Lot 101 DP1170190, Ironbark Road Muswellbrook NSW
Aboriginal Heritage Archaeological Assessment

Freedom Development Group

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DOCUMENT TRACKING

Project Name	Lot 101 DP1170190, Ironbark Road, Muswellbrook NSW – Aboriginal Heritage Archaeological Assessment
Project Number	24SYD - 7558
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Approved by	Karyn McLeod
Status	Final
Version Number	V1
Last saved on	9 May 2024

This report should be cited as 'Eco Logical Australia, 2024. *Lot 101 DP1170190, Ironbark Road, Muswellbrook NSW – Aboriginal Heritage Archaeological Assessment*. Prepared for Freedom Development Group.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Freedom Development Group.

Template 2.8.1

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1. Introduction

1.1 Project background

Eco Logical Australia (ELA) have been engaged by Freedom Development Group to undertake an Aboriginal Heritage Archaeological Assessment for Lot 101, DP1170190 Ironbark Road, Muswellbrook NSW (hereafter referred to as 'the study area; Figure 1). The archaeological assessment will be used to inform the concept design for the proposed subdivision. The 14 staged subdivision includes 327 general residential lots, 57 large lots and 240 dual occupancy dwellings and associated public open space. Associated works will include the construction of roads, the installation of associated infrastructure, and ecological offsets. The development will involve bulk earthworks and landscape modification which could potentially have an impact on Aboriginal objects within the study area

ELA previously undertook an Aboriginal Heritage Due Diligence Assessment which identified three isolated Aboriginal objects within the study area. As such, further archaeological investigations, in the form of an archaeological assessment, were recommended to undertake a comprehensive survey to determine archaeological potential of the study area.

1.2 Study area

The study area covers Lot 101 DP1170190, Ironbark Road, Muswellbrook NSW (Figure 1) and is located within the Upper Hunter Region, in the Muswellbrook Shire Local Government Area (LGA). The study area is located approximately 4km south-east of the Muswellbrook town centre and 47km north-west of Singleton in the Parish of Rowan, County of Durham and falls within the Wanaruah Local Aboriginal Land Council (LALC) boundaries.

A concept plan of the proposed works has been provided by Spiire (Figure 2).

1.3 Purpose and objectives of the archaeological assessment

The purpose of the archaeological investigation is to establish whether any known or additional unrecorded Aboriginal objects are present, and to assess the likelihood of archaeological deposits within the study area. The assessment will determine whether further archaeological investigations are required.

This assessment documents the archaeological values within the study area and has been undertaken in accordance with the Heritage NSW, Department of Planning and Environment (Heritage NSW) *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a).

1.4 Authorship

This assessment has been prepared by ELA Archaeologist Kate Storan. It was reviewed by ELA Senior Archaeologist Jennifer Norfolk.

Kate Storan has a BA (Archaeology) from Macquarie University and Jennifer Norfolk has an MSc. (Marine Archaeology) from Southampton University.

1.5 Legislative context

NATIONAL PARKS AND WILDLIFE ACT 1974

Aboriginal cultural heritage in NSW is afforded protection under the provisions of the *National Parks and Wildlife Act* 1974 (NSW) [NPW Act]. The Act is administered by Heritage NSW, which has responsibilities under the legislation for the proper care, preservation, and protection of 'Aboriginal objects' and 'Aboriginal places'.

Under the provisions of the NPW Act, all Aboriginal objects are protected irrespective of their level of significance or issues of land tenure. Aboriginal objects are defined by the Act as, *any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of NSW, before or during the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains).* Aboriginal objects are limited to physical evidence and may be referred to as 'Aboriginal sites', 'relics' or 'cultural material'. Aboriginal objects can include scarred trees, artefact scatters, middens, rock art and engravings, as well as post-contact sites and activities such as fringe camps and stockyards. Heritage NSW must be notified about the discovery of Aboriginal objects under section 89A of the NPW Act.

Part 5 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to destroy, deface, damage, or move them from the land. *The Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (CoP) (DECCW 2010b) as adopted by the and Wildlife Regulation 2019 (NPW Regulation) made under the NPW Act, provides guidance to individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects. The CoP also determines whether proponents should apply for consent in the form of an Aboriginal Heritage Impact Permit (AHIP) under section 90 of the Act. The CoP can be used for all activities across all environments. The NPW Act provides that a person who exercises due diligence in determining that their actions will not harm Aboriginal objects has a defence against prosecution for the strict liability offence if they later unknowingly harm an object without an AHIP. However, if an Aboriginal object is encountered in the course of an activity work must cease and an application should be made for an AHIP.

The *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010a) assists in establishing the requirements for undertaking archaeological investigation without an AHIP or establishing the requirements that must be followed when carrying out archaeological investigation in NSW where an application for an AHIP is likely to be made. Heritage NSW recommends that the requirements of this Code also be followed where a proponent may be uncertain about whether or not their proposed activity may have the potential to harm Aboriginal objects or declared Aboriginal places.

ABORIGINAL LAND RIGHTS ACTS 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) established Aboriginal Land Councils (at State and Local levels). Division 1A outlines the functions of Local Aboriginal Land Councils and their statutory obligation under the ALR Act to:

> (a) take action to protect the culture and heritage of Aboriginal persons in the council's area, subject to any other law, and

(b) promote awareness in the community of the culture and heritage of Aboriginal persons in the council's area.

The study area is within the boundary of the Wanaruah Local Aboriginal Land Council (LALC).

ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979

The *Environmental Planning and Assessment Act 1979* (NSW) [EP&A Act] requires that consideration is given to environmental impacts as part of the land use planning process. In NSW, environmental impacts are interpreted as including cultural heritage impact. Proposed activities and development are considered under different parts of the EP&A Act, including:

- Major projects (State Significant Development under Part 4.1 and State Significant Infrastructure under Part 5.1), requiring the approval of the Minister for Planning.
- Minor or routine developments, requiring local council consent, are usually undertaken under Part 4. In limited circumstances, projects may require the Minister's consent.
- Part 5 activities which do not require development consent. These are often infrastructure projects approved by local councils or the State agency undertaking the project.

The EP&A Act also controls the making of environmental planning instruments (EPIs) such as Local Environmental Plans (LEPs) and State Environmental Planning Policies (SEPPs). LEPs commonly identify and have provisions for the protection of local heritage items and heritage conservation areas.

Planning decisions within LGAs are guided by Local Environmental Plans (LEPs). Each LGA is required to develop and maintain and LEP that includes Aboriginal and historical heritage items which are protected under the EP&A Act and the *Heritage Act 1977*. The study area is located in the Muswellbrook LGA and is subject to consents under the Muswellbrook LEP 2009. One of the aims of the Muswellbrook LEP 2009, Part 5.10, Clause 1 (a) and (d) is to 'to conserve the environmental heritage of Muswellbrook' and 'to conserve Aboriginal objects and Aboriginal places of heritage significance'.

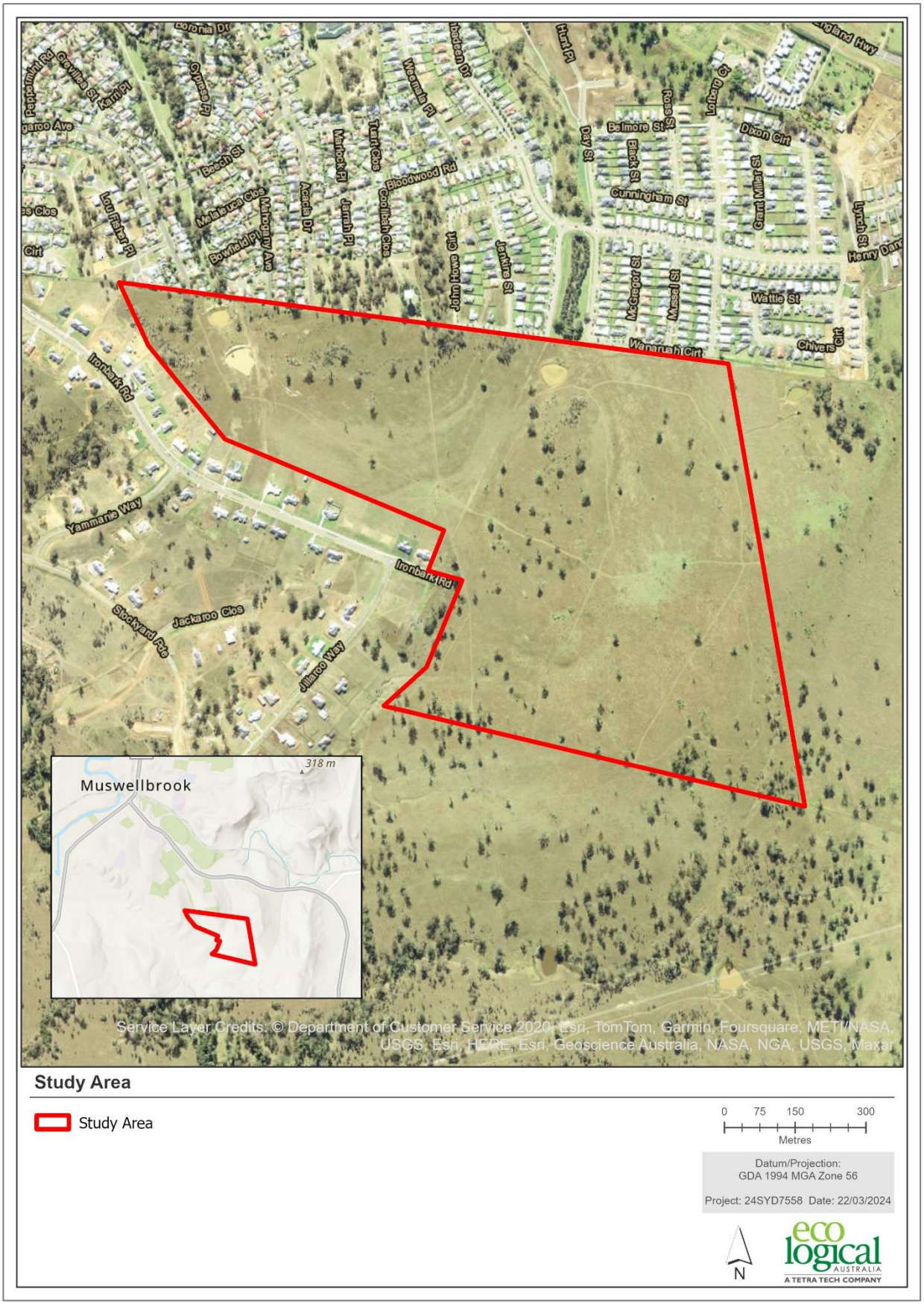

Figure 1: The study area Lot 101 DP1170190

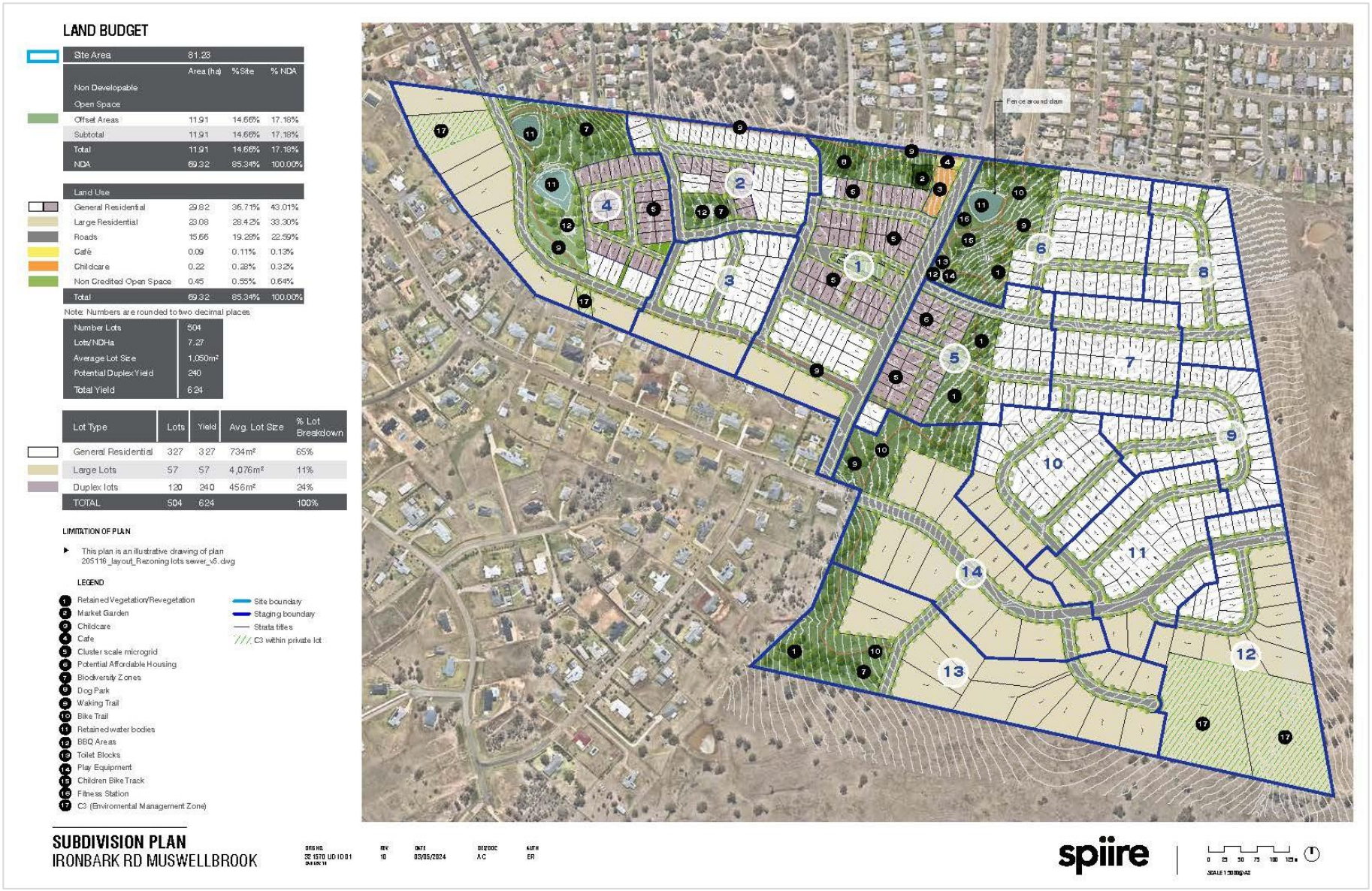

Figure 2: Concept plan for the subdivision of Lot 101 (DP1170190) Ironbark Road (Source: Spiire 2024)

2. Environmental context

Landscape, geomorphic history, and extent of disturbance within a given area all play a role in the presence and/or preservation of Aboriginal objects. As outlined in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a), this section aims to assist in the prediction of:

- The potential of the landscape to contain Aboriginal objects; and
- The ways Aboriginal people have used the landscape in the past, with reference to the presence of resource areas, surfaces for art and other focal points which may have been used for particular activities and settlement; and
- Disturbance, including historical land-use, which may have removed earlier archaeological evidence; and
- The likely distribution of the material traces of Aboriginal land use based on the above.

To investigate these elements, this section focuses on the environmental context of the current study area, including geomorphology and soils, vegetation, hydrology, and previous land use to identify potential disturbance. The study area is located within the Hunter subregion of the NSW Sydney Basin bioregion. A summary of the geology, landforms, soils and vegetation typical within this subregion is provided in Table 1 below:

Table 1: Hunter subregion located within the study area (source: NSW Department of Planning and Environment 2024)

Hunter Subregion	
Geology	A complex of Permian shales, sandstones, conglomerates, volcanics and coal measures. Bounded on the north by the Hunter Thrust fault and on the south by cliffs of Narrabeen Sandstone. Pleistocene coastal barrier system in Newcastle bight.
Characteristic Landforms	Rolling hills, wide valleys, with a meandering river system on a wide flood plain. River terraces are evident, the highest with silicified gravels. Streams can be brackish or saline at low flow. Numerous small swamps in upper catchment, extensive estuarine swamps behind the coastal barrier of beach and dunes.
Typical Soils	A variety of harsh texture contrast soils on slopes and deep sandy loam alluvium on the valley floors. Small number of source bordering dunes on southern tributaries of the Hunter. Deep sands with podsol profiles in dunes on the barrier, saline, organic muds in the estuary. Soil salinity is common on some bedrocks in the upper catchment.
Vegetation	Patches of rainforest brush in the lower valley. Forest and open woodland of white box, forest red hum, narrow-leaved ironbark, grey box, grey gum spotted gum, rough-barked apple and extensive stands of swamp oak in upper reaches and foothills. River oak and river red gum along the streams. Coastal dune vegetation of blackbutt, smooth-barked apple, coast banksias and swamp mahogany. Mangroves, salt marsh and freshwater reed swamps in the estuary.

SOIL LANDSCAPES

The study area is located within the Roxburgh (YP-rx) soil landscape (Figure 3), which occurs on undulating low hills with elevations of 80-70m and slopes of 0-10%. The underlying geology comprises Singleton coal measures, including sandstone, shale, mudstone, conglomerate, coal, weathered rock and derived colluvium.

Yellow podzolic soils occur on the upper to midslopes across much of the region and comprise an A Horizon of brown fine sandy loam to silt loam, with potential of an A2 Horizon of bleached, light brown-grey fine sandy loam (pH 6.5), to a depth of 40cm (bedrock at 80cm). Red solodic soils, comprising dark reddish brown fine sandy loams, overlie the A2 Horizon to a depth of 20cm (bedrock at 140cm) and occur on rounded hills and upper conclave slopes. Lithosols, comprising dark reddish brown light sandy clay loam, are shallow (bedrock at 35cm) and occur on crests. Brown podzolic soils, comprising very dark brown loam, overlie the dark brown A2 Horizon to a depth of 20cm (bedrock at 60cm) and occur on slopes. Yellow soloths have been recorded in some gullies.

Soils range from acidic to neutral (pH 5.5 – 7.5) and the soil landscape is moderately erodible, with some gullies (up to 3m depth). The depth and erodibility of the soil landscape indicate there is potential for *intact* deposits within undisturbed contexts across lower slopes and along drainage lines (State of NSW Department of Planning and Environment, 2024).

HYDROLOGY

A first order tributary of Muscle Creek runs through the centre of the study area (Figure 3). Muscle Creek, an ephemeral fifth order tributary of the Hunter River (*Coquun*), runs approximately 1km to the north of the study area and a third order tributary of Ramrod Creek, a first order tributary of the Hunter River, flows to the south. Associated first, second and third order streams of Ramrod and Muscle Creek flow to the north, south, east and west.

VEGETATION

The Upper Hunter Region would have provided a vast range of flora and fauna resources for past Aboriginal groups. The study area has largely been cleared for grazing, though native vegetation within the vicinity of the study area includes open woodland, narrow-leaved red ironbark, white box and yellow box with Blakely's red gum, broad-leaved red ironbark, grey gum and grey box (State of NSW Department of Planning and Environment, 2024).

LAND USE HISTORY

Land use within the study area has largely been pastoral and historic aerials of the study area from 1958 (Figure 4), 1974 (Figure 5), 1989 (Figure 6) and 1993 (Figure 7) show the study area has undergone minimal changes over time. Localised disturbance has occurred within the study area related to vegetation clearance, the installation of three artificial dams, two of which appear after 1958 (Figure 5, Figure 6) and natural erosional processes, as well as farm tracks and evidence of ploughing which appear in the 1993 aerial (Figure 7). The study area has largely been cleared of native vegetation and is currently used for cattle grazing.

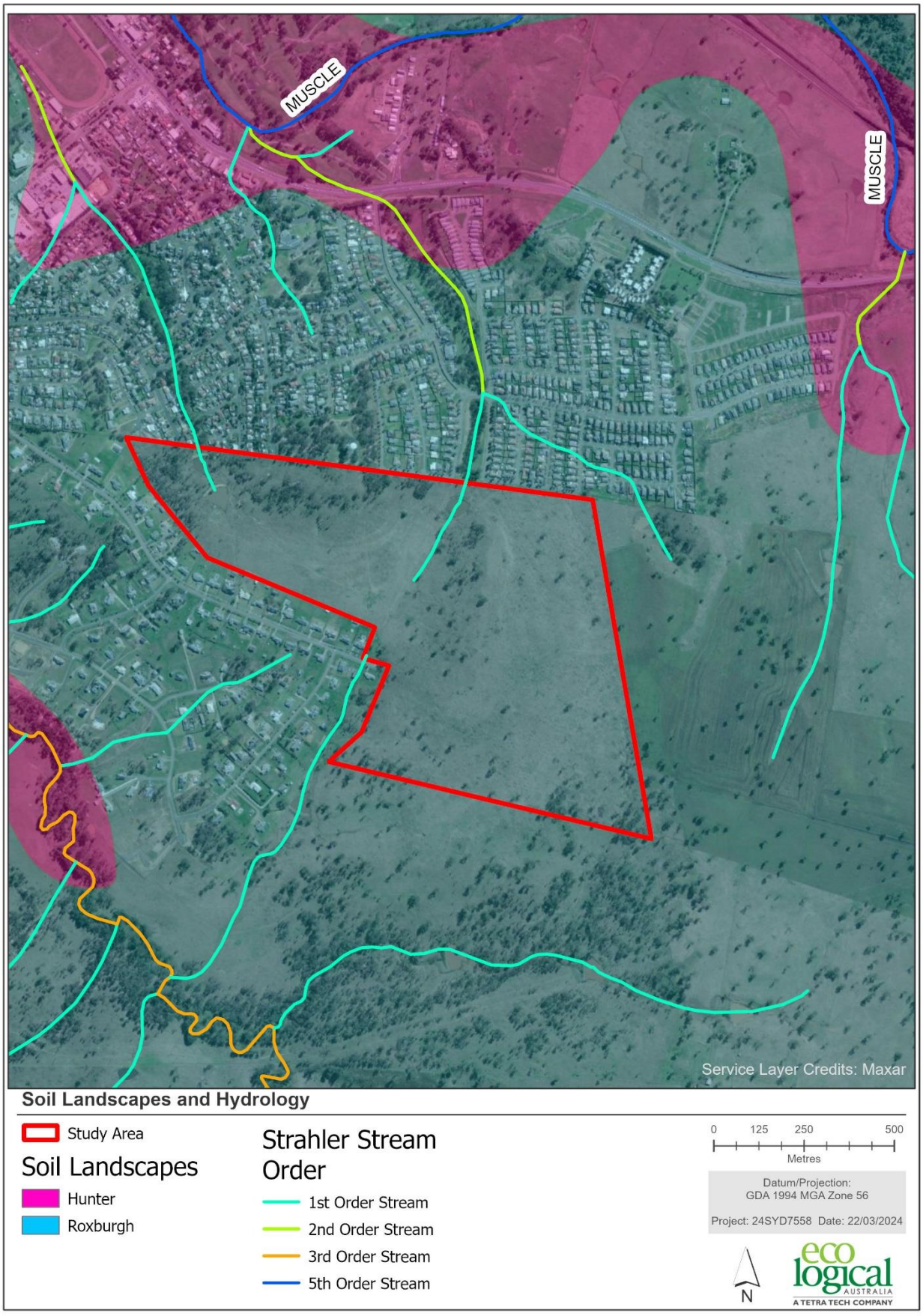

Figure 3: Soil landscapes and hydrology within the study area

Figure 4: 1958 historic aerial of study area

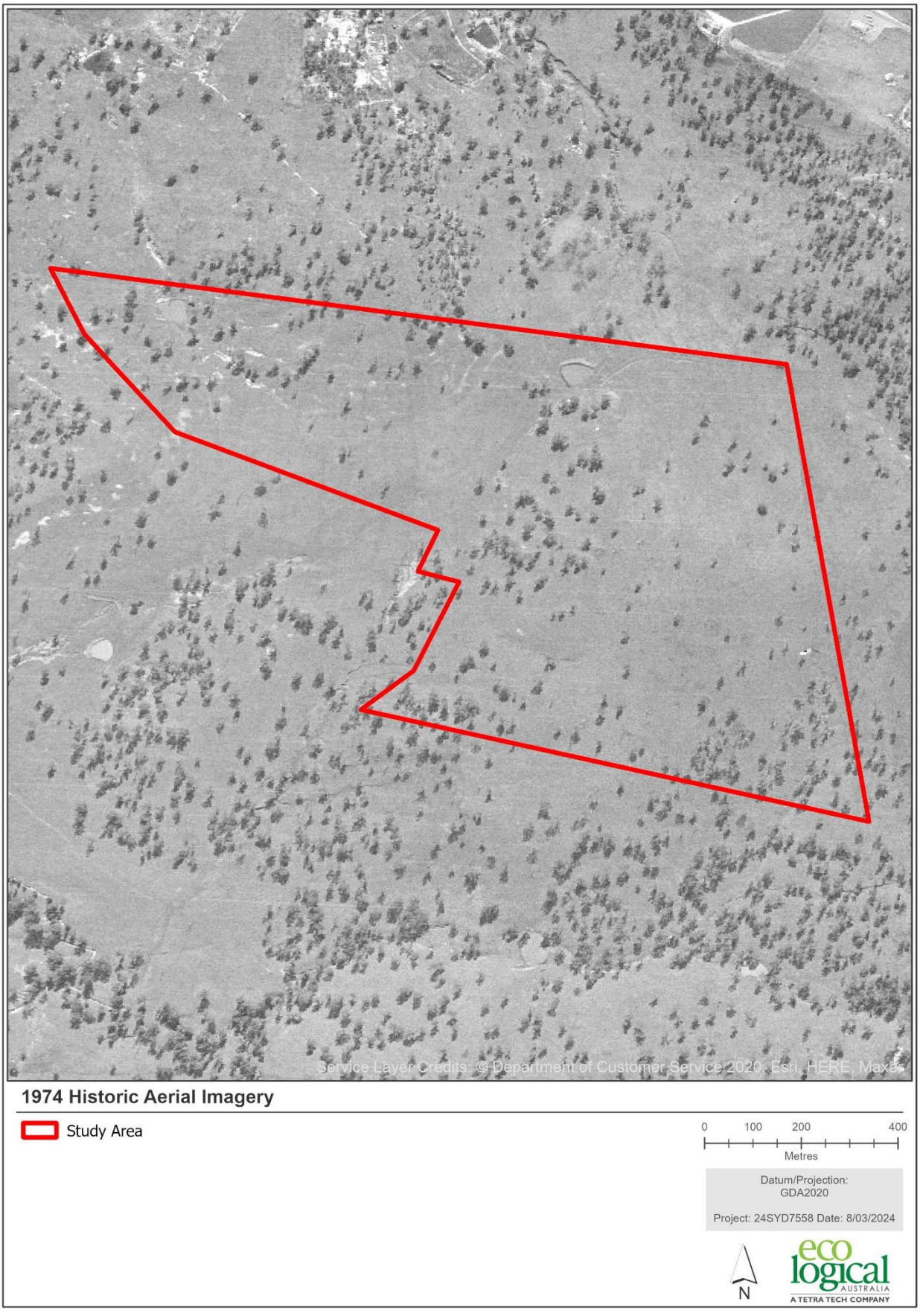

Figure 5: 1974 historic aerial of study area

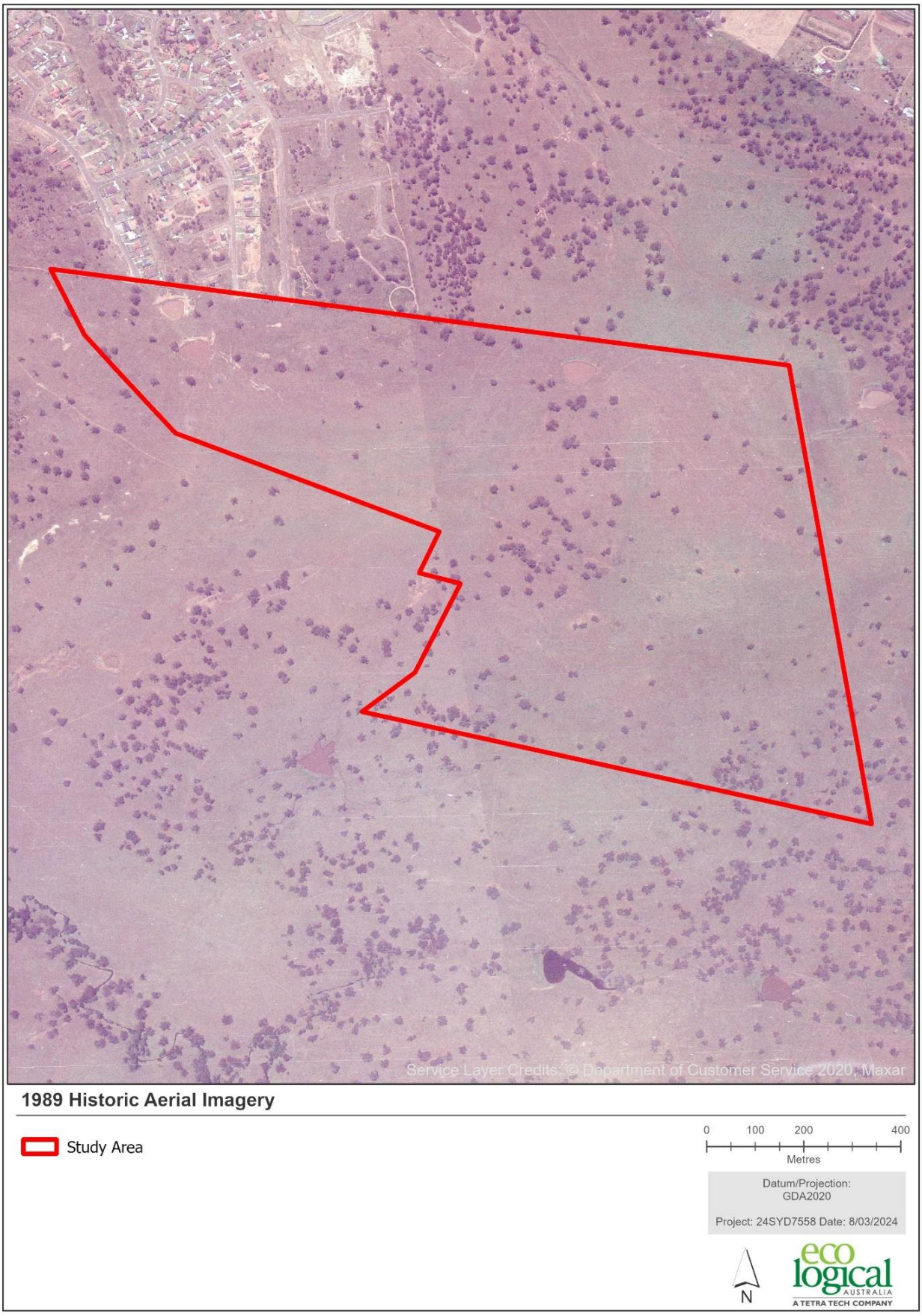

Figure 6: 1989 historic aerial of study area

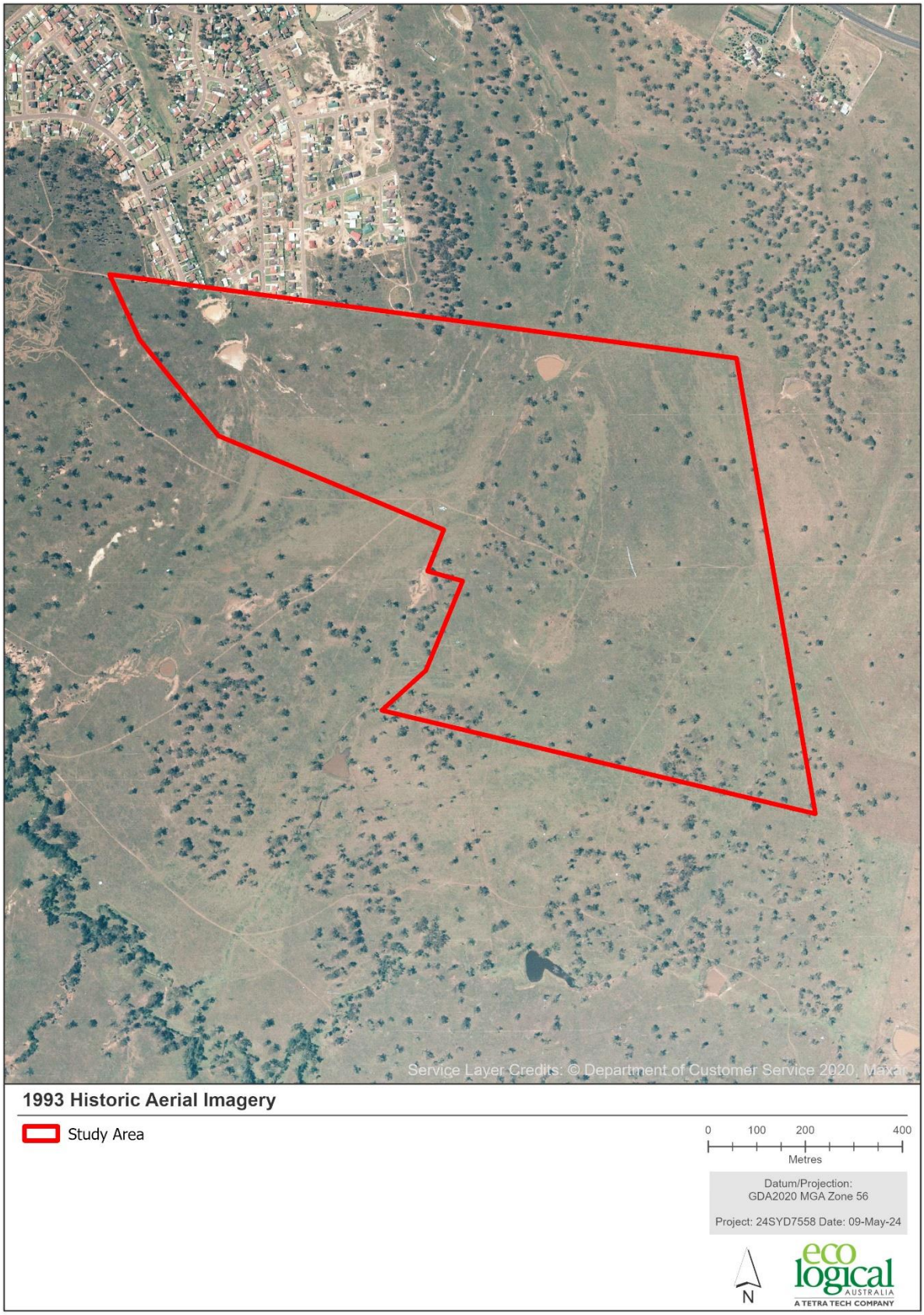

Figure 7: 1993 historic aerial of study area

3. Aboriginal context

3.1 Ethnohistory

Aboriginal people have continuously occupied Australia for at least 65,000 years (Clarkson et al 2017), utilising the land and available resources, though dates of the earliest occupation of the continent by Aboriginal people are subject to continued revision as more research is undertaken. Aboriginal people have occupied the Upper Hunter region for at least 20,000 years (Brayshaw 1987), with a reported date of >20,000 years from a hearth at Glennies Creek (Koettig, 1987), located approximately 35 km to the south-east of the study area, though the majority of dated Aboriginal archaeological sites in the Hunter Valley are less than 4,000 years of age (Kuskie & Clarke 2004).

Ethnographic resources attribute the original inhabitants of Muswellbrook to be either the Wonnarua or Geawegal (or *Keawekal*) people. Howitt (1904) describes the Geawegal boundaries as 'within the valley of the Hunter River surrounding Glendon with little interaction with the Aboriginal people of Muswellbrook', though Tindale (1974) describes the boundaries of the Geawegal to extend to Scone in the north, east to Mount Royal and encompassing Aberdeen and Muswellbrook, with the Wonnarua inhabiting the Maitland area. Brayshaw (1987) also maps Muswellbrook within Geawegal boundaries, which spans from Murrundi in the north and Ravensworth in the south, with the Wonnarua boundary immediately south of Ravensworth and west to the Goulburn Valley. Brayshaw (1987) also suggests that Kamilaroi were the dominant cultural influence in the Hunter Valley, and that Wonnarua, Geawegal and Worimi were all part of the "Kamilaroi Nation". While the ethnographic resources are conflicting, the original inhabitants of Muswellbrook were either one of the two groups, or representative of a transitional boundary between the two groups.

Today, Aboriginal and Torres Strait Islander people make up 8.3% of the population of Muswellbrook Shire which is the highest in the Hunter Valley region. Strong cultural ties to the landscape are maintained through stories of the Dreaming. A sky deity, shared by numerous groups along south-eastern Australia, is known as *Baiame* ('The Great Shaper', 'Thunder-God' or 'Great One'), who created the hills and rivers, and whose presence is felt most strongly along the rivers. Baiame was believed to return to earth to work magic or to punish transgressors of marriage rules. The story of the Dreaming is recounted by James Miller:

> *'The Valley was always there. It was there in the Dreaming, though mountains, trees, animals and people were not yet formed. The river as know it today was yet to be born. Everything was sleeping. For some unknown reason there was movement. This movement stirred from invisible forces…The spirits interacted, shaping what was nothing, into something. They gave life to the whole valley... The land held both human and animal life and was the home of the spirits who were born in the Dreaming'* (Miller, 1985).

Aboriginal people in the lower slopes and plains of the Hunter region were hunter-gatherers who would seasonally move from large, semi-permanent camps comprised of complex huts made from grass and tree branches or grass and mud over a frame along riverbanks in the summer, while in the winter months groups would disperse into smaller hearth-groups (AECOM, 2009). Men hunted for food like food like kangaroos, emus and wallaby's and women gathered bush fruits, yams, grubs and roots (Miller, 1985).

Food was often caught with nets in wooded areas, though sections of the landscape were often burnt to create favourable conditions to access game (Miller, 1985).

The material culture of the Upper Hunter region was seemingly dominated by wood and bark materials. Canoes were made from grass tree bark which was softened and shaped through the use of fire and tied with vines at either end. A hearth of clay was sometimes constructed in the centre of the canoe to cook fish. Shields were constructed from both wood and bark and often painted with white and red ochre. Wide shields were used to protect against spears, while narrow shields were used against clubs or "*waddies*". Waddies were always made from hard wood and were used in both hunting and warfare. Other raw materials, including kangaroo bone for awls, shell for scrapers and possum skin for headbands and cloaks, were widely used in the region. Lithic raw materials within the region are most commonly mudstone/tuff, though silcrete and chert is also observed in the archaeological assemblages of the Upper Hunter.

3.2 Archaeological context

3.2.1 Database searches

AHIMS SEARCH

The AHIMS database is maintained by Heritage NSW and regulated under Section 90Q of the *National Parks and Wildlife Act 1974.* The AHIMS database holds information and records regarding the registered Aboriginal archaeological sites (Aboriginal objects, as defined under the Act) and declared Aboriginal places that exist in NSW.

A search of the AHIMS database was conducted on 13 December 2023 to identify if any registered Aboriginal sites were present within, or adjacent to, the study area (Appendix A). This represents the study area and 2km surrounding the study area.

Table 2: Search parameters for the AHIMS database search and results

Search Parameters		Search Result	
GDA Zone	56	Aboriginal sites recorded	83
Eastings	300909 - 304909	Aboriginal places declared	0
Northings	6423284 - 6427284		

One Aboriginal site, AHIMS ID 37-2-2625, has been identified within the study area (Figure 8). The site is listed as 'destroyed' on the AHIMS database and was initially recorded in 2007 by ERM. The site comprised an isolated indurated mudstone flake, located on a steep, eroded slope on the eastern bank of Muscle Creek. The artefact was located in a disturbed context, indicating it was not *in situ* and thus was considered to have low potential for subsurface archaeological deposits (see site card, Appendix B). Muscle Creek is approximately 1km north of the study area, therefore the AHIMS site coordinates are incorrect. The map attached to the site card show the Aboriginal site in a different location outside the study area.

Two isolated artefact sites, AHIMS ID 37-2-2707 and AHIMS ID 37-2-2708, are located in the adjacent subdivided property, approximately 100m to the east of the study area (Figure 8) and have been subject to salvage under AHIP 3120.

The majority of Aboriginal sites within the search parameters are artefact scatters or isolated finds (90.36%). The distribution of recorded Aboriginal sites within the vicinity of the study area is shown in Figure 8 and Figure 9. The frequencies of site types recorded within the AHIMS database search area are listed in Table 3 below:

Table 3: Frequencies of site types

Site Features	Number	Percentage (%)
Artefact	75	90.36
Artefact, PAD	1	1.20
Modified Tree (Carved or Scarred)	6	7.23
Potential Archaeological Deposit (PAD)	1	1.20
Total	**83**	**100**

LOCAL, STATE AND NATIONAL HERITAGE REGISTERS

Searches of the Australian Heritage Database, the State Heritage Register (SHR) and the Muswellbrook Local Environmental Plan (LEP) 2009 were conducted on 7 March 2024 in order to determine if any places of archaeological significance are located within the study area.

No Aboriginal archaeological sites were recorded on these databases within the study area.

One built heritage item of local significance, 'Yammanie' (LEP item no. I82) is located along the southern boundary of the study area.

3.2.2 Regional Archaeological Context

A number of surveys and Aboriginal archaeological investigations have been undertaken across the wider Hunter region over the past 15 years in relation to coal mining and residential developments. A summary of some key reports is provided below:

AECOM, 2009. *ABORIGINAL ARCHAEOLOGY AND CULTURAL HERITAGE IMPACT ASSESSMENT MT ARTHUR COAL, MUSWELLBROOK, NSW*. PREPARED FOR HANSEN BAILEY.

AECOM were previously engaged by Hansen Baily, on behalf of Hunter Valley Energy Coal, to prepare an Aboriginal archaeological and cultural heritage impact assessment for the Mt Arthur Coal Consolidation Project near Muswellbrook, NSW, covering an area of approximately 618ha. This assessment was undertaken approximately 4.3km south-west of the current study area.

The AHIMS search identified 663 known sites located within the study area boundary and nine located within previously unsurveyed areas. The most common site types identified were open camp sites comprising lithic artefacts, as well as culturally modified trees and grinding grooves. A total of 94 sites, including both low to high density artefact scatters and two culturally scarred trees were identified in three additionally surveyed areas. The overall findings of the survey included:

- Sites were predominately identified within close proximity to permanent or ephemeral water sources and higher density sites were found along Fairford Creek compared with other main tributaries of Whites Creek.
- Ground surface visibility was highest along eroded and exposed creek lines.

- Indurated mudstone was the most common raw material in lithic artefacts (40.2%), followed by silcrete and quartz and complete flakes were the most dominant artefact type.

The assessment identified that a total of 105 additional sites would be impacted by the proposed works and were all considered to have low or low-moderate scientific significance due to being highly represented in the local archaeological context. It was assessed that a representative sample of these site types within the study area boundaries would be conserved within the two Conservation Areas – Saddlers Creek and Mount Arthur, as well as the proposed Offset management area. The management actions and recommendations for the assessment included:

- Continue to establish the creation of Mount Arthur and Saddlers Creek CAs.
- Ongoing consultation with local Aboriginal community to mitigate the impact of heritage values.
- Compile an updated Aboriginal Cultural Heritage Management Plan (ACHMP).

BIOSIS RESEARCH, 2011. *PROPOSED MITCHELL LINE FEEDER DUPLICATION: ABORIGINAL CULTURAL HERITAGE ARCHAEOLOGICAL REPORT*. PREPARED FOR AUSGRID.

Biosis were previously engaged by Ausgrid to undertake an Aboriginal Cultural Heritage Archaeological Report for the proposed Mitchell Line Feeder Duplication, located between Thomas Mitchell Drive and the northern part of Muswellbrook. This assessment was undertaken approximately 4.3km to the south of the current study area.

No Aboriginal sites had previously been identified within the study area, and a desktop review found common site types within the vicinity of the study area included artefact scatters and isolated finds, identified in eroded and exposed contexts in proximity to third and second order tributaries and creeks, included Muscle and Ramrod, as well as on differentiated landforms (flat sections or hill rises) and foot slopes as far as 400m from creeklines that would have provided good vantage points. Common raw materials included mudstone (71%), silcrete (47%) and quartz (16%).

A field survey of the proposed alignment found the landscape was characterised by rolling and low hills, with streams widely spaced throughout the study area. Areas of erosion and gullies caused by sheet wash were also found. The study area had largely been cleared of trees, and modern disturbances associated with human and animal activities were observed, including cattle and vehicular movement, the construction of contour banks and vegetation clearance, as well as the construction of roads which displayed high levels of disturbance. Effective survey coverage was low due to low ground surface visibility, and exposures were limited to vehicle tracks and eroded areas. Three previously unrecorded Aboriginal sites were identified during the initial field survey, a low density open artefact scatter (AHIMS ID 37-2-2805) and two isolated finds (AHIMS ID 37-2-2806 and 37-2-2807), assessed as having a low archaeological significance. One low density artefact scatter was identified during an additional survey. All identified sites were located within 400m of a watercourse. The archaeological sensitivity of the study area was identified to be moderate in three zones, associated with Ramrod Creek, a tributary of Ramrod Creek, Muscle Creek and a tributary of Muscle Creek.

Sub-surface test excavations were conducted in the zones presenting a moderate archaeological sensitivity; Area 1 situated on a mid-slope on the western side of a tributary of Ramrod Creek (within 100m); Area 2 crossed Ramrod Creek and Area 3 crossed Muscle Creek. Five test pits were excavated in Area 1 which recovered three artefacts. Six test pits were excavated in Area 2, which resulted in the

recovery of 32 artefacts, with a high density (n=29) of *in situ* artefacts (mostly grey silcrete) from Test Pit 2. Five test pits were excavated across Area 3, no artefacts were identified.

As a result, Areas 1 and 3 were assessed as presenting a moderate sensitivity and the areas associated with Test Pit 2 in Area 2 were assessed as having a high sensitivity. Recommendations included an application for an AHIP for sites that would be impacted, and a salvage should be undertaken, as a condition of the AHIP, in areas presenting a high archaeological sensitivity.

RPS AUSTRALIA, 2013. *ABORIGINAL AND NON-INDIGENOUS CULTURAL HERITAGE ASSESSMENT. MT ARTHUR COAL OPEN CUT MODIFICATION*. PREPARED FOR HUNTER VALLEY ENERGY COAL.

RPS Australia were previously engaged by Hunter Valley Energy Coal to prepare an Aboriginal and Non-Indigenous Cultural Heritage Assessment for the proposed extension of the Mt Arthur Coal Mine, located approximately 7km to the south-west of the current study area.

The desktop assessment found that the study area had previously been disturbed by farming activities, as well as by the installation of pipelines, tracks, access roads, fence lines and dams. A desktop review of investigations undertaken for the Mt Arthur Coal Mine and a search of the AHIMS database identified 301 previously recorded Aboriginal sites in vicinity of the study area, including 294 artefact scatters and isolated finds. Of these, 25 artefact sites, one area of PAD and one grinding groove were located within the proposed extension area.

A field survey was undertaken in four landform based survey units; with Survey Unit 1 comprising rolling hills intersected by Ramrod Creek, Survey Unit 2 comprising moderate to steep slopes, Survey Unit 3 comprising Saddlers Creek and several tributaries and Survey Unit 4 comprising rolling hills. The survey identified a further 28 sites within the study area, including 15 artefact scatters, 12 isolated finds and one area of PAD. All sites were identified on the mid to lower slope areas, and in proximity to creek lines.

As a result of this investigation, recommendations included where possible Aboriginal objects should remain *in situ*, and if they would be harmed by the development, they should be salvaged in accordance with the Mt Arthur Coal Aboriginal Heritage Management Plan.

AECOM, 2019. *MAXWELL PROJECT – ABORIGINAL CULTURAL HERITAGE ASSESSMENT*. PREPARED FOR MALABAR COAL LIMITED.

AECOM were previously engaged by Malabar Coal Limited to prepare an ACHA for the 'Maxwell Project', a proposed underground coal mine east of Denman and southwest of Muswellbrook. In relation to the current study area this assessment was undertaken approximately 6km to the south-east.

The desktop review identified the majority of sites within the region were located along or in proximity to creeklines and water sources (<100m) and included predominantly mudstone/tuff and silcrete flakes, cores and flake fragments. Searches of the AHIMS database found 1621 previously recorded sites within 20km of the study area, including 1594 artefact scatters and isolated finds, 18 of which had associated areas of PAD, as well as 15 culturally modified trees and five grinding groove sites. Two-hundred and twenty-seven (227) artefact scatters and isolated finds and one stone quarry were located within the boundaries of the study area.

The field survey found the study area was situated mostly on flats interspersed with low undulating and steeply sloping hills, ridges and crests near Saddlers Creek, which is fed by smaller ephemeral creeks and

drainage lines. Historical land use and disturbance was noted in relation to vegetation clearance, the construction of farm dams and erosional processes, though it was considered that most of the area retained moderate integrity.

The field survey identified a total of 47 new sites within the study area, all comprising artefact scatters and isolated finds, bringing the total number of sites within the study area to 275. These sites were predominantly flake debitage (76%), including complete flakes (44%), flake shatter (27%) and proximal flakes (3%) made of silicified tuff (76%) and silcrete (21%). The sites were assessed as presenting a low to moderate archaeological potential, and the RAPs identified the study area was situated within a landscape with broader cultural significance, in proximity to Mt Arthur, the Hunter River and Saddlers Creek.

As a result, recommendations included an ACHMP be developed, which should include an archaeological salvage program, mitigation measures for the conservation of Aboriginal sites and subsistence monitoring.

JACOBS, 2021. *LIDDELL BATTERY AND BAYSWATER ANCILLARY WORKS PROJECT – ABORIGINAL CULTURAL HERITAGE ASSESSMENT.* PREPARED FOR AGL MACQUARIE PTY LTD.

Jacobs were previously engaged by AGL Macquarie Pty Ltd to prepare an ACHA for the Liddell Battery and Bayswater Ancillary Works Project, located within the Bayswater and Liddell Power Stations, approximately 12km to the south-east of the current study area.

A desktop review of archaeological investigations undertaken within and in proximity the study area found that the most commonly occurring sites were artefact scatters and isolated finds, as well as areas of PAD, located on elevated landforms adjacent to ephemeral waterways, with dominant raw materials including indurated mudstone and silcrete. The desktop review indicated Aboriginal sites were unlikely to be located in areas of high disturbance, sub surface deposits or areas of archaeological potential were likely to be within 200m of a water source (river or creek) and ridgelines and hills would often have a lower density artefact but may be of higher cultural significance.

The field survey found there as low-nil surface visibility but re-identified one previously recorded artefact scatter and identified 13 new sites within the study area, all comprising artefact scatters and isolated finds, including silcrete and mudstone flakes and flaked pieces, a basalt axe and silcrete core. All identified sites were assessed as presenting a low archaeological significance and were highly representative of sites within the region.

Recommendations included a cultural heritage management plan be developed for the sites.

EVERICK HERITAGE, 2021. *DENHAM SOLAR PARK, DENHAM ROAD MUSWELLBROOK – ABORIGINAL CULTURAL HERITAGE ASSESSMENT.* PREPARED FOR DPI AUSTRALIA.

Everick Heritage were previously by DPI Australia to prepare an ACHA for the proposed development of a Solar Park at Lot 400 Denman Road, Muswellbrook, located approximately 15km to the south-west of the current study area.

A search of the AHIMS database identified 64 previously recorded Aboriginal sites within the vicinity of the study area, including 8 isolated finds and one stone artefact scatter within study area. The desktop

review found the highest density of Aboriginal sites were found in the Central Lowlands subregion, <100m from natural watercourses and on alluvial terraces and gentle slopes.

The field survey found the study area was covered in dense grass, limiting surface visibility. The survey identified five areas of PAD and 54 stone artefacts on the crest (n=34), and upper slopes (n=16), with 4 sites identified on the middle and lower slopes. The majority of the identified sites were silcrete and indurated mudstone flakes (n=45) and cores (n=7). The newly identified sites were considered to represent the same site extent as the previously recorded sites within the study area.

Test excavations were subsequently undertaken across all landforms in the areas in proximity to the Hunter River. Two subsurface stone artefacts, a pink silcrete flake and a dark red quartzite retouched flake, were recovered from two of the 34 test pits. Both artefacts were recovered between a depth of 50-100mm, on the crest landform and on the upper slope. No further subsurface deposits were recovered. The subsurface site was considered to form part of the surface artefact scatter (AHIMS ID 37-2-5976) and was assessed as presenting a low to moderate archaeological significance.

The survey and test excavation found that the crest landform was the most archaeologically sensitive, and would have provided an elevated, relatively flat and well drained campsite location with views across the floodplain to the Hunter River, though clearing and grazing likely brought surface artefacts to the surface. Recommendations include an AHIP be sought prior to any development within the study area, and salvage and community collection be undertaken as a condition of the AHIP.

3.2.3 Local Archaeological Context

INSITE HERITAGE, 2016. *DUE DILIGENCE ASSESSMENT – ABORIGINAL CULTURAL HERITAGE PROPOSED REZONING LOT 101 & 103 DP 11701090 MUSWELLBROOK NSW*. PREPARED FOR CASSON PLANNING AND DEVELOPMENT SERVICES.

Insite Heritage were previously engaged by Casson Planning and Development Services, on behalf of Faye Webber, to undertake an Aboriginal Archaeological Due Diligence Assessment for the proposed rezoning of Lots 101 and 103 DP 1170190, Ironbark Road Muswellbrook. The assessment was undertaken within the boundaries of the current study area.

The AHIMS search identified three isolated finds within the vicinity of the study area, indicating the area is likely to have been occupied in a transitory manner. AHIMS ID 37-2-2707 and AHIMS ID 37-2-2708 area located outside of the study area and one site, AHIMS ID 37-2-2625 had previously been identified within the study area, however, the site card showed it was located approximately 1.3km to the east and had been subject to a consent to destroy (#2925) and collection permit (#2933). The desktop assessment found the study area had been cleared and historically used for grazing, with numerous farm tracks and remnant shade trees, indicating some prior disturbance.

A visual inspection of the study area was undertaken with a member of the LALC. The western portion of the study area comprised two dams, mature ironbark trees with some regrowth, and was noted to have poor visibility due to grass cover, with exposures around the dam walls, along cattle pads and in the eroded area to the east of the dams. The eastern portion of the study area comprised one dam, farm tracks, a small gully system in the south-eastern corner and two naturally scarred trees. It is noted in Insite's assessment that '*due to the size of the transect, much was driven over, with areas of exposure*

targeted'. All identified lithic material comprised small boulders of fine grained sandstone or poor quality ironstone, as well as one small piece of quartzite.

The assessment did not relocate any evidence of Aboriginal occupation in the study area, and it was considered there was insufficient evidence of archaeological potential to warrant any further assessment.

AECOM, 2021. NEW ENGLAND HIGHWAY BYPASS OF MUSWELLBROOK – REVIEW OF ENVIRONMENTAL FACTORS. PREPARED FOR TRANSPORT NSW.

AECOM were previously engaged by Transport NSW to prepare a Review of Environmental Factors (REF) for the proposed construction of the New England Highway Bypass in Muswellbrook, NSW. As part of the assessment, Kelleher Nightingale Consulting (KNC) prepared an ACHA (KNC 2021). This assessment was undertaken approximately 3km to the east of the current study area.

A search of the AHIMS database identified 117 Aboriginal sites within the vicinity of the study area, including artefact scatters and isolated finds (n=108) and culturally modified trees (n=7). The AHIMS search identified 12 previously recorded sites within the study area, comprising artefact scatters and isolated finds.

A program of test excavation was undertaken at 11 of the 12 identified sites, which confirmed the presence of subsurface archaeological deposits, of varying density, in all tested areas, indicating the diversity of Aboriginal activities undertaken across the study area. The identified sites were assessed as presenting a low to moderate archaeological significance. Three areas of cultural significance were also identified, including a cultural resource area, cultural line of sight and traditional pathway.

Recommendations included an Aboriginal Heritage Management Plan be prepared, an AHIP be sought prior to any construction, and mitigated archaeological salvage should be conducted at two moderately significant sites that would be substantially impacted by the proposal. The other sites presenting a low – moderate significance were considered to be only marginally impacted by the proposal and thus salvage was not warranted.

EMM, 2023. *MUSWELLBROOK SOLAR FARM – ABORIGINAL CULTURAL HERITAGE ASSESSMENT*. PREPARED FOR ESCO PACIFIC.

EMM were previously engaged by ESCO Pacific, in partnership with Idemitsu Australia, to undertake an ACHA for the proposed development of an approximately 482 hectare solar farm within the Muswellbrook LGA. This assessment was undertaken between Sandy Creek Road and Muscle Creek Road, approximately 3km to the north-east of the current study area.

A desktop review of archaeological investigations undertaken within the vicinity of the study area found 6 previously recorded Aboriginal sites within the study area, and the most commonly occurring site types are low density stone artefact scatters and isolated finds (97%), comprising mostly unmodified flakes, as well as cores and backed blades. Mudstone is the most common lithic material within the region, followed by silcrete, though quartz, tuff and quartz and rhyolite also occur. These assessments also found that the majority of recorded sites are located along Muscle Creek or within 100m of a watercourse, subsurface archaeological deposits are typically confined to the A horizon or topsoil (generally <25cm) and these sites were often low density and situated in disturbed contexts. High levels of disturbance related to vehicle tracks, mining infrastructure, water management, dams and eroded

exposures have damaged and disturbed many sites across the region, limit the potential for *intact* subsurface deposits.

The field survey found the study area was situated on a gently undulating plain with limited surface visibility, within a well-resourced landscape and surrounded by major water bodies, including Muscle Creek. The study area had been subject to disturbance related to pastoralism, vegetation removal and soil destabilisation, though there was limited evidence of extensive or high disturbance. The field survey identified 11 new Aboriginal sites, including 3 low density artefact scatters, 7 isolated artefacts, one potentially culturally modified tree as well as one of the previously recorded stone artefact sites (AHIMS ID 37-2-1845). The sites were generally located on low hills or along exposed creek banks and access tracks and comprised mudstone, chert and tuff artefacts.

A test excavation was subsequently undertaken. A total of 122 test pits were excavated, with the main focus on the surrounds of Muscle Creek, a focal point in the region, and test pits generally situated on the flat plains or low hill landforms, which were noted to be flood prone. A total of 52 artefacts were recovered across the test pits, with the highest concentrations between 0-20cm, and few (15%) below 30cm. The assemblage was dominated by indurated mudstone (44%), chert (23%) and silcrete (23%). No formal tools were identified, with artefacts comprising 21 complete flakes, 28 broken flakes and one core fragment, indicating the site was not used as intensely as other parts of the Hunter Valley.

The assessment found sites were predominantly found on lower slopes and in proximity (<200m) to water courses, near the confluence of Muscle Creek and at the confluence of two minor tributaries, The excavation demonstrated the archaeological resource within the region is characterised by a background scatter of low density artefact sites or isolated stone artefacts, within which discrete areas of high density or complex occupation can be found, though past disturbance including erosion, creek meandering and human activities could impact the cultural resources. The recovered artefact typology indicated the sites within the study area had been occupied within the last 5000 years.

As a result of this assessment, the sites were assessed as presenting a low to moderate archaeological significance, and recommendations included an ACHMP be developed for the study area.

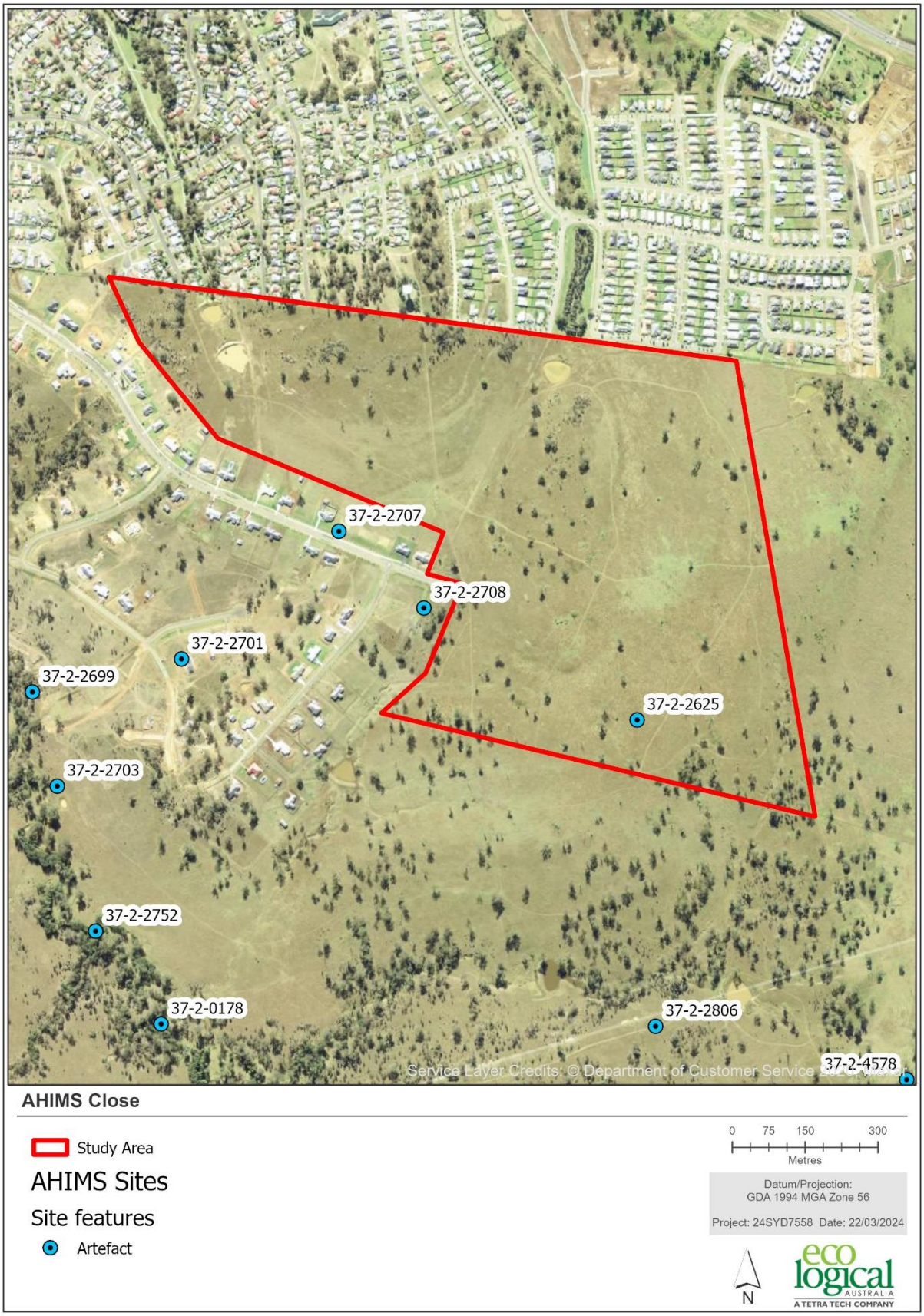

Figure 8: Registered AHIMS sites within the study area

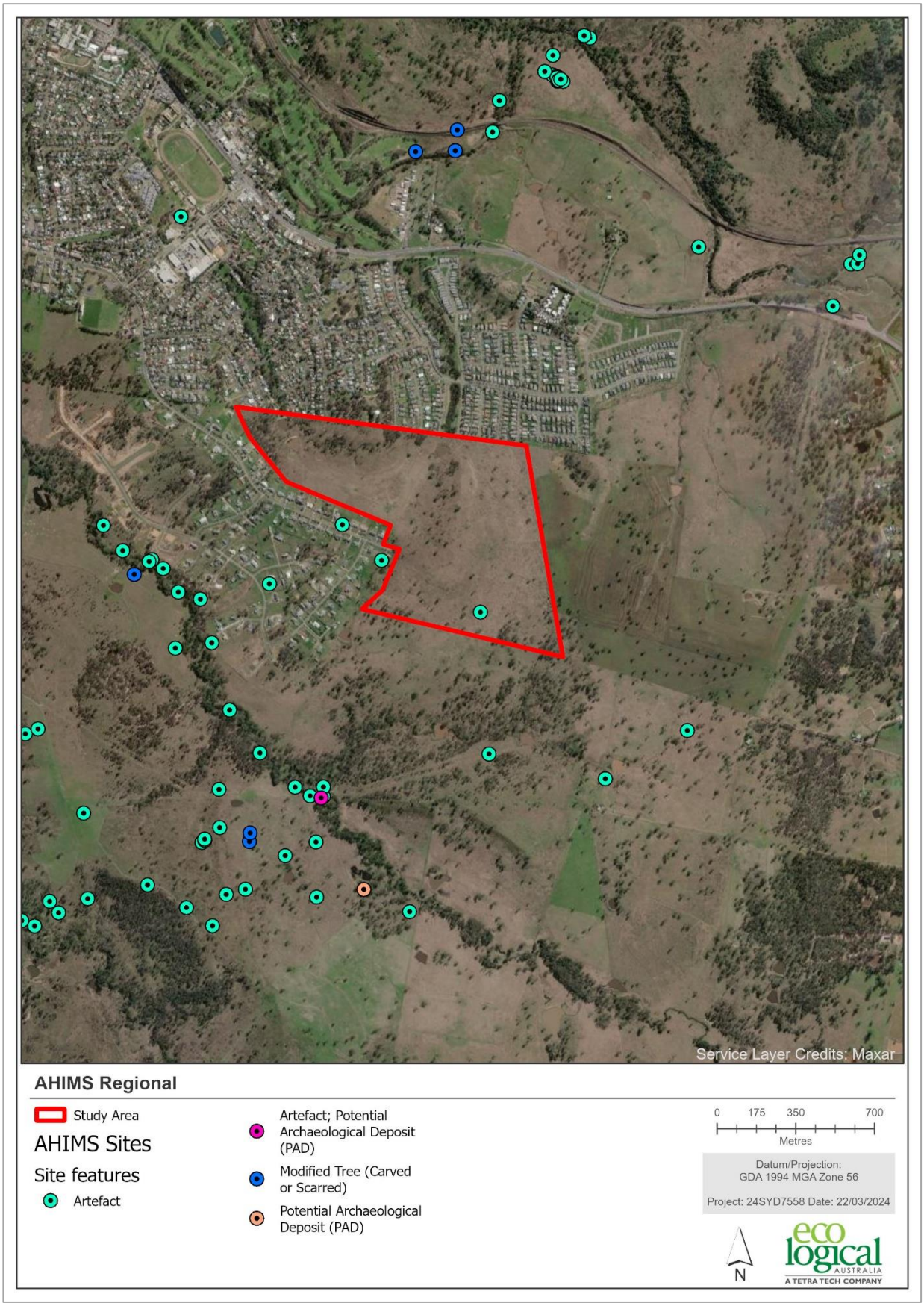

Figure 9: Regional overview of AHIMS sites surrounding the study area

4. Regional character and predictive model

4.1 Regional character

Previous archaeological assessments across the region provide important data on Aboriginal archaeological site distribution and typology from which an understanding of the archaeological landscape within the study area can be developed.

Aboriginal people have continuously occupied Australia for at least 65,000 years (Clarkson et al 2017) and the Upper Hunter region for at least 20,000 years (Brayshaw 1987), with a reported date of >20,000 years from a hearth at Glennies Creek (Koettig, 1987), though the majority of dated Aboriginal archaeological sites in the Hunter Valley are less than 4,000 years of age (Kuskie & Clarke 2004).

A review of archaeological investigations undertaken within the vicinity of the study area have found the most commonly occurring site types are low density stone artefact scatters and isolated finds. These sites are often identified in eroded and exposed locations along access tracks or creek banks, on low hills and on elevated landforms in proximity (<200m) to Muscle Creek, a focal point in the region, and other water courses (creeks and rivers) (AECOM 2009; Biosis 2011; RPS 2013; Jacobs 2019; Everick 2021; EMM 2023), which would have provided good vantage points.

Indurated mudstone is the most common lithic raw material within the region, followed by silcrete, with minor occurrences of quartz, chert, tuff, quartz and rhyolite (AECOM 2009; Biosis 2011; EMM 2023) and flakes (complete or broken) are the most common artefact type, though cores, flake fragments and backed blades also occur (AECOM 2019; EMM 2023).

These studies have also found that subsurface archaeological deposits are typically confined to the A horizon or topsoil (<25cm) and these sites are often low density and situated in disturbed contexts and in proximity to creeks and water courses (Biosis 2011; Everick 2021; EMM 2023). Subsurface investigations have recovered low-density assemblages dominated by mudstone, chert and silcrete and comprising broken and complete flakes, indicating the area may not have been more transient than other parts of the Hunter Valley and demonstrating the archaeological resource within the region is characterised by a background scatter of low density artefact sites or isolated stone artefacts, within which discrete areas of high density or complex occupation can be found (EMM 2023). It should be noted that whilst the artefact densities recovered may be low, they are often situated in a landscape of broader cultural significance (AECOM 2019).

High levels of disturbance across the region related to natural creek meandering, erosional processes and human activities, including pastoral land use and the installation of mining infrastructure and water management, have damaged and disturbed many sites across the region, limiting the potential for *intact* subsurface deposits and indicating Aboriginal objects are unlikely to be located in areas of high disturbance (Biosis 2011, AECOM 2009, RPS 2013; Jacobs 2019; EMM 2023).

4.2 Predictive models

Predictive models are a commonly utilised tool in the planning and management of Aboriginal cultural heritage. These models aim to identify specific landforms and places within the landscape which may contain archaeological material. They usually begin as geographically broad models, constructed through extensive reviews of the available literature to determine basic patterns of site distribution, before being refined according to specific landforms and the environmental characteristics of a study area.

Predictive models are primarily based upon a cultural ecological perspective of the landscape. This is because landforms and environmental characteristics provided a distinct set of subsistence constraints which meant the landscape could only be occupied in particular ways in order to minimise distance to portable water, maximise biodiversity, and provide shelter from the elements. As such, land use patterns are expected to vary between environmental zones due to differing constraints, a difference that manifests in varying spatial distributions of archaeological material. Social factors may have also influenced communities to venture through or avoid certain landscapes, regardless of environmental conditions, which is why we must consult with local Aboriginal knowledge holders and community members to understand to understand the cultural context of certain landscapes.

4.2.1 Site types

There are several common Aboriginal cultural heritage site types that may be found in the study area.

Open camp sites / stone artefact scatters represent past Aboriginal subsistence and stone knapping activities and may include archaeological remains such as stone artefacts and hearths. This site type usually appears as surface artefact scatters in areas where vegetation is limited, and ground surface visibility is high. They are also often exposed by erosion, agricultural events (such as ploughing), and the creation of informal, unsealed vehicle access tracks and walking paths. Open campsites are often located on dry, relatively flat land along or adjacent to rivers and creeks. Sites that contain surface or subsurface deposits resulting from repeated or continuous occupation are more likely to occur on elevated ground near permanent, reliable water sources. Flat, open areas associated with creeks and their resource-rich environments would have offered ideal camping areas to the Aboriginal inhabitants of the local area.

Isolated artefacts may represent a single item discard event or the result of limited stone knapping activity. The identification of isolated artefacts may indicate the presence of a more extensive, subsurface in situ archaeological deposit, or a larger deposit obscured by low ground visibility. Isolated artefacts are likely to be located on landforms associated with a range of activities, such as ridge lines that would have provided ease of movement through the area and level areas with access to a water source. Artefact scatters and isolated artefacts are the most common site types found in association with fresh water and/or food resource gathering areas.

Potential Archaeological Deposit (PAD) are areas where there is no surface expression of stone artefacts, but, due to a landscape feature or isolated artefact, there is a strong likelihood that the area will contain subsurface *in situ* archaeological deposits. Landscape features that may indicate a PAD include proximity to reliable water sources, particularly terraces and flats, ridge lines and ridge tops, and sand dune systems.

Culturally modified trees exhibit evidence of the deliberate removal of the *periderm* (outer bark), *phloem* (inner bark), and, in some cases, the sapwood. These materials can be used to manufacture a variety of items, including shields, Coolamon (bowls or trays), watercraft, containers, and a range of wooden tools and implements. Trees may also have been scarred in order to gain access to food resources (such as cutting toeholds so as to climb the tree and catch possums or birds) or to mark locations (such as tribal territories). In some instances, Aboriginal people marked important features or locations (such as ceremonial grounds) by carving patterns or motifs into the sapwood of established trees or bending and grafting the branches of saplings to create rings.

Grinding grooves are the physical evidence of tool making or food processing activities undertaken by Aboriginal people. The manual rubbing of stones against other stones creates grooves in the rock; these are usually found on flat areas of abrasive rock such as sandstone in close proximity to water courses.

Bora grounds / ceremonial sites are locations that have spiritual or ceremonial values to Aboriginal people. Such sites may comprise natural or altered landforms and, in some cases, will also contain archaeological material. For example, bora grounds are a ceremonial site type usually consisting of a cleared area around one or more raised earth circles connected by a pathway. Bora grounds are often accompanied by ground drawings or mouldings of people, animals or deities, or geometrically carved designs on the surrounding trees.

Burials often took place in proximity to camp sites, as most people tended to die in or close to camp and it is difficult to move a body over a long distance. Soft, sandy soils on or close to rivers and creeks allowed for easier removal of earth for burial. Similarly, rock shelters or middens also provided accessible burial places. Burial sites may be marked by stone cairns, modified trees, or a natural landmark. They may also be identified through historic records or oral histories.

Contact / historical sites can include a wide variety of sites and may be identified through artefactual evidence or oral histories. Artefacts located at such sites may involve the use of introduced materials such as glass or ceramics or may have social significance regarding the interaction between Aboriginal people and European settlers.

4.2.2 Site occurrence

Based on the results from the landscape assessment, searches of the AHIMS database and examination of the regional and local Aboriginal archaeological context, the below predictive model (Table 4) has been designed for the study area.

Table 4: Predictive model for the occurrence of archaeological site types in the study area

Site Type	Description	Likelihood of occurrence
Open camp sites / stone artefact scatters / isolated finds	Artefact scatters and isolated artefacts are the most common site types found in association with fresh water, and/or food resource gathering areas. Artefact scatters and isolated finds are reported to be the most common archaeological site type in the vicinity of the study area, occurring within close proximity to water sources and in undisturbed contexts. Three isolated stone artefact sites were identified during the due diligence site inspection, and several artefact sites have been recorded in proximity to the study area indicating this is likely to occur.	High

Site Type	Description	Likelihood of occurrence
Potential Archaeological Deposits	Three isolated stone artefact sites were identified during the due diligence site inspection, and several artefact sites have been recorded in proximity to the study area indicating areas of archaeological potential are likely to occur on low hills and in areas that have not been disturbed.	Moderate
Culturally modified trees	Culturally modified trees may be present wherever tree specimens of an appropriate age are present. No scarred trees have been recorded within the study area, and the study area has largely been cleared of native vegetation indicating this is unlikely to occur.	Low
Axe grinding grooves	There are no recorded grinding grooves within proximity to the study area, and the underlying geomorphology of the study area is not conducive to this site type indicating this is unlikely to occur.	Low
Bora grounds / ceremonial sites	There are no reported bora/ceremonial sites within the vicinity of the study area.	Low
Burials	There are no recorded burial sites in proximity to the study area. The study area is not located within a sand dune system or within 200m of a major water source, indicating this is unlikely to occur.	Low
Contact / historical sites	Contact sites may occur in any area where Aboriginal people encountered early European settlers, however there is no evidence to suggest this will occur within the study area.	Low

5. Archaeological survey

5.1 Purpose

The purpose of the survey was to assess the current condition of the site and to identify any unrecorded Aboriginal sites or objects. Areas of subsurface archaeological potential identified in the desktop assessment were also inspected and potential areas for archaeological testing were considered.

5.2 Survey strategy

Archaeological survey of the study area was conducted on foot, in accordance with the *Code of Practice*. The overall strategy was to complete a full coverage survey, targeting areas of exposure and archaeological sensitivity. A handheld Global Positioning System (GPS) was used to track the survey area covered and record the location of key features such as disturbances and areas of archaeological sensitivity/potential. The coordinate system projection used for all site recording was GDA94 MGA 56.

The field survey methodology was as follows:

- Record the landform, general soil information, surface conditions and vegetation conditions encountered during the survey and how these impact on the visibility of objects.
- Define the boundaries of any Aboriginal sites and areas of PAD based on landmarks and historical maps.
- Reinspect previously identified Aboriginal sites and areas of archaeological potential within the study area.
- Identify areas of disturbance which may have impacted the presence of intact soils and archaeological features.
- Consultation with Aboriginal representatives to discuss the potential intangible cultural heritage values of the study area.
- Collect information to ascertain whether further archaeological investigation is required.

All ground exposures were examined for Aboriginal objects, such stone artefacts, or other traces of Aboriginal occupation and old growth trees, were examined for signs of cultural manipulation, manufacture, scarring and/or marking. A photographic record was kept during the survey. Photographs were taken to record aspects of survey units including vegetation and disturbance. Scales were used for photographs where appropriate.

5.2.1 Site definition and recording

An Aboriginal site is generally defined as an Aboriginal object or place. An Aboriginal object is the material evidence of Aboriginal land use, such as stone tools, scarred trees, or rock art. Some sites, or Aboriginal places can also be intangible and although they might not be visible, these places have cultural significance to Aboriginal people.

The Heritage NSW guidelines state, in regard to site definition, that one or more of the following criteria must be used when recording material traces of Aboriginal land use:

- The spatial extent of the visible objects, or direct evidence of their location.

- Obvious physical boundaries where present, e.g., mound site and middens (if visibility is good), a ceremonial ground.
- Identification by the Aboriginal community on the basis of cultural information.

For the purposes of this study, an Aboriginal site was defined by recording the spatial extent of visible traces or the direct evidence of their location.

5.2.2 Protocol for recording Potential Archaeological Deposits

Where areas of PAD are identified towards the margins of each survey unit, efforts must be made by the survey team to delineate each area of potential beyond the survey unit. Where the extent of the PAD extends beyond the survey unit, efforts must be made to map the extent of that feature up to approximately 50m outside the survey unit. If it is likely that these PADs continue beyond that point, the survey team must justify that the distance is adequate to provide an accurate representation of the PAD with regard to future planning and design for the project.

5.3 Survey results

An archaeological survey was undertaken by ELA Senior Archaeologist Jennifer Norfolk, ELA Archaeologist Kate Storan, ELA Graduate Archaeologist Chloe Verman and two Heritage Officers from the Wanaruah Local Aboriginal Land Council (LALC), Les Atkinson and Wayne French on 14 March 2024.

SURVEY UNIT 1

Survey Unit 1 (SU1) comprises a moderately sloping, crest landform in the south-eastern portion of the study area (Figure 36), situated within a wider low-lying hill landform overlooking the valley (Figure 11). SU1 has undergone minor observable ground disturbance, with localised disturbance related to remnant farm tracks, vegetation clearance and the natural gully erosion along the drainage line (Figure 10 – Figure 13). Native vegetation within SU1 has largely been cleared, with remnant woodland trees scattered along the slopes (Figure 11, Figure 12).

Surface visibility (5-10%) and exposures (5%) within SU1 were low due to dense vegetation and grass cover (Figure 10 – Figure 12, and exposures were limited to the natural erosional processes along the drainage line in the south-eastern corner of the study area (Figure 13). Exposures revealed angular shales and dark brown organic loams, and no surface artefacts were identified in any areas of exposure in SU1.

No Aboriginal objects or areas of archaeological potential were identified. There were several areas of exposure along the gully erosion. No cultural markings were observed on any trees within SU1.

Figure 10: South-eastern portion of study area, view north showing dense vegetation and sloping landform towards crest.

Figure 11: South-eastern portion of study area, view south along crest showing wider undulating hills and valley, sloping landform and dense vegetation.

Figure 12: Natural gully erosion along drainage line in south-eastern corner of study area.

Figure 13: Natural gully erosion in south-eastern corner of study area revealing exposed dark brown loams.

SURVEY UNIT 2

Survey Unit 2 (SU2) comprises a gently sloping landform in the south-western portion of the study area (Figure 36), situated within a wider low-lying hill landform overlooking the valley (Figure 14, Figure 16). SU2 has undergone moderate levels of ground disturbance related to past agricultural activities, ploughing, vegetation clearance and farm tracks (Figure 15, Figure 17). Native vegetation within SU2 has largely been cleared, with remnant woodland trees scattered along at the base of the slope (Figure 16, Figure 17).

Surface visibility within SU2 was low (10%) due to dense vegetation and grass cover (Figure 14, Figure 16) and exposures were low (5%), limited to areas of disturbance along the south-western boundary, resulting from past ploughing and agricultural activities. Exposures revealed mixed deposits of bedrock and reddish-orange loams (Figure 15, Figure 17) and no surface artefacts were identified in any areas of exposure.

No mature trees, cultural markings or areas of archaeological potential were observed in SU2, and no surface artefacts were identified in any areas of exposure.

Figure 14: South-western portion of study area, view west showing dense vegetation and slope.

Figure 15: South-western corner of study area, view west showing evidence of ploughing, with mixed deposits of bedrock and red-orange loams at base of slope.

Figure 16: View east from south-western corner of study area showing sloping landform and remnant trees.

Figure 17: South-western corner of study area, view north showing base of slope, dense vegetation and evidence of ploughing.

SURVEY UNIT 3

Survey Unit 3 (SU3) comprises a moderately sloping landform in in the north-eastern portion of the study area (Figure 36). SU3 has undergone varying degrees of ground disturbance related to remnant farm tracks, vegetation clearance, the construction of an artificial dam, natural erosional processes and past agricultural activities (Figure 19). Moderate levels of disturbance were observed in the north-eastern corner of the study area, where there was evidence of ploughing (Figure 26) and native vegetation within SU3 has largely been cleared, with remnant woodland trees scattered along the slopes (Figure 18 and Figure 19). No cultural markings were observed on any trees within SU3.

Surface visibility within SU3 was low (15%) due to dense vegetation and grass cover and overall exposure within SU3 was low (10%), with moderate exposure along the edge of the artificial dam. Exposures around the edge of the dam revealed a relatively intact soil profile, with deposits of reddish-orange loams (Figure 21).

Four Aboriginal objects, including one rhyolite core (Figure 20), two silcrete flakes (Figure 23, Figure 25) and one silcrete backed blade (Figure 24), were identified in exposures around the edge of the dam and along the access track to the dam in SU3. These scattered aboriginal objects identified in exposed areas

indicate a larger artefact scatter is likely present (Ironbark AS 1 – AHIMS ID pending). There is a potential for further Aboriginal objects to be identified subsurface. The area of archaeological potential skirts the dam at the base of the slope (Figure 37), in association with the artefact scatter and where the landform remains relatively intact (Figure 19, Figure 22). This area was considered as a possible testing location.

Figure 18: View west showing remnant woodland and slope.

Figure 19: North-eastern portion of study area, view east showing dense vegetation, dam and sloping landform.

Figure 20: Rhyolite core identified along northern edge of dam.

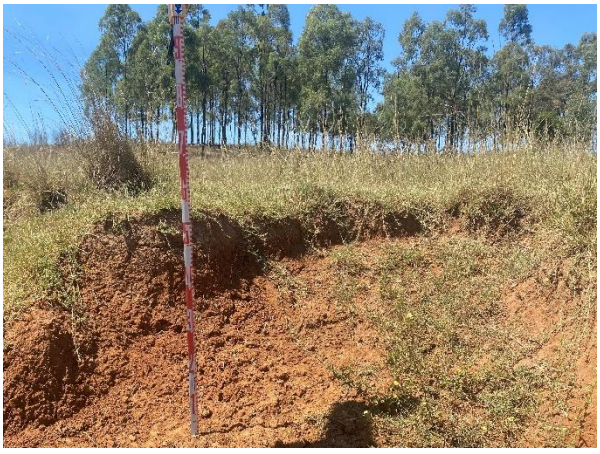

Figure 21: View north showing exposed red-orange loams and intact soil profile along northern edge of dam.

Figure 22: View west showing general location of Ironbark AS1 at base of slope and edge of dam.

Figure 23: Pink silcrete flake located in exposure along edge of dam.

Figure 24: Silcrete backed blade located to north-west of dam.

Figure 25: Silcrete flake located along disturbed track to east of dam.

Figure 26: View south showing sloping landform, evidence of disturbance related to ploughing and dense vegetation.

Figure 27: View north showing exposures along remnant track.

SURVEY UNIT 4

Survey Unit 4 (SU4) comprises a gentle-moderate slope in the north-western portion of the study area (Figure 36). SU4 has undergone varying degrees of ground disturbance related to farm tracks, the installation of fencing, the construction of two artificial dams and associated drainage pumps, ploughing and vegetation clearance. Native vegetation within SU4 has largely been cleared, with remnant, old-growth woodland trees scattered along and at the base of the slope (Figure 28 – Figure 30, Figure 34). No cultural markings were observed on any trees within SU4.

Surface visibility (20%) within SU4 was hindered by vegetation and grass cover (Figure 28, Figure 29, Figure 35). Exposures (10%) were limited to the edges of the two dams and patches of erosion beneath the remnant woodland trees (Figure 29, Figure 33), revealing deposits of quartz, rock and yellow-orange sand. No surface artefacts were re-identified along the edges of the dams.

One isolated Aboriginal flaked pebble/axe was identified along the north-western boundary of the study area (Figure 30, Figure 31). No areas of archaeological potential were identified in SU4.

Figure 28: North-western portion of study area, view west showing flat area at base of slope and evidence of land clearance and ploughing.

Figure 29: View east showing artificial dam, remnant woodland and sloping landform.

Figure 30: View south along north-western boundary of study area, showing approximate location of isolated Aboriginal object.

Figure 31: Isolated Aboriginal object comprising a flaked pebble/axe, identified along north-western boundary of study area.

Figure 32: View east showing sloping landform towards artificial dam.

Figure 33: Area of exposure showing deposit of orange-yellow sand.

Figure 34: View east showing remnant woodland and exposed yellow sand.

Figure 35: View south-east showing disturbance related to drainage pump and dense vegetation.

5.3.1 Survey coverage

In accordance with Heritage NSW *Code of Practice* the study area was surveyed in relation to survey units, landforms, and landscapes.

Table 5: Survey coverage

Landform Unit	Landform	Survey Unit Area (m^2)	Visibility (%)	Exposure (%)	Effective coverage (ECA)	Effective coverage (%)
1	Slope	1,677	10	5	83.85	5
	Crest	1,128	5	2	22.56	2
2	Slope	1,422	10	5	71.1	5
3	Slope	2,219	15	10	33.28	1.5
4	Slope	1,941	20	10	38.82	2

Table 6: Landform summary

Landform	Landform Area (m^2)	Area effectively surveyed (m^2)	% of landform effectively surveyed	Number of sites	Number of features
Slope	7,259	227.05	3.1	2	2
Crest	1,128	22.56	2	0	0

There was evidence of various degrees of disturbance across the study area, related to the use of farm tracks, access roads, agricultural activities and ploughing, the installation of fencing, the construction of three artificial dams and associated drainage pumps, as well as by vegetation and land clearance.

Exposures within the study area were overall low due to dense grass cover, and areas of exposure revealed varying deposits of dark brown organic loams, bedrock, angular shale fragments, quartz, orange loams and yellow sand. Native vegetation within the study area has largely been cleared, with remnant, regrowth and old-growth woodland trees scattered along the slopes. No cultural markings were observed on any trees within the study area.

NEW ABORIGINAL SITES

Ironbark IF 2 (AHIMS ID 37-2-6618) – identified during the Aboriginal Due Diligence (ADD) site inspection could not be located during the survey. This is likely due to natural erosion and impacts from cattle. This site is located in a disturbed context on the edge of a formed damn and adjacent to a buried pipeline. This site is of low scientific significance.

Ironbark IF 3 (AHIMS ID Pending) – The survey resulted in the identification of a new Aboriginal site within the study area, an isolated Aboriginal object located on an eroding slope with skeletal soils and exposed clays. This Aboriginal object is a flaked cobble, unidirectional and was likely an axe blank that would have formed a ground edge axe.

Ironbark AS 1 (AHIMS ID Pending) – The archaeological survey re-identified the rhyolite core recorded during the ADD site inspection. Further Aboriginal objects were identified during the survey including three other Aboriginal objects, two silcrete flakes and a silcrete backed blade. All Aboriginal objects were identified in exposed disturbed contexts but are indications that further Aboriginal objects could be identified subsurface. The Aboriginal objects area currently located in disturbed contexts and are of low scientific significance, however test excavations are required and may change the overall site significance.

UPDATED ABORIGINAL SITES

Ironbark IF1 (AHIMS ID 37-2-6617) – Not a site – was identified during the ADD site inspection and was located on the eroding vehicle track. Following further assessment this has been identified as not an Aboriginal object and the site card will be updated.

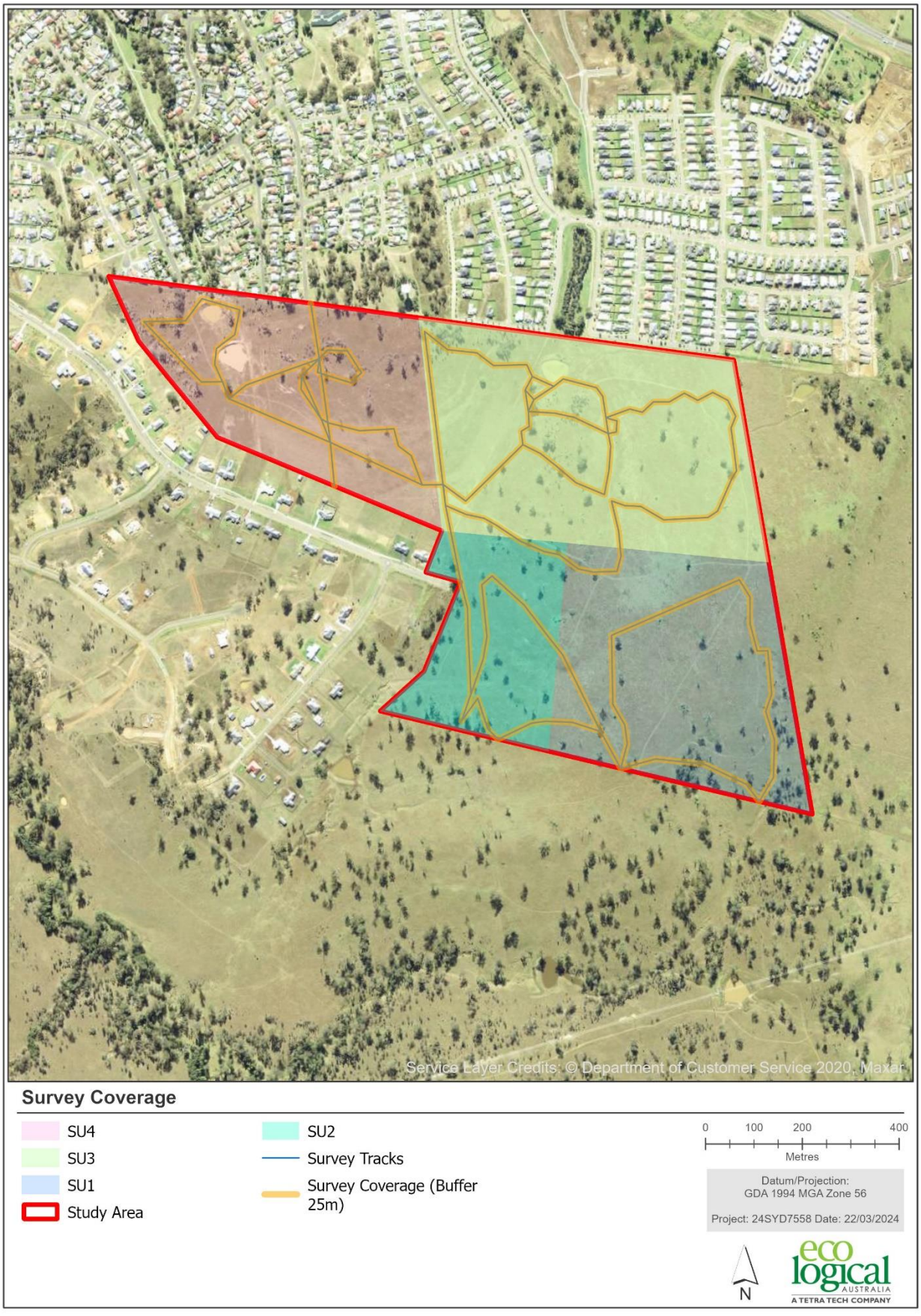

Figure 36: Survey coverage and tracks for the study area

Figure 37: Aboriginal sites and areas of potential identified during the survey for the study area

6. Scientific values and significance assessment

6.1 Significance assessment criteria

This significance assessment has been undertaken in accordance with the *Guide to Investigating Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011). Archaeological significance refers to the archaeological or scientific importance of a landscape or area. This is characterised by using the archaeological criteria such as archaeological research potential, representativeness and rarity of the archaeological resource and potential for educational values. These are outlined below:

- Research potential: does the evidence suggest any potential to contribute to an understanding of the area and/or region and/ or states natural and cultural history?
- Representativeness: how much variability (outside and/or inside the study area) exists, what is already conserved, how much connectivity is there?
- Rarity: is the study area important to demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practised? Is it in danger of being lost or of exceptional interest?
- Education potential: does the study area contain teaching sites or sites that might have teaching potential?

6.2 Scientific significance assessment

The majority of Aboriginal sites within the AHIMS search parameters are artefact scatters or isolated finds (90.36%). These sites are well represented in the regional archaeological record. The survey resulted in the identification of three Aboriginal sites within the study area but was unable to re-identify one of the isolated finds from the due diligence site inspection, Ironbark Isolated Find 2 (AHIMS ID 37-2-6618). Ironbark Isolated Find 1 (AHIMS ID 37-2-6617) was reassessed as not being an Aboriginal object.

A summary of the scientific significance of the previously recorded AHIMS sites is presented in Table 7.

Table 7: Scientific significance assessment

Site name (AHIMS ID)	Research potential	Representative	Rarity	Education potential	Scientific Significance
Ironbark Road IF 2 (AHIMS ID 37-2-6618)	Low	Low	Low	Low	Low
Ironbark Road IF 3 (AHIMS ID Pending)	Low	Low	Low	Low	Low
Ironbark Road AS 1 (AHIMS ID Pending)	Low PAD - Unknown	Low PAD - Unknown	Low PAD - Unknown	Low PAD - Unknown	Unknown

7. Impact assessment

The 14 staged subdivision includes 327 general residential lots, 57 large lots and 240 dual occupancy dwellings and associated public open space. Associated works will include the construction of roads, the installation of associated infrastructure, and ecological offsets. The development will involve bulk earthworks and landscape modification which could potentially have an impact on Aboriginal objects within the study area (Figure 38).

The archaeological survey resulted in the identification of three Aboriginal sites as well as an area considered to have subsurface archaeological potential, located on a lower slope with gentle incline and adjacent to a drainage line/ tributary of Muscle Creek. The location of the Aboriginal sites are in a similar context to AHIMS sites in the surrounding properties. The remainder of the study area is considered to have overall low archaeological potential due to the moderately sloping landform with observed high disturbance and shallow soils.

Under the draft plan of works, Ironbark IF 3 (AHIMS ID Pending) will be impacted by proposed residential development. Ironbark AS 1 (AHIMS ID Pending) is located partially within an open space, and partially within the proposed road corridor. Test excavations will be required to understand the nature and extent of this Aboriginal site in order to properly understand the potential impacts to Aboriginal cultural heritage values.

If impacts to Aboriginal objects cannot be avoided an Aboriginal Cultural Heritage Assessment (ACHA) will be required to assess the impacts to Aboriginal cultural heritage values and to support an application for an Aboriginal Heritage Impact Permit (AHIP).

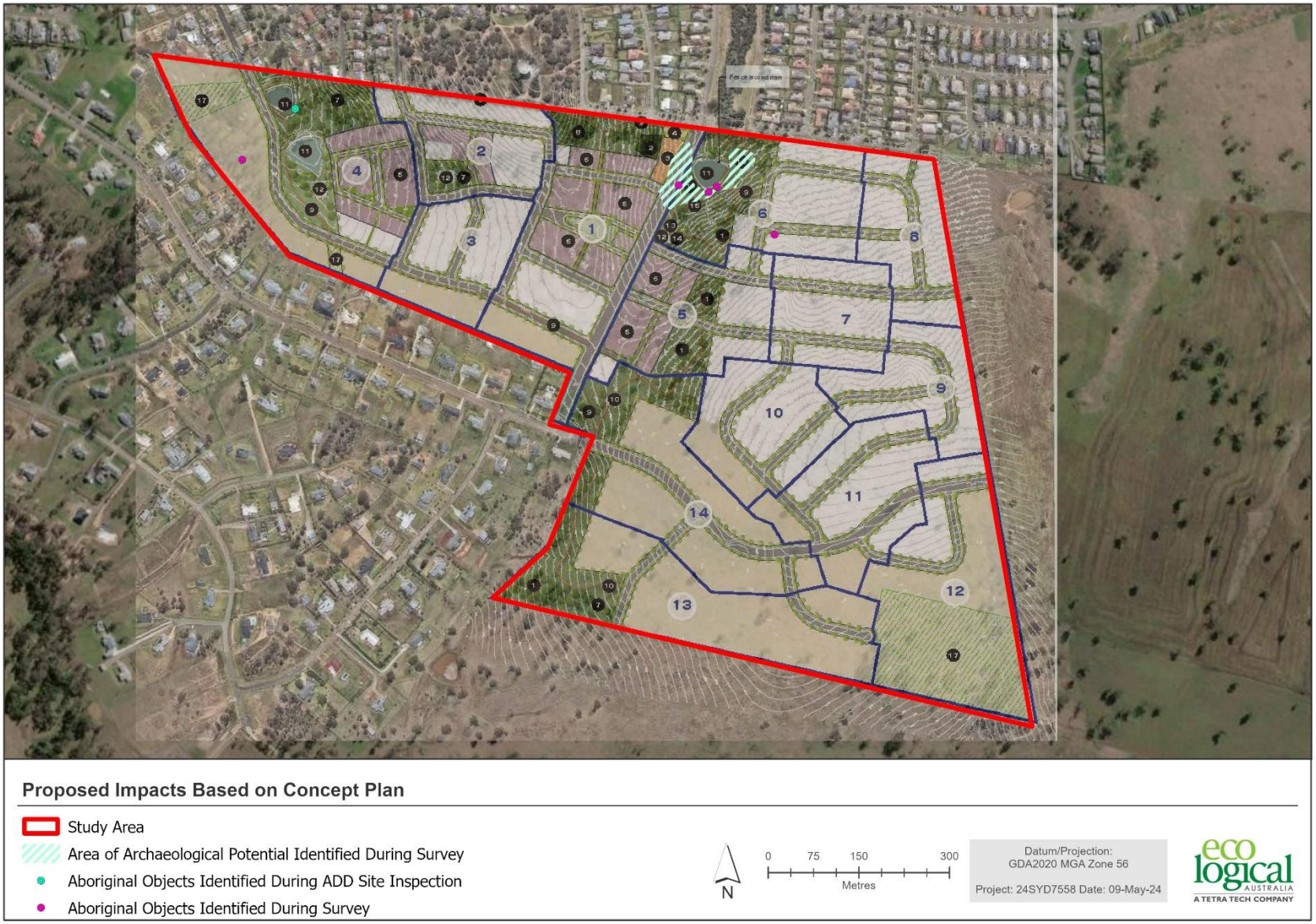

Figure 38: Proposed impacts to Aboriginal sites based on concept plan for Lot 101 Ironbark Road

8. Recommendations

The following recommendations are based on consideration of:

- Statutory requirements under the *National Parks and Wildlife Act 1974* as amended.
- The potential and known impacts from the proposed works.
- The Aboriginal sites identified through this archaeological assessment.
- Recommendations made by the Aboriginal cultural heritage officers during the field survey.

Summary of assessment findings:

- The desktop review and previous due diligence assessment identified three isolated Aboriginal objects within the study area, indicating a sensitive landform with a moderate potential for further Aboriginal objects.
- The archaeological survey resulted in the identification of two new Aboriginal sites, an isolated find and an artefact scatter with subsurface archaeological potential. Ironbark IF2 (AHIMS ID 37-2-6618) could not be located however the site was previously identified in a disturbed context and was assessed as having low significance.
- The archaeological survey re-assessed a previous Aboriginal object as not being an Aboriginal site (Ironbark IF1 - AHIMS ID 37-2-6617).
- The impact assessment has identified that the proposed works are likely to have an impact on the identified Aboriginal sites within the study area.
- Test excavations will be required to investigate the nature and extent of the artefact scatter (Ironbark AS 1 – AHIMS ID Pending) and the potential for further Aboriginal objects to be identified in the areas identified in this assessment as having subsurface archaeological potential, to assess the potential impacts to Aboriginal cultural heritage values.
- An Aboriginal Cultural Heritage Assessment (ACHA) will also be required to assess the impacts to the cultural heritage values and provide management and mitigations measure for the identified Aboriginal sites within the study area. The ACHA would support an application for an Aboriginal Heritage Impact Permit (AHIP).

Based on the findings of the archaeological assessment and archaeological survey, the following is recommended:

RECOMMENDATION 1 – FURTHER INVESTIGATIONS ARE REQUIRED

Subsurface archaeological investigations, in the form of a test excavation, will be required to investigate the nature and extent of the archaeological resource (Ironbark AS 1 – AHIMS ID Pending) and the potential for further Aboriginal objects to be identified in the areas identified in this assessment as having subsurface archaeological potential. The test excavation will be undertaken in accordance with the *Code of Practice for Archaeological Investigation in NSW* (DECCW 2010).

RECOMMENDATION 2 – ABORIGINAL CULTURAL HERITAGE ASSESSMENT

As the impact assessment has identified Aboriginal sites will likely be impacted under the current concept design for the subdivision and the proposed works, an Aboriginal Cultural Heritage Assessment

(ACHA) will be required to address the intangible Aboriginal cultural significance values within the study area and assess the potential impacts to these cultural values. The ACHA would develop management and mitigation measures for Aboriginal cultural values and known Aboriginal sites within the study area and would be undertaken in accordance with the *Guide to investigating, assessing, and reporting on Aboriginal cultural heritage in NSW* (OEH 2011). The ACHA would entail Aboriginal community consultation following the '*Aboriginal cultural heritage consultation requirements for proponents 2010*' (DECCW 2010) to identify Aboriginal cultural heritage values through consultation with Aboriginal stakeholders.

Aboriginal objects are protected under the NPW Act, the ACHA can then be used to support an application for an Aboriginal Heritage Impact Permit (AHIP) if impacts to registered Aboriginal sites cannot be avoided.

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Appendix A – AHIMS Search Results

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 23SYD7167
Client Service ID : 848246

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
37-2-4540	MWB STP 006	GDA	56	300928	6424311	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mrs.Rebecca Newell					Permits		
37-2-2625	M-STH1	GDA	56	303185	6424716	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	ERM Australia Pty Ltd- Sydney CBD					Permits	2925,2933	
37-2-4190	MAC54	GDA	56	301203	6423320	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4192	MAC56	GDA	56	301270	6423430	Open site	Valid	Artefact : 2		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-1632	MB7	AGD	56	301205	6423189	Open site	Destroyed	Artefact : -	Open Camp Site	
	Contact	Recorders	Unknown Author,RPS AAP Consulting Pty Ltd - Hamilton,Ms.Jo Nelson					Permits	1384	
37-2-4183	MAC48	GDA	56	301421	6423822	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4160	MAC24	GDA	56	301947	6423692	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4181	MAC46	GDA	56	301959	6423702	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4180	MAC45	GDA	56	301959	6423706	Open site	Valid	Artefact : 4		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4214	MAC85	GDA	56	301705	6423503	Open site	Valid	Artefact : 3		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2704	Yammanie Isolated Find 1 (YIF 1)	AGD	56	301620	6424760	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits		
37-2-4103	MFLD04	GDA	56	304832	6426264	Open site	Valid	Artefact : 1		
	Contact	Recorders	Biosis Research (to be deleted)					Permits		
37-2-4178	MAC43	GDA	56	301162	6424175	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-0160	Black Hill Gyarran	AGD	56	304050	6426150	Open site	Valid	Artefact : -	Open Camp Site	144
	Contact	Recorders	Muswellbrook Shire Council					Permits		
37-2-2700	Yammanie Artefact Scatter 3 (YAS 3)	AGD	56	301670	6424720	Open site	Valid	Artefact : 15		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits		
37-2-2708	Yammanie Isolated Find 5 (YIF 5)	AGD	56	302641	6424757	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits	3120	
37-2-2573	Muswellbrook Common 9	GDA	56	303519	6427093	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-4156	MAC20	GDA	56	302140	6423484	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		

Report generated by AHIMS Web Service on 13/12/2023 for Kate Storan for the following area at Datum :GDA, Zone : 56, Eastings : 300909.0 - 304909.0, Northings : 6423284.0 - 6427284.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 83

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 23SYD7167
Client Service ID : 848246

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
37-2-4158	MAC22	GDA	56	302158	6423696	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney,RPS AAP Consulting Pty Ltd - N					Permits		
37-2-4157	MAC21	GDA	56	302161	6423734	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney,RPS AAP Consulting Pty Ltd - N					Permits		
37-2-4213	MAC84	GDA	56	301439	6423442	Open site	Valid	Artefact : 3		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4152	MAC16	GDA	56	302477	6423890	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2707	Yammanie Isolated Find 4 (YIF 4)	AGD	56	302466	6424915	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits	3120	
37-2-4176	MAC41	GDA	56	301099	6424372	Open site	Valid	Artefact : 4		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2702	Yammanie Artefact Scatter 6 (YAS 6)	AGD	56	301404	6424912	Open site	Valid	Artefact : 3		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits		
37-2-2571	Muswellbrook common 7	GDA	56	303505	6427105	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2576	muswellbrook Common 12	GDA	56	303528	6427077	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-0178	Ramrod Creek;	AGD	56	302100	6423900	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Len Dyall					Permits		
37-2-0028	Ramrod Creek;	AGD	56	301724	6424366	Open site	Valid	Artefact : -	Open Camp Site	310
	Contact	Recorders	Len Dyall					Permits		
37-2-4159	MAC23	GDA	56	302026	6423758	Open site	Valid	Artefact : 2		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2805	MTLD01	GDA	56	302023	6423928	Open site	Valid	Artefact : 1		102371
	Contact	Recorders	Mrs.Georgia Roberts					Permits		
37-2-5051	Muswellbrook Pipeline AS1	GDA	56	304862	6426266	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Alex Timms					Permits		
37-2-0101	Muscle Creek	GDA	56	304870	6426304	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Len Dyall,Mr.Matthew Kelleher,Mr.Matthew Kelleher,Kelleher Nightingale Consulti					Permits		
37-2-4219	MAC90	GDA	56	302457	6423449	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Rick Bullers,AECOM Australia Pty Ltd - Sydney					Permits		

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Extensive search - Site list report

Your Ref/PO Number : 23SYD7167
Client Service ID : 848246

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
37-2-4154	MAC18	GDA	56	302454	6423694	Open site	Valid	Artefact : 1		
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37-2-4191	MAC55	GDA	56	301146	6423344	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2567	Muswellbrook common 3	GDA	56	303073	6426768	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2579	Muswellbrook Common 15	GDA	56	303532	6427094	Open site	Valid	Artefact : -		
	Contact Searle	Recorders	Glen Morris					Permits		
37-2-2582	Muswellbrook Common 18	GDA	56	303552	6427076	Open site	Valid	Artefact : -		
	Contact Searle	Recorders	Glen Morris					Permits		
37-2-2701	Yammanie Artefact Scatter 4 (YAS 4)	AGD	56	302142	6424652	Open site	Valid	Artefact : 8		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits	3120	
37-2-2697	Yammanie Artefact Scatter 5 (YAS 5)	AGD	56	301541	6424694	Open site	Valid	Artefact : 8		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits		
37-2-2806	MFLD02	GDA	56	303223	6424085	Open site	Valid	Artefact : 1		102371
	Contact	Recorders	Mrs.Georgia Roberts					Permits		
37-2-2572	Muswellbrook Common 8	GDA	56	303523	6427098	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2577	Muswellbrook Common 13	GDA	56	303532	6427081	Open site	Valid	Artefact : -		
	Contact Searle	Recorders	Glen Morris					Permits		
37-2-4155	MAC19	GDA	56	302317	6423633	Open site	Valid	Artefact : 5		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4105	MFLD06	GDA	56	302361	6423938	Open site	Partially Destroyed	Artefact : 1		
	Contact	Recorders	Biosis Research (to be deleted)					Permits	3463	
37-2-0108	Mt Arthur.	AGD	56	301205	6423189	Open site	Destroyed	Artefact : -	Open Camp Site	316
	Contact	Recorders	Len Dyall,RPS AAP Consulting Pty Ltd - Hamilton,Ms.Jo Nelson					Permits		
37-2-4216	MAC87	GDA	56	301878	6423402	Open site	Valid	Artefact : 3		
	Contact	Recorders	Mr.Rick Bullers,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4182	MAC47	GDA	56	301959	6423701	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2699	Yammanie Artefact Scatter 1 (YAS 1)	AGD	56	301835	6424584	Open site	Valid	Artefact : 32		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits	3120	
37-2-4586	Muswellbrook Trunk Main Isolated Find 1 (MTM IF1)	GDA	56	302487	6423896	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Josh Symons					Permits		

Report generated by AHIMS Web Service on 13/12/2023 for Kate Storan for the following area at Datum :GDA, Zone : 56, Eastings : 300909.0 - 304909.0, Northings : 6423284.0 - 6427284.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 83

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 23SYD7167
Client Service ID : 848246

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
37-2-4220	MAC91	GDA	56	302667	6423483	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Rick Bullers,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2570	Muswellbrook Common 6	GDA	56	303471	6427120	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2575	Muswellbrook Common 11	GDA	56	303527	6427086	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2583	Muswellbrook Common 19	AGD	56	303566	6427080	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2569	Muswellbrook Common 5	GDA	56	302897	6426764	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2566	muswelbrook Common 1	GDA	56	303269	6426991	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-0184	Ramrod Creek.	AGD	56	304000	6424000	Open site	Valid	Artefact : -	Open Camp Site	172
	Contact	Recorders	Helen Brayshaw					Permits		
37-2-4106	MFLD07	GDA	56	302487	6423939	Open site	Partially Destroyed	Artefact : 1		
	Contact	Recorders	Biosis Research (to be deleted)					Permits	3463	
37-2-4184	MAC40	GDA	56	301045	6424831	Open site	Valid	Artefact : 2		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4541	MWB STP 007	GDA	56	300950	6424218	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mrs.Rebecca Newell					Permits		
37-2-2705	Yammanie Isolated Find 2 (YIF 2)	AGD	56	301490	6424800	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits		
37-2-2568	Muswellbrook Common 4	GDA	56	303082	6426860	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact Searle	Recorders	Glen Morris					Permits		
33-2-0023	Muswellbrook Common 2	GDA	56	303239	6426851	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2580	Muswellbrook Common 16	AGD	56	303541	6427090	Open site	Valid	Artefact : -		
	Contact Searle	Recorders	Glen Morris					Permits		
37-2-4177	MAC42	GDA	56	301218	6424197	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2703	Yammanie Artefact Scatter 7 (YAS 7)	AGD	56	301886	6424390	Open site	Valid	Artefact : 4		

Report generated by AHIMS Web Service on 13/12/2023 for Kate Storan for the following area at Datum :GDA, Zone : 56, Eastings : 300909.0 - 304909.0, Northings : 6423284.0 - 6427284.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 83

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 23SYD7167
Client Service ID : 848246

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits		
37-2-2706	Yammanie Isolated Find 3 (YIF 3)	AGD	56	301607	6424752	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Tudur Llwyd Davies					Permits		
37-2-5962	Muswellbrook Bypass IF 1	GDA	56	304752	6426077	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Matthew Kelleher,Kelleher Nightingale Consulting Pty Ltd (Generic users)					Permits	5199	
37-2-4161	MAC25	GDA	56	302055	6423461	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4153	MAC17	GDA	56	302870	6423384	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2584	Muswellbrook Common 20	GDA	56	303507	6427192	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	Glen Morris					Permits		
37-2-2574	Muswellbrook Common 10	GDA	56	303525	6427093	Open site	Valid	Artefact : -		
	Contact T Russell	Recorders	A.K. Morris					Permits		
37-2-2578	Muswellbrook Common 14	GDA	56	303533	6427081	Open site	Valid	Artefact : -		
	Contact Searle	Recorders	Glen Morris					Permits		
37-2-2581	Muswellbrook Common 17	GDA	56	303542	6427086	Open site	Valid	Artefact : -		
	Contact S Scanlon	Recorders	Glen Morris					Permits		
37-2-4578	Muswellbrook Trunk Main Artefact Concentration 01 (MTM AC01)	GDA	56	303740	6423975	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Josh Symons					Permits		
37-2-2752	YIF 6	GDA	56	302070	6424281	Open site	Valid	Artefact : 1		
	Contact	Recorders	ERM - Thornton					Permits		
37-2-2751	YAS 2	GDA	56	301842	6424805	Open site	Valid	Artefact : 2		
	Contact	Recorders	ERM - Thornton					Permits		
37-2-2033	Harvey Norman Site Muswellbrook	AGD	56	301749	6426285	Open site	Valid	Artefact : 6		
	Contact Searle	Recorders	John Mathews					Permits		
37-2-4179	MAC44	GDA	56	301959	6423707	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Neville Baker,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-4217	MAC88	GDA	56	301994	6423321	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Rick Bullers,AECOM Australia Pty Ltd - Sydney					Permits		
37-2-2698	YST 1	AGD	56	301541	6424694	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Ms.Tudur Llwyd Davies,RPS AAP Consulting Pty Ltd - Newcastle					Permits		
37-2-4579	Muswellbrook Trunk Main Artefact Concentration 2 (MTM AC2)	GDA	56	302428	6423899	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Josh Symons					Permits		

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Appendix B – Site Cards

To be attached separately on the following pages.