30 – 36 PEELWOOD ROAD, LAGGAN, NSW

ABORIGINAL DUE DILIGENCE ASSESSMENT

Report to Laterals Engineering and Management

July 2021

APEX ARCHAEOLOGY

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Executive Summary

Apex Archaeology has been engaged to assist Laterals Engineering and Management in the assessment of three parcels of land located at Laggan, NSW, in order to assess the Aboriginal archaeological values of the study area. Apex Archaeology has prepared a Due Diligence assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (the Due Diligence Code of Practice).

The study area is located within Laggan, NSW, at 30 – 36 Peelwood Road (Lot 2 DP 1233492, Lot 1 DP 239858 and Lots 21-24 DP 1697). The study area is located approximately 165km south west of Sydney, NSW. It is located within the Upper Lachlan Shire Council (ULSC) Local Government Area (LGA). The study area comprises approximately 35.4 hectares.

A site visit was conducted on 15 October 2019. No previously recorded archaeological sites were located within the study area. No newly identified archaeological material was identified during the survey. Ground surface visibility (GSV) was low throughout the study area. GSV was rated at 15% overall. Ground disturbance was quite moderate throughout the study area. Evidence of land clearance for agricultural activity and landscape modification for drainage and dam construction was identified.

It is recommended that:

- No further Aboriginal archaeological assessment is required prior to the commencement of upgrade works as described in this report.
- The results of this assessment fulfil the requirement for Due Diligence in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Code of Practice). Works may proceed with caution.
- The proposed works must be contained to the area assessed during this due diligence assessment, as shown on Figure 1. If the proposed location is amended, further archaeological assessment may be necessary to determine if the proposed works will impact any Aboriginal objects or archaeological deposits.
- Should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment and Aboriginal community consultation may be required prior to the recommencement of works. Any objects confirmed to be Aboriginal in origin must be reported to the OEH under Division 1, Section 89A of the NPW Act.

Apex Archaeology would like to acknowledge the Aboriginal people who are the traditional custodians of the land in which this project is located. Apex Archaeology would also like to pay respect to Elders both past and present.

Document Control

The following register documents the development and issue of the document entitled '30 - 36 Peelwood Road, Laggan, NSW – Aboriginal Due Diligence Assessment', prepared by Apex Archaeology in accordance with its quality management system.

Revision	Prepared by	Reviewed by	Comment	Issue Date
1 – Draft	Leigh Bate	Jenni Bate	Initial preparation	21 October 2019
2 – Draft	Leigh Bate	Robert Mowle	Client review	23 October 2019
3 - Final	Leigh Bate		Final Report	25 October 2019
4 - Final	Leigh Bate		Minor Adjustments	21 July 2021

GLOSSARY OF TERMS

Aboriginal Object	An object relating to the Aboriginal habitation of NSW (as defined in the NPW Act), which may comprise a deposit, object or material evidence, including Aboriginal human remains.
AHIMS	Aboriginal Heritage Information Management System maintained by Heritage NSW, detailing known and registered Aboriginal archaeological sites within NSW
AHIP	Aboriginal Heritage Impact Permit
ATER	Aboriginal Test Excavation Report
BP	Before Present, defined as before 1 January 1950.
Code of Practice	The DECCW September 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*
Consultation	Aboriginal community consultation in accordance with the DECCW April 2010 *Aboriginal cultural heritage consultation requirements for proponents 2010.* Consultation is not a required step in a due diligence assessment; however, it is strongly encouraged to consult with the relevant Local Aboriginal Land Council and to determine if there are any Aboriginal owners, registered native title claimants or holders, or any registered Indigenous Land Use Agreements in place for the subject land
DA	Development Application
DECCW	The Department of Environment, Climate Change and Water – now HNSW
Disturbed Land	If land has been subject to previous human activity which has changed the land's surface and are clear and observable, then that land is considered to be disturbed
DPIE	Department of Planning, Industry and Environment (Formerly OEH now HNSW)
Due Diligence	Taking reasonable and practical steps to determine the potential for an activity to harm Aboriginal objects under the *National Parks and Wildlife Act 1974* and whether an application for an AHIP is required prior to commencement of any site works, and determining the steps to be taken to avoid harm
Due Diligence Code of Practice	The DECCW Sept 2010 *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*
GIS	Geographical Information Systems
GSV	Ground Surface Visibility
HNSW	Heritage New South Wales
Harm	To destroy, deface or damage an Aboriginal object; to move an object from land on which it is situated, or to cause or permit an object to be harmed
LALC	Local Aboriginal Land Council
LGA	Local Government Area
ULSC	Upper Lachlan Shire Council
NPW Act	NSW *National Parks and Wildlife Act* 1974
OEH	The Office of Environment and Heritage of the NSW Department of Premier and Cabinet
RAPs	Registered Aboriginal Parties

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1.0 Introduction

Apex Archaeology has been engaged to assist Laterals Engineering and Management in the assessment of three parcels of land located at Laggan, NSW (Figure 1), in order to assess the Aboriginal archaeological values of the study area. Apex Archaeology has prepared a Due Diligence assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (the Due Diligence Code of Practice).

1.1 Study Area

The study area is located within Laggan, NSW, at 30 – 36 Peelwood Road (Lot 2 DP 1233492, Lot 1 DP 239858 and Lots 21-24 DP 1697). The study area is located approximately 165km south west of Sydney, NSW. It is located within the Upper Lachlan Shire (ULS) Local Government Area (LGA). The study area comprises approximately 35.4 hectares.

1.2 Investigators and Contributors

This report has been prepared by Leigh Bate, Director and Archaeologist with Apex Archaeology, and reviewed by Jenni Bate, Director and Archaeologist with Apex Archaeology. Both have over 11 years of consulting experience within NSW.

Name	Role	Qualifications
Leigh Bate	Project Manager, Primary Report Author, GIS, Field inspection	B. Archaeology; Grad. Dip. Arch; Dip. GIS
Jenni Bate	Review	B. Archaeology; Grad. Dip. CHM

1.3 Statutory Context

Heritage in Australia, including both Aboriginal and non-Aboriginal heritage, is protected and managed under several different Acts. The following section presents a summary of relevant Acts which provide protection to cultural heritage within NSW.

1.3.1 Commonwealth Native Title Act 1993

The *Native Title Act 1993*, as amended, provides protection and recognition for native title. Native title recognises the traditional rights of Aboriginal and Torres Strait Islanders to land and waters.

The National Native Title Tribunal (NNTT) was established to mediate native title claims made under this Act. Three registers are maintained by the NNTT, as follows:

- National Native Title Register
- Register of Native Title Claims
- Register of Indigenous Land Use Agreements

A search of the above registers did not identify any applicable Native Title claims, registrations, or applications, for the study area or surrounds.

1.3.2 NSW National Parks and Wildlife Act 1974

Protection for Aboriginal heritage in NSW is provided primarily under the *National Parks and Wildlife Act* 1974 (NPW Act). Although cultural heritage is protected by other Acts, the NPW Act is the relevant Act for undertaking due diligence assessments. Protection for Aboriginal sites, places and objects is overseen by the Heritage NSW.

Changes to the NPW Act with the adoption of the *NPW Amendment (Aboriginal Objects and Places) Regulation* 2010 led to the introduction of new offences regarding causing harm to Aboriginal objects or declared Aboriginal places. These new offences include destruction, defacement or movement of an Aboriginal object or place. Other changes to the NPW Act include:

- Increased penalties for offences relating to Aboriginal heritage for individuals and companies who do not comply with the legislation;
- Introduction of the strict liability offences, meaning companies or individuals cannot claim 'no knowledge' if harm is caused to Aboriginal objects or places; and
- Changes to the permitting process for AHIPs – preliminary archaeological excavations can be undertaken without the need for an AHIP, providing the excavations follow the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.

A strict liability offence was introduced, meaning a person who destroys, defaces or moves an Aboriginal object without an Aboriginal Heritage Impact Permit (AHIP) is guilty of an offence, whether they knew it was an Aboriginal object or not. Exercising due diligence (as described in Section 1.4) provides a defence against the strict liability offence.

1.4 NSW Due Diligence Code of Practice

The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Code of Practice) was introduced in September 2010. It outlines a method to undertake 'reasonable and practical' steps to determine whether a proposed activity has the potential to harm Aboriginal objects within the subject area, and thereby determine whether an application for an Aboriginal Heritage Impact Permit (AHIP) is required. When due diligence has been correctly exercised, it provides a defence against prosecution under the NPW Act under the strict liability clause if Aboriginal objects are unknowingly harmed without an AHIP.

The Code of Practice provides the 'reasonable and practicable' steps to be followed when determining the potential impact of a proposed activity on Aboriginal objects. Due diligence has been defined by Heritage NSW as "taking reasonable and practical steps to determine whether a person's actions will harm an Aboriginal object and, if so, what measures can be taken to avoid that harm" (DECCW 2010:18).

These steps include:

- Identification of whether Aboriginal objects are, or are likely to be, present within the subject area, through completing a search of the Aboriginal Heritage Information Management System (AHIMS);
- Determine whether the proposed activity is likely to cause harm to any Aboriginal objects; and
- Determine the requirement for an AHIP.

Should the conclusion of a due diligence assessment be that an AHIP is required, further assessment must be undertaken, with reference to the following guidelines:

- DECCW, April 2010, *Aboriginal cultural heritage consultation requirements for proponents 2010. Part 6 National Parks and Wildlife Act 1974*;
- DECCW, Sept 2010, *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*;
- OEH, April 2011, *Guide to Investigation, assessing and reporting on Aboriginal cultural heritage in NSW*; and
- OEH, May 2011, *Applying for an Aboriginal Heritage Impact Permit: Guide for Applicants*.

The Code of Practice also outlines activities considered a low impact activity for which there is a defence in the NPWS Regulation under Clause 58. 'Disturbed land' defined as "...disturbed if it has been the subject of human activity that has changed the land's surface, being changes that remain clear and observable". The study area has been cleared of vegetation in the past and technically meets this definition, but based on the requirements of the Kiama DCP, an ADD was considered appropriate to confirm whether there was any potential for archaeological material to be present within the site.

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0 250 500
metres

Projection:
MGA Zone 55 (GDA 94)
Base Map:
Google Earth Pro
FINAL - Version 1

Figure 1: General location of the study area.

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2.0 The Due Diligence Code of Practice Process

The Due Diligence Code of Practice provides a specific framework to guide the assessment of Aboriginal cultural heritage. The following section presents the results of this process.

2.1 Step 1: Will the activity disturb the ground surface?

The proposed works will disturb the ground surface. It is proposed that Lot 2 DP 1233492, Lot 1 DP 239858 and Lots 21-24 DP 1697 be sub-divided into smaller residential lots.

Earthworks would also include clearing, grubbing, stripping and moving topsoil, levelling of the area, excavation of soil, and backfilling. Services such as electricity and water would be installed. All proposed works would have an impact to some extent on the ground surface.

2.2 Step 2a: AHIMS and Available Literature Search

HNSW is required to maintain a register of Aboriginal sites recorded during archaeological assessments and other activities within NSW. This is known as the Aboriginal Heritage Information Management System (AHIMS). This register provides information about site types, their geographical location, and their current status. It is the requirement for the recorder of a newly identified site to register this site with HNSW to be placed onto the AHIMS register. It is a requirement of the Code of Practice to undertake a search of this register as part of undertaking a due diligence assessment.

HNSW also maintains a register of archaeological reports relating to archaeological investigations throughout NSW. These reports are a valuable source of information regarding investigations previously completed and their findings, and can inform the assessment process regarding the potential for Aboriginal cultural material and archaeological potential within a study area.

2.2.1 AHIMS Results

A search of the study area with a 5km² radius was conducted. No Aboriginal sites were identified within the study area or a 5km² radius. It should be noted the lack of recorded sites within the wider area itself may be due to the area not previously being subject to archaeological assessment, rather than no sites being actually present. A copy of the basic search attached in Appendix A.

2.2.2 Literature Review

A review of previous archaeological work within the surrounding region of the study area was undertaken. A number of reports were identified from background research and the AHIMS database and are detailed below.

Table 1: Previous assessments undertaken by archaeological consultants in the wider region

Consultant	Date	Sites Identified/Salvaged	Region
Koettig, M	1982	6669 artefacts salvaged from two sites (C-AB2 & C-AB1)	Collector, NSW
Koettig, M	1983	650 artefacts salvaged.	Goulburn, NSW
Lance, A	1984	1 isolated find identified	Sooley Dam, Wollondilly River, NSW
Stone, T	1986	2 artefact scatters identified	Yass, NSW
Lance and Koettig	1986	Aboriginal Resources Planning Study	Goulburn Area
Silcox, R	1988	3 artefacts scatters identified	Chatsbury, NSW
Fuller, N	1989	17 artefact scatters & 5 isolated finds identified	Goulburn Area
Patton, R	1990	15,257 artefacts salvaged	Goulburn, NSW
Silcox, R	1991	97 artefacts salvaged	Goulburn, NSW
Williams, D	1992	Relocation of 53 artefacts previously recorded by Koettig in 1983.	Goulburn to Campbelltown, NSW
Silcox, R	1993	4 artefacts salvaged	Breadalbane, NSW
Effenberger, S	1994	2 isolated finds identified	Goulburn Racecourse
Silcox, R	1995	2 artefact scatters	Goulburn, NSW
Stuart, I	1995	2 artefact scatters, 2 isolated finds	Goulburn, NSW
Kuskie, P	1996	1 artefact scatter, 1 isolated find	Goulburn, NSW
JMcDCHM	1998	2154 artefacts salvaged	Crookwell, NSW
NOHC	2000	No Aboriginal sites or areas with PAD recorded	Goulburn. NSW
Dominic Steele	2003	1 scarred tree, 2 possible scarred tree and an Isolated find identified	Goulburn, NSW
NOHC	2003	1 artefact scatter identified	Run O Waters, Goulburn, NSW
Dibden, J	2004	A large amount of artefact scatters identified.	Greenwich Park, Goulburn, NSW
Biosis	2004	7 artefact scatters & 8 isolated finds identified	Tarago, NSW
OzArk E&HM	2004	6 artefact sites and 1 scarred tree identified	Taralga, NSW
Dibden, J	2005	4 artefact sites identified	Cullerin, NSW
Austral Archaeology Pty Ltd	2005	No artefacts recovered from salvage excavations	Gunning, NSW
Saunders, P	2007	12 artefact scatters and 2 isolated finds identified	Parkesbourne, NSW
Austral Archaeology Pty Ltd	2007	2 artefact scatters, 3 isolated finds and 6 PAD areas identified	Capitol Wind Farm, Lake George, NSW
Austral Archaeology Pty Ltd	2007	348 artefacts recovered from salvage excavations	Capitol Wind Farm, Lake George, NSW

Consultant	Date	Sites Identified/Salvaged	Region
Dibden, J	2008	116 artefact scatters identified	Yass Valley Wind Farm, Yass, NSW
Dibden, J	2012	13 artefact scatters identified	Rye Park Wind Farm, Yass, NSW
Dibden, J	2013	14 artefacts scatters identified	Bango Wind Farm, Bango, NSW
Dibden, J	2015	3 artefact scatters identified	Collector Wind Farm, Collector, NSW

2.2.1 SYNTHESIS

Archaeological works within the wider areas have generally been related to development proposals. It appears that artefact evidence generally comprises low density background scatter or discard distributed widely across the locality, with higher densities occurring occasionally in areas of more focused occupation such as camp sites or repeat occupation sites. This generally occurs in favourable environmental contexts such as elevated, well drained spur and ridge crests, flats, terraces and simple slopes in close proximity to watercourses, with a greater focus on higher order water courses. Artefacts tend to comprise raw materials such as quartz, tuff, silcrete and chert. In general, non-specific flaking activities are represented, although microlith and microblade production is also noted.

2.3 STEP 2B: LANDSCAPE FEATURES

An assessment of landscape features is required to determine whether Aboriginal objects are likely to be present within the proposed activity area. Certain landscape features are more likely to have been utilised by Aboriginal people in the past and therefore are more likely to have retained archaeological evidence of this use. Focal areas of activity for Aboriginal people include rock shelters, sand dunes, water courses, waterholes and wetlands, as well as ridge lines for travel routes.

The presence of specific raw materials for artefact manufacture, as well as soil fertility levels to support vegetation resources, are also factors to be considered in the assessment of the environmental context of a study area. Geomorphological factors, such as erosion and accretion of soils, affect the preservation of potential archaeological deposits and therefore need to be considered when making an assessment of the potential for archaeological material to be present within a study area. This assessment is predominantly a desktop exercise.

2.3.1 EXISTING ENVIRONMENT

SOILS, GEOLOGY AND VEGETATION

The study areas falls wholly within the Blakney Creek soil landscape. The Blakney Creek soil landscape is identified as having shallow topsoil with moderate to severe gullying and moderate sheet erosion to occur extensively. The underlying geology is made up of undifferentiated Ordovician and Silurian sediments. Rocks include silty sandstone, siltstone, greywacke, phyllite, shale, slate and quartzite. Elevations in the area are generally from 600 – 900 m. Slope gradients are usually <10%. Local relief between 20 – 50 m. Vegetation within this area consists of savannah woodland of

yellow box and gum and dry sclerophyll forest dominated by red stringybark. Snow gum is found at higher altitudes and in frost pockets. Extensive clearing has taken place throughout the area and only scattered trees remain.

HYDROLOGY

The nearest major permanent water source is the Bolong River. The Bolong River is a watercourse that is part of the Lachlan catchment within the Murray–Darling basin. The hydrology of the study area consists of a 1st order ephemeral drainage line which drains east and connects to a 2nd order ephemeral watercourse called Reedy Creek according to the Strahler system as used by DPI Water (Figure 4). Watercourse classification ranges from 1st order through to 4th order (and above) with 1st order being the lowest, ie a minor creek or ephemeral watercourse. Reedy Creek connects to the Bolong River ~20km north of the study area.

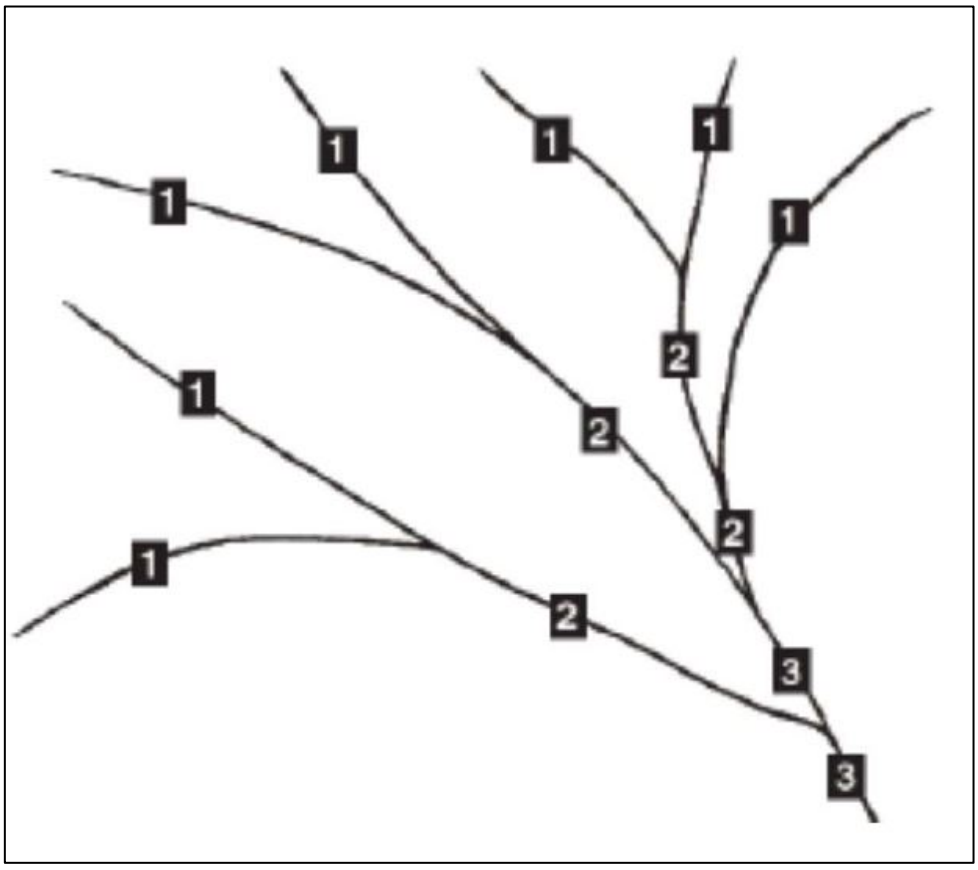

Figure 2: The Strahler system (Source: Department of Planning and Environment 2016).

Although the study area meets the definition of "disturbed land", there is a requirement to proceed to step 3 of the due diligence assessment process as an ephemeral watercourse runs through the study area and a higher order, named creek is within close proximity. Proximity to water is a factor to be considered when assessing Aboriginal archaeological potential.

2.3.2 ETHNOHISTORY

There is a relatively little in the way of information regarding the exact tribal boundaries and locations of ceremonial or domiciliary activities of Aboriginal people pre-contact within the Crookwell area. Phil Boot (202:58) notes:

> *The problem associated with ethnohistoric documents include their tendency to record unusual, rather than everyday events, and their focus on religious behaviour to the exclusion of woman and children (Attenbrow 1976:34; Sullivan 1983:12.4).*

According to Tindale (1974), the study area is located along the border between the Gandangara and Wiradjuri tribal area and linguistic territory. His observations are an attempt to depict Aboriginal occupation at the time of European contact. The Gundangarra tribal area is described by Tindale (1974) as being:

> *....At Goulburn and Berrima; down the Hawkesbury River (Wollondilly) to about Camden.*

Whilst the Wiradjuri tribal area is described by Tindale (1974) as being:

> *...on the Lachlan River and south from Condoblin to Booligal; at Carrathool, Wagga Wagga, Cootamundra, Cowra, Parkes, Trundle; east to Gundagai, Boorowa and Rylstone; at Wellington, Mudgee, Bathurst and Carcoar; west along Billabong Creek to beyond Mosgiel, south west to near Hay and Narranderra, south to Howlong on the upper Murray; at Albury and east to about Tumbarumba (Tindale 1974).*

Aboriginal society was constructed of a hierarchy of social levels and groups, with fluid boundaries (Peterson 1976), with the smallest group comprising a family of a man and his wife/wives, children and some grandparents, referred to as a 'clan (Attenbrow 2010). The next level consists of bands, which were small groups of several families who worked together for hunting and gathering purposes, also known as a 'band' (Attenbrow 2010). The third level comprised regional networks with a number of bands, and these bands generally shared a common language dialect and/or had a belief in a common ancestor.

Networks would come together for specific ceremonial purposes. The highest level is described as a tribe, which is usually described as a linguistic unit with flexible territorial boundaries (Peterson 1976); although Attenbrow (2010) argues that "these groups were not tribes in the current anthropological sense of the word". Various dialects of the Wiradjuri language were identified within the region (Tindale 1974). Tindale also considered the Wiradjuri to be "one of the largest tribal groupings in Australia, with many hordes".

Aboriginal people utilised a wide range of subsistence resources in the past, with ethnohistorical sources recording the diet of Aboriginal people including kangaroo, possum, kangaroo rat, lizards, birds, platypus, wallaby and a range of plants and insects as well as fish and shell fish (Pearson 1981). A wide range of native animals,

including birds and reptiles, have been identified within the wider environment around Laggan, and are likely to have been utilised as food resources by Aboriginal people in the past.

2.3.3 Raw Materials

A wide range of raw materials were selected by Aboriginal people for flaking to create stone implements. Material types ranged from high quality to poor quality for flaking purposes, depending on the geology of the area and readily available material types. The following is a description of a range of raw material types known to have been utilised by Aboriginal people for the creation of stone artefacts.

Breccia

Breccias are coarse, angular volcanic fragments cemented together by a finer grained tuffaceous matrix.

Chalcedony

Chalcedony is a microcrystalline, siliceous rock which is very smooth and can be glossy. Introduction of impurities can produce different coloured versions of chalcedony, including yellow/brown (referred to as carnelian), brown (sard), jasper (red/burgundy) and multicoloured agate. It flakes with a sharp edge and was a prized material type for the creation of stone artefacts in parts of Australia (Kuskie & Kamminga 2000: 186).

Chert

Chert is a highly siliceous sedimentary rock, formed in marine sediments and also found within nodules of limestone. Accumulation of substances such as iron oxide during the formation process often results in banded materials with strong colours. Chert is found in the Illawarra Coal Measures and also as pebbles and colluvial gravels. It flakes with durable, sharp edges and can range in colour from cream to red to brown and grey.

Petrified Wood

Petrified wood is formed following burial of dead wood by sediment and the original wood being replaced by silica. Petrified wood is a type of chert and is a brown and grey banded rock and fractures irregularly along the original grain.

Quartz

Pure quartz is formed of silicon dioxide, and has a glossy texture and is translucent. Introduction of traces of minerals can lead to colouration of the quartz, such as pink, grey or yellow. The crystalline nature of quartz allows for minute vacuoles to fill with gas or liquid, giving the material a milky appearance. Often quartz exhibits internal flaws which can affect the flaking quality of the material, meaning that in general it is a low-quality flaking material (Kuskie & Kamminga 2000: 186). However, quartz is an abundant and widely available material type and therefore is one of the most common raw materials used for artefact manufacture in Australia. Flaking of quartz can produce small, very sharp flakes which can be used for activities such as cutting plant materials, butchering and skinning.

QUARTZITE

Formed from sandstone, quartzite is a metamorphic stone high in silica that has been heated or had silica infiltrate the voids found between the sand grains. Quartzite ranges in colour from grey to yellow and brown.

SILCRETE

Silcrete is a siliceous material formed by the cementing of quartz clasts with a matrix. These clasts may be very fine grained to quite large. It ranges in colour from grey to white, brown, red or yellow. Silcrete flakes with sharp edges and is quite durable, making silcrete suitable for use in heavy duty woodworking activities and also for spear barbs (Kuskie & Kamminga 2000:184).

TUFF/INDURATED MUDSTONE

There is some disagreement relating to the identification of lithic materials as tuff or indurated mudstone. The material is a finely textured, very hard yellow/orange/reddish-brown or grey rock. Kuskie and Kamminga (2000: 6, 180) describe that identification of lithic materials followed the classification developed by Hughes (1984), with indurated mudstone described as a common stone material in the area. However, Kuskie and Kamminga's analysis, which included x-ray diffraction, identified that lithics identified as 'indurated mudstone' was actually rhyolitic tuff, with significant differences in mineral composition and fracture mechanics between the stone types. They define mudstone as rocks formed from more than 50% clay and silt with very fine grain sizes and then hardened.

The lithification of these mudstones results in shale (Kuskie & Kamminga 2000: 181) and thus 'indurated mudstone', in the opinion of Kuskie and Kamminga, do not produce stones with the properties required for lithic manufacture.

In 2011, Hughes, Hiscock and Watchman undertook an assessment of the different types of stones to determine whether tuff or indurated mudstone is the most appropriate terminology for describing this lithic material. The authors undertook thin section studies of a number of rocks and determined that the term 'indurated mudstone' is appropriate, with an acknowledgment that some of this material may have been volcanic in origin. They also acknowledge that precise interpretation of the differences between material types is difficult without detailed petrological examination, and suggest that artefacts produced on this material are labelled as 'IMT' or 'indurated mudstone/tuff'.

2.3.4 PROCUREMENT

Assemblage characteristics are related to and dependent on the distance of the knapping site from raw materials for artefact manufacture, and different material types were better suited for certain tasks than other material types. Considerations such as social or territorial limitations or restrictions on access to raw material sources, movement of groups across the landscape and knowledge of source locations can influence the procurement behaviour of Aboriginal people. Raw

materials may also have been used for trade or special exchange between different tribes.

2.3.5 MANUFACTURE

A range of methodologies were used in the manufacture of stone artefacts and tools, through the reduction of a stone source. Stone may have been sourced from river gravels, rock outcrops, or opportunistic cobble selection. Hiscock (1988:36-40) suggests artefact manufacture comprises six stages, as follows:

1. The initial reduction of a selected stone material may have occurred at the initial source location, or once the stone had been transported to the site.
2. The initial reduction phase produced large flakes which were relatively thick and contained high percentages of cortex. Generally the blows were struck by direct percussion and would often take advantage of prominent natural ridges in the source material.
3. Some of these initial flakes would be selected for further reduction. Generally only larger flakes with a weight greater than 13-15 grams would be selected for further flaking activities.
4. Beginning of 'tranchet reduction', whereby the ventral surface of a larger flake was struck to remove smaller flakes from the dorsal surface, with this retouch applied to the lateral margins to create potential platforms, and to the distal and proximal ends to create ridges and remove any unwanted mass. These steps were alternated during further reduction of the flake.
5. Flakes were selected for further working in the form of backing.
6. Suitable flakes such as microblades were retouched along a thick margin opposite the chord to create a backed blade.

Hiscock (1986) proposed that working of stone materials followed a production line style of working, with initial reduction of cores to produce large flakes, followed by heat treatment of suitable flakes before the commencement of tranchet reduction. These steps did not necessarily have to occur at the same physical location, but instead may have been undertaken as the opportunity presented.

2.3.6 PREDICTIVE MODEL

Predictive models have been developed and refined over the years. Detailed predictive and occupational models for the Aboriginal occupation in the wider region in general identified that:

- Aboriginal occupation focussed predominantly on resource rich zones, particularly along higher order watercourses. Abundant resources for sustenance and water would supply longer stays for family and community base camps, as well as occasional gatherings of larger groups. These areas were considered to be primary resource zones;
- Secondary resource zones were focussed on watercourses, wetlands and/or swamps in close proximity to higher order watercourses and the associated flats and terraces. These areas were seasonally occupied during the course of hunting and gathering activities by small hunting parties and family

groups. Generally level ground was selected for camping, near water sources, and was sporadic rather than continuous occupation;

- Outside of the primary and secondary resource zones, activities included resource gathering and movement across the landscape by small parties, in order to access areas with greater resources;
- Opportunistic reduction of raw materials to create stone artefacts would be quite widespread across the landscape, in order to produce stone tools on an 'as needed' basis;
- Locally available quartz was favoured for knapping activities, along with tuff and chert, depending on their availability;
- Exposed sandstone would be utilised for creating and maintaining ground edge hatchets, creating grinding grooves. This action may have been opportunistic rather than specific, with evidence of long term, repeated use not expected to occur; and
- Aboriginal occupation of the general area is believed to have occurred within the past 5,000 years, although it is possible it may extend as far as 30,000-40,000 years ago (SEA 2013:23).

From these general predictions of how the area was utilised for occupation by Aboriginal people in the past, a predictive model for the location of archaeological sites was developed and this has been summarised below:

- Low spurs within 100m of higher order streams are likely to contain sites with relatively higher numbers of artefacts;
- Very low density artefact scatters may occur throughout valley floor contexts;
- Elevated, level ground adjacent to major, permanent streams has the potential for open sites with higher concentrations of artefacts;
- Stone artefact scatters are likely to increase in number and density relative to the site's proximity to water and raw material sources;
- Suitable rockshelters with relatively level floors, adequate shelter and located in basal slope contexts in association with a drainage line may contain occupation deposit and/or pigment rock art;
- Grinding grooves are likely to occur only where suitable sandstone exposures occur in association with a source of water;
- Burials are rare but may occur in deep, fine grained alluvial or Aeolian sediments, or in the form of stone cairns;
- Scarred trees have the potential to survive in areas of suitable old growth trees;
- Archaeological deposits with high scientific significance are most likely to be found in rockshelters with suitable deposit depth, or on elevated areas with aggrading sediments in close proximity to permanent or reliable water sources, or within rockshelter contexts;
- Outside of these identified areas, stratified deposits or in situ archaeological material is unlikely to survive due to bioturbation and/or natural processes such as water action, erosion etc; and

- Isolated surface and subsurface archaeological material may exist as background scatter in very low densities, but the location of this potential material is impossible to predict.

The hydrology, topography, soils and geology of an area are all important considerations when developing a predictive model for an area.

2.4 Step 3: Avoid harm

Given the proximity to water (Reedy Creek) it was necessary to undertake a visual inspection of the study area to identify any surface objects or landforms with potential archaeological deposits (PAD). This inspection would allow conclusions to be made regarding the probability of archaeological objects occurring within the proposed area of upgrade. This would assist in determining if there was any archaeological potential within the study areas which could potentially be harmed by the proposed works, and in turn, assist in determining if harm to the archaeological resource could be avoided.

The proposed development will impact the majority of the study area, through the subdivision and subsequent residential development of the property.

2.5 Step 4: Visual Inspection

A visual pedestrian inspection of the proposed upgrade areas was undertaken on Tuesday 15 October 2019 by Leigh Bate, archaeologist with Apex Archaeology.

2.5.1 Survey Coverage

The entire area was inspected by pedestrian survey to identify any surface artefacts or any areas with potential for subsurface deposits to be present.

2.5.2 Results

Ground surface visibility (GSV) was generally low throughout the study area. GSV was rated at 10%-15% overall. However, in some sections visibility increased due to erosional scours and ground disturbance to 40%.

No previously recorded archaeological sites were located within the study area.

Plate 1: General view looking south from the north east corner of the study area.

Plate 2: Looking west along the northern boundary of the study area (Telstra cables in the vicinity).

Plate 3: Looking east along the northern boundary.

Plate 4: Looking south east from the highest point of the study area

Plate 5: Looking east along midslope towards the drainage line through the centre of the study area.

Plate 6: Looking east through the dammed area within the centre of the study area.

Plate 7: Looking north north across the central portion of the study area.

Plate 8: Looking north along the eastern boundary of the study area.

2.5.3 Discussion

In accordance with the Due Diligence Code of Practice, land is considered disturbed if human activities within the area have left clear and observable changes on the landscape. The study area met this definition in general, as ground disturbance was high throughout the study area. Evidence of landscape modification in the form of vegetation clearance for farming activities and damming of the drainage line through the centre of the study area have left a clear and visible mark on the landscape, as has the installation of Telstra cables in the southern portion of the site. The majority of the study area is under crop and is also being utilised for cattle agistment.

The level of disturbance and level of slope within the study area means that there is a low chance of intact sub-surface deposits being present within the area. No areas suitable for Aboriginal habitation or short-term camping were identified within the study area, based on the predictive model for the region. No areas of potential were identified and no archaeological material was identified on the ground surface. It is possible that the area may have been utilised by Aboriginal people for resource gathering in the past, but these activities are ephemeral and rarely leave evidence that survives in the archaeological record.

3.0 Conclusions and Recommendations

3.1 Conclusions

- No previously recorded Aboriginal sites are located within the study area.
- No archaeological material was identified on the ground surface within the study area.
- The study area is assessed as having no potential for subsurface archaeological deposits and this is confirmed by the site inspection.
- This assessment was based on identification of landform elements, previous archaeological work undertaken within the wider region, and a visual inspection of the study area.

3.2 Recommendations

- No further Aboriginal archaeological assessment is required prior to the commencement of upgrade works as described in this report.
- The results of this assessment fulfil the requirement for Due Diligence in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Code of Practice). Works may proceed with caution.
- The proposed works must be contained to the area assessed during this due diligence assessment, as shown on Figure 1. If the proposed location is amended, further archaeological assessment may be necessary to determine if the proposed works will impact any Aboriginal objects or archaeological deposits.
- Should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment and Aboriginal community consultation may be required prior to the recommencement of works. Any objects confirmed to be Aboriginal in origin must be reported to the OEH under Division 1, Section 89A of the NPW Act.

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Appendix A: AHIMS Basic Search Results

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 1943

Client Service ID : 457073

Apex Archaeology

PO Box 291
Macarthur Square New South Wales 2560

Attention: Leigh Bate

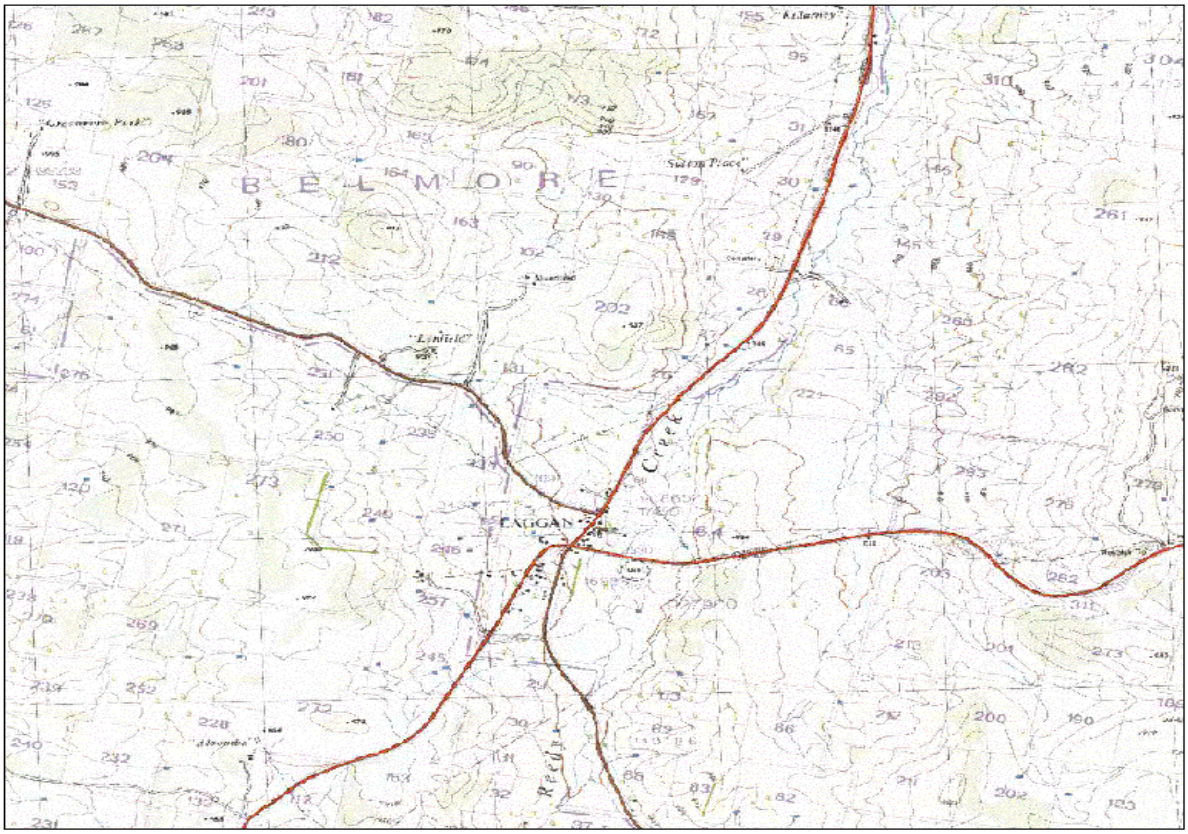
Email: leigh@apexarchaeology.com.au

Date: 16 October 2019

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 55, Eastings : 730101 - 735113, Northings : 6188414 - 6193403 with a Buffer of 0 meters, conducted by Leigh Bate on 16 October 2019.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

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