormwater basin
- Transmission line

Figure 10 Impact assessment

0 50 100 150 200

Metres

Scale: 1:5,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37807, Date: 22 June 2023,
Drawn by: JB, Checked by: AB, Last edited by: jbeckius
Location: P:\37800s\37807\Mapping\
37807_CalalaBESS_Constraints_AR, Layout: 37807_AR_F10_ImpactAss

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © NeraMap 2023 ; Proposed development supplied by Equis Energy Pty Ltd 2022/2023

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 assessment is required in areas of low potential

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential. This recommendation is conditional upon Recommendation 2 to 6.

Recommendation 2: Continued consultation with the registered Aboriginal stakeholders

As per the consultation requirements, the proponent should provide a copy of this report to the Aboriginal stakeholders and consider 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 3: Heritage induction

Heritage inductions and the inclusion of an unexpected finds procedure should be prepared. These should be provided to all site workers and contractors in order to prevent any unintentional harm to unexpected finds and Aboriginal sites located outside of the study area. This includes the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

Recommendation 4: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW. Should any unanticipated 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 5: Discovery of unanticipated historical relics

Relics are historical archaeological resources of local or State significance and are protected in NSW under the Heritage Act. Relics cannot be disturbed except with a permit or exception notification. Should unanticipated relics be discovered during the course of the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.

Recommendation 6: Discovery of human remains

If any suspected human remains are discovered during any activity you must:

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

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Appendices

Appendix 1 AHIMS results

THE AHIMS RESULTS ARE NOT TO BE MADE PUBLIC AND HAVE BEEN REMOVED FROM PUBLIC EXHIBITION