



Report

Aboriginal Due Diligence Heritage Assessment

Meppem Quarry

Regional Group Australia

29 September, 2020

Rev 4 (Revised Issue)

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Prepared For

Regional Group Australia

c/. Jim Lawler, Project Director, Groundwork Plus Pty Ltd

Email: jlawler@groundwork.com.au, Telephone: 07 38710411

6 Mayneview Street Milton Queensland 4064

PO Box 1779 Milton Queensland 4064

Prepared By

Advitech Pty Limited t/a Advitech Environmental

ABN: 29 003 433 458

Jake Brown, Archaeologist

Email: jake.brown@advitech.com.au, Telephone: 02 4924 5400, Mobile: 0421555894



Facsimile: 02 4967 3772, Web: www.advitech.com.au, General Email: mail@advitech.com.au

7 Riverside Drive Mayfield West NSW 2304 PO Box 207 Mayfield NSW 2304

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Endorsements

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Authorised for Release by		Dr Rod Bennison Lead Environmental Scientist	29 September, 2020

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1. INTRODUCTION

Advitech Pty Limited (trading as Advitech Environmental) was engaged by GroundworkPlus Pty Ltd (Groundwork Plus) to undertake an Aboriginal Due Diligence Heritage Assessment on the proposed hard rock quarry site located north east of Bellata on the land formally identified as Lot 10 DP 751753 and Lot 110 DP 257328. Regional Group Australia propose to operate the quarry for the land owner and proponent, John Meppem. This Aboriginal Due Diligence Heritage Assessment has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) dated 24 August, 2018. This report aims to provide an assessment of Aboriginal heritage of the proposed hard rock quarry against the criteria set out in the SEARS.

It should be noted that this report was prepared by Advitech Pty Limited for Regional Group Australia ('the customer') in accordance with the scope of work and specific requirements agreed between Advitech and the customer. This report was prepared with background information, terms of reference and assumptions agreed with the customer. The report is not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in this report, other than that which was intended at the time of writing.

2. QUALIFICATIONS OF THE INVESTIGATORS

Jake Brown, Archaeologist, has four years of experience in Aboriginal archaeological assessments, research, reporting, analysis and consultation. This experience has included cataloguing stone artefacts from the Hunter region, conducting field surveys, and monitoring of potential find sites during surface/subsurface disturbance across central and northern Queensland. Jake's educational qualifications include a *Bachelor of Social Science (Hons)* in Sociology and Anthropology, University of Newcastle 2015, and a *Graduate Certificate of Archaeology* from Flinders University 2017. Jake is a member of the Australian Archaeological Association.

Jessica Blackman, Archaeologist, has six years of experience in Aboriginal archaeological assessment, cultural heritage management, reporting, analysis, and community consultation. Jessica's training in the mining and minerals industry has allowed her to gain extensive experience in field heritage survey and assessment, artefact and cultural site identification and cataloguing, and land access facilitation through meeting internal and regulatory compliance obligations. Jessica has worked in Queensland, New South Wales and the Northern Territory. Jessica holds a *Bachelor of Arts* with an extended major in archaeology and anthropology (University of Queensland 2011) and a *Native Title Masterclass Certificate* (James Cook University 2015). Jessica is a member of several heritage and archaeological organisations. Jessica provided a critical review of the document.

3. BACKGROUND AND OBJECTIVES OF THE ASSESSMENT

3.1 The Proposed Meppem Quarry

The proposed Meppem Quarry is located along Manamoi Road, approximately 10 kilometres north east of the township of Bellata, midway between Narrabri and Moree in northern New South Wales. The proposed quarry lies on Lot 10 DP751753 and Lot 110 DP 257328 within the Moree Plains Local Government Area on land zoned RU1 Primary Production. The lots comprise about 143 hectares, although the footprint of the quarry would be 8.34 hectares, with an additional approximate 1.6 hectares for the haul road (see **Figure 1**). The haul road connects to the Newell Highway via Manamoi Road and Boo Boo Road. A water dam is located to the east of the footprint and will be created for the proposed quarry.

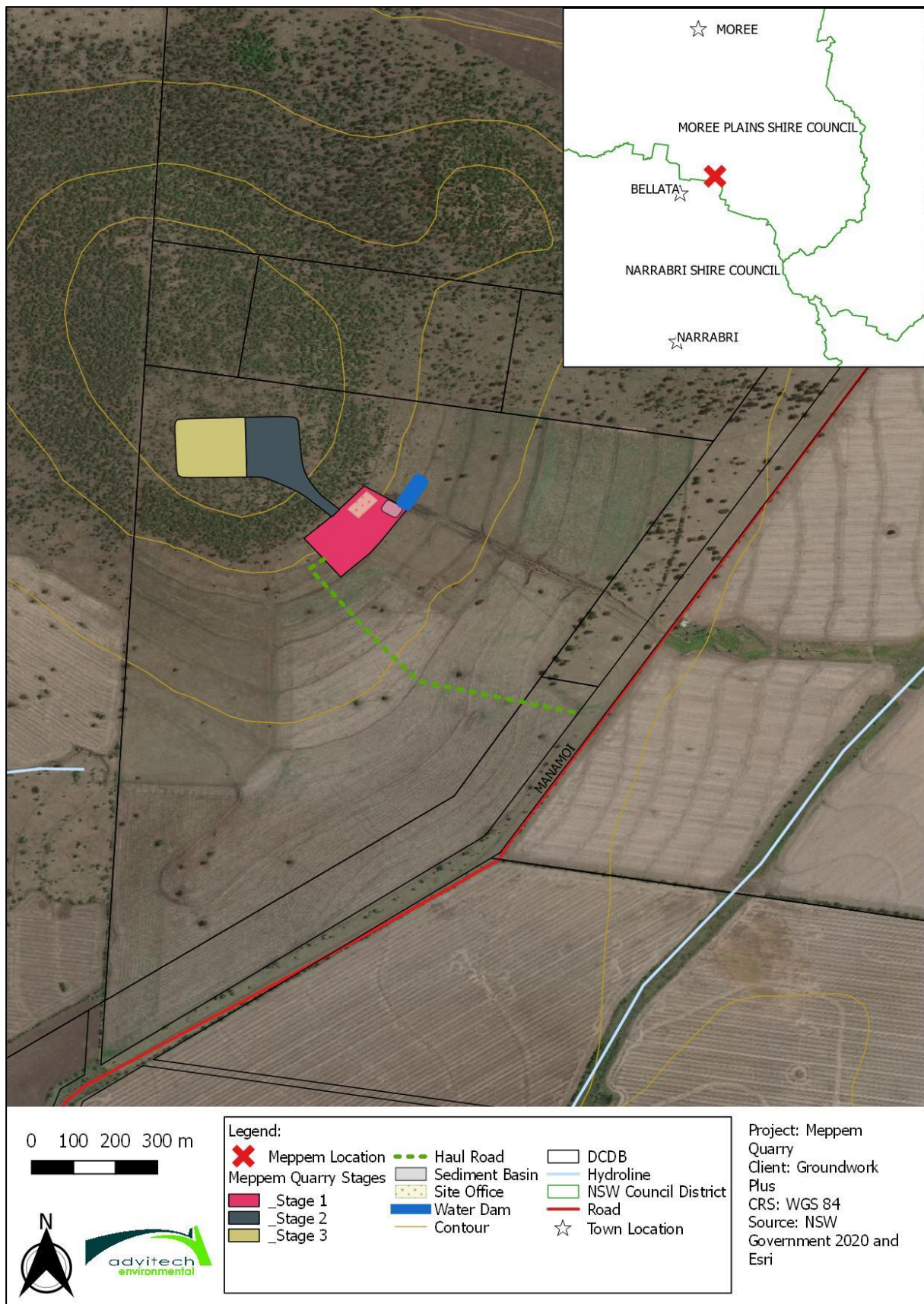


Figure 1: Site Location Map.

The locality of the proposal site is considered to be rural in nature, with farming (cropping) making up the predominant land use within the region. It is proposed that the hard rock quarry will extract and process a maximum of 490,000 tonnes per annum over a five year period. The material extracted from the quarry will comprise overburden and hard rock, which will be processed through a mobile crushing and screening plant before being stockpiled. The quarry will produce a number of products suitable for the needs of the Inland Rail Project. Upon completion of supply of material to the project, the area of operation of the quarry would be rehabilitated to a suitable landform for continuing rural activities.

3.2 Purpose of this Assessment Report

The purpose of this report is to assess potential Aboriginal heritage issues from the operation and construction of the proposed quarry and, where required, identify feasible and reasonable mitigation measures. The proposal is designated development under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and, as such, this statement has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs).

3.3 Secretary's Environmental Assessment Requirements

This report will be appended to an Environmental Impact Statement (EIS) which must comply with the requirements of Clause 6 and 7 of the Environmental Planning and Assessment Regulation 2000, and which addresses environmental considerations identified in the Secretary's Environmental Assessment Requirements (SEARs) (EAR1247) relevant to heritage. The SEARs state that the heritage assessment should be undertaken with a view to the:

an assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage...,having regard to the relevant policies and guidelines listed in Attachment 1.

Those relevant policies and guidelines listed in Attachment 1 are:

- The Burra Charter (The Australia ICOMOS charter for places of cultural significance);
- Guide to investigation, assessing and reporting on Aboriginal cultural heritage in NSW (OEH) 2011, and
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH).

Further, in regards to Aboriginal heritage, the Office of Environment and Heritage provided recommendations to inform the SEARs:

- *The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the proposal. This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and be guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and consultation with OEH regional branch officers.*
- *Where Aboriginal cultural heritage values or potential values are present, these are to be assessed and documented in an Aboriginal Cultural Heritage Assessment Report (ACHAR). An assessment under the Due Diligence process is not an Aboriginal Cultural Heritage Assessment Report. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable,*

the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.

- *Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW) where an ACHAR is required. The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.*
- *Note: Consultation is not only required when an AHIP will be required, but also when test excavations are carried out under the Code of Practice. These may not always require an AHIP but will trigger the need for an ACHAR.*
- *Where harm to an Aboriginal object or declared Aboriginal place cannot be avoided, an Aboriginal Heritage Impact Permit (AHIP) will be required from OEH under the National Parks and Wildlife Act 1974. You must apply to OEH for an AHIP prior to commencing works that will directly or indirectly harm an Aboriginal object or a declared Aboriginal place.*
- *Note: Designated development where an AHIP is required should also be considered as an integrated development application (IDA). In these circumstances, OEH will issue General Terms of Approval (GTAs) to the consent authority to be included in conditions of development consent. OEH GTAs will address Aboriginal cultural heritage matters required to be addressed as part of an AHIP application. The matters outlined in the GTAs will be required to be assessed as part of an AHIP after development consent has been granted. OEH requires valid development consent to accompany an AHIP application.*
- *The ACHAR must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the development to formulate appropriate measures to manage unforeseen impacts.*
- *The ACHAR must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate protocols to manage the impacts to this material in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010).*

Project specific requirements

- *If you do not know whether a proposal may harm Aboriginal objects or declared Aboriginal places, it may be appropriate to apply the due diligence procedure as prescribed under the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH 2011). The due diligence must indicate whether further assessment under an Aboriginal Cultural Heritage Report (ACHAR) is required. An assessment under the Due Diligence process is not an ACHAR.*
- *The assessment of cultural heritage values must include a surface survey undertaken by a qualified archaeologist in areas with potential for subsurface Aboriginal deposits. The result of the surface survey is to inform the need for targeted test excavation to better assess the integrity, extent, distribution, nature and overall significance of the archaeological record. The results of surface surveys and test excavations are to be documented in the ACHAR.*

4. PLANNING CONTEXT

4.1 New South Wales legislation

4.1.1 Environmental Planning and Assessment Act 1979

Development in NSW is subject to the requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and its associated regulations and planning instruments. Developments requiring consent, such as the Meppem Quarry proposal, are assessed under Part 4 of the EP&A Act. As the proposed quarry is designated development, the application for development must be accompanied by an environmental impact assessment in the form prescribed by the accompanying regulations, and as stipulated in the SEARs detailed above. Where extractive industries, including quarries, generate more than 30,000 cubic metres per year and or disturb greater than 2.0 ha of land, consent under Schedule 3 (Part 19) of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) is also required.

4.1.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) aims to conserve and manage natural resources and Aboriginal heritage.

4.1.3 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) aims to conserve and manage the State's heritage, whether they are places, buildings, works, relics, moveable objects or precincts of local or State heritage significance. A property is a heritage item if it is listed in the heritage schedule of the Local Council's Local Environmental Plan or on the State Heritage Register, a register of places and items of particular importance to the people of NSW. If an item of heritage value was identified, then consultation would be undertaken with Moree Plains Shire Council and an assessment undertaken in accordance with OEH guidelines for *Assessing Heritage Significance* (Heritage Office, 2001). The heritage statement is the basis for policies and management structures that will affect an item's future.

4.1.4 Local Planning Instruments

Development at the site is regulated under the Moree Plains Shire Council Local Environmental Plan 2011 and the Development Control Plan 2013. These policies determine which development is either permissible or prohibited, or exempt or complying. As the proposed quarry is on land zoned RU1 Primary Production, an extractive industry located at the proposal site would be permissible with development consent. Further, Schedule 5 lists all items of environmental heritage. No heritage item is listed within proximity to the proposal site.

4.2 Commonwealth legislation

Under the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), referral is required to the Australian Government for proposed actions that have the potential to significantly impact on Matters of National Environmental Significance (MNES) or the environment of Commonwealth land. The assessment of the proposal's impact on MNES and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant MNES or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of the Agriculture, Water and the Environment (DAWE) under the EPBC Act.

5. PHYSICAL CONTEXT

5.1 Topography

The topography of the area slopes away from the proposed extraction area. The extraction area situated on a hill is approximately 340 m above sea level and at the entrance to the haul road is approximately 280 m above sea level (see **Figure 1**).

5.2 Hydrology

The development site is situated at the northern end of the Brigalow Belt South Bioregion within the Northern Basalts sub region. Myall Hollow Creek borders the northern border of Lot 10 DP 751753. The site has watercourses surrounding it; however, none are within the lot and the proposed extraction area. The area is a part of the Gwydir catchment which covers 26,600 km² (Green et al 2011).

5.3 Geology/Soils/Geomorphology

The Great Soil Group map of NSW (OEH 2017) indicates Chocolate Soils occur at the site and just within the intended extraction area. The rest of the site is characterised by black earths (see **Figure 2**). The Northern Basalts subregion is generally characterised by black loams on basalt ridges, deep sands on sandstone and texture contrast soils on slopes. Heavy grey clay exist on alluvial flats (NPWS 2003, pp. 136).

The Brigalow Belt South Bioregion contains large volcanic attributes such as the Liverpool Range and Warrumbungles (NPWS 2003, pp. 132). The subregion is the Northern Basalts which geologically contain tertiary basalts over Jurassic quartz sandstone and alluvial sediments and characterised by undulating low stony hills, long slopes with sandy wash and heavy clays in the valley floors (NPWS, 2003, pp. 136).

5.4 Flora and Fauna

The majority of the landscape in the study has been cleared for agricultural purposes. The Subregion of Northern Basalt in the Brigalow Belt South Bioregion is classified as having flora including:

Brigalow, belah, whitewood, wilga, budda and poplar box on basalt hills. Silverleaved ironbark, spotted gum and smooth-barked apple on stony hills. River red gum, belah myall and poplar box on basalt flats. Silver-leaved ironbark and white cypress pine in sandstone rocks, smooth-barked apple, white cypress, Blakely's red gum, Moreton Bay ash, poplar box, wilga, rough-barked apple, bull oak, on lower sandstone slopes. White box, with silver-leaved ironbark, white wood, bull oak and brigalow on alluvial clays. River red gum on all streams. (NSW NPWS 2003 136).

The fauna include both endemic and introduced species. Introduced species such as pigs, goats, foxes, rabbits, wild dogs, feral cats and carp have been noted in the bioregion (Bastin 2008, pp. 4-5). An EPBC search (5/12/2018) with a 10km radius search found:

- 22 listed threatened species;
- 9 migratory species;
- 15 listed marine species;
- 5 listed threatened ecological communities; and
- 22 invasive species.



Figure 2: Soil Map with DCDB and Quarry Footprint.

5.5 Landscape history, uses and disturbances

The history of the landscape and its past and present uses and disturbances are important to the interpretation of archaeological evidence and what may remain. Occupation of Australia by Aboriginal people is currently thought to have commenced at least 20,000 to 60,000 years prior to arrival of the European settlers. The environments of five broad time periods can be reconstructed within which the archaeological resources of the eastern coast of Australia can be evaluated:

- The Late Pleistocene (>40,000 years ago) is thought to overlap with the time Aboriginal people first settled in the Hunter Valley;
- The Last Glacial Maximum (LCM) (peaked around 20,000 years ago) during which people adapted to significant climatic and environmental change;
- The Holocene (the last 10,000 years) that saw sea levels and positions stabilise at their current positions;
- The landscape in c.1790 as it was immediately prior to European colonisation; and
- The last 200 years when the landscape was dramatically altered by European settlement and land use practices.

There are very few direct lines of evidence (archaeological, ecological, and geomorphic) that document what the landscape at Bellata was like prior to European settlement. The regional history connects to pastoralism, with cattle, sheep and wheat the main industries recorded (HO and DUAP 1996, pp. 78-87). In Bellata, employment in the 2016 census (ABS 2018) is still mainly based in agriculture with grain growing being the main occupation reported with 37.2 %. Farming of cattle/grain and sheep/grain made up another 13.2%.

6. ABORIGINAL CULTURAL HERITAGE ASSESSMENT

This Aboriginal Due Diligence Heritage Assessment has been prepared in order to determine and assess whether the proposed development will have any impact on Aboriginal heritage or culture within the study area. This assessment has been prepared in accordance with:

- Aboriginal Cultural Heritage Consultation Requirements for Proponents, Department of Environment and Climate Change, 2010 (ACHCRP);
- Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW, Department of Environment and Climate Change, 2010 (Code of Practice); and
- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW, NSW Office of Environment and Heritage, 2011 (the Guide).

A model of Aboriginal occupation and the study area's ensuing archaeological potential determines the likely impacts to a project. Hence, the following factors are considered:

- The environment (see **Section 5**);
- Statutory controls (see **Section 6.1**);
- Local and regional archaeological context (see **Section 6.2**);
- Heritage NSW Aboriginal Heritage Information Management System (AHIMS) (see **Section 6.3**);
- The local and regional character of Aboriginal Land Use incorporating Aboriginal history, contemporary cultural accounts and cultural significance (see **Section 6.4**); and

- Existing predictive models of past Aboriginal land use (see **Section 6.5**).

Environmental factors strongly influence the suitability of a place for human occupation as well as the duration of that use. The environment of the study area (topography, geology, landforms, climate, geomorphology, hydrology, soils and vegetation) has been described in detail in **Section 5** of this assessment.

6.1 Statutory Controls

Land managers are required to consider the effects of their activities or proposed development on the environment under several pieces of legislation. Aboriginal cultural heritage in NSW is protected and managed under both Commonwealth and State legislation. The appropriate legislation is summarised below.

The following general overview of the legislative framework is not legal advice and should not be interpreted as such. Advitech Environmental is not liable for any actions taken by any person, body or group as a result of this broad overview of relevant legislation. Advitech Environmental always recommends that legal advice be obtained from a qualified legal practitioner in regard to law and legislation.

6.1.1 New South Wales National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) is the primary legislation for the protection of Aboriginal cultural heritage in New South Wales.

Part 6 of the Act provides protection for Aboriginal objects and declared Aboriginal places through the establishment of offences of 'harm' to these objects and places. Under the Act, it is an offence to knowingly harm or desecrate an Aboriginal object or Aboriginal place. If harm to an object or place is anticipated, an Aboriginal Heritage Impact Permit (AHIP) must be applied for. Where an AHIP Section 90 is required, they can be issued in relation to specific parcels of land, deal with multi-stage developments, and there are clear provisions for variation, transfer, suspension and revocation.

Linked to the NPW Act is the National Parks and Wildlife Regulation 2009, as well as the following Departmental guidelines:

- Aboriginal Cultural Heritage Consultation Requirements for Proponents, Department of Environment and Climate Change, 2010 (ACHCRP 2010);
- Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW, Department of Environment and Climate Change, 2010 (Due Diligence Code);
- Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW, Department of Environment and Climate Change, 2010 (Code of Practice); and
- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW, NSW Office of Environment and Heritage, 2011 (the Guide).

The above legislation provides guidance about Aboriginal heritage in New South Wales. It also provides steps in which individuals or organisations that own, use or manage land can undertake in order to identify the likely presence of Aboriginal objects, if the proposed activities will harm Aboriginal objects and to determine if an AHIP is required.

If harm to Aboriginal object or places cannot be avoided, then an AHIP is required. The CoP assists in establishing the requirements for undertaking test excavations as part of an archaeological investigation without an AHIP. It also establishes the requirements that must be followed when undertaking an archaeological investigation in NSW where an AHIP application is likely to be made.

6.1.2 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act 1979 (EPA Act) establishes the statutory framework for planning and environmental assessment in New South Wales. The implementation of the EPA Act is the responsibility of the Minister for Planning and Environment and is implemented by statutory authorities and local councils. The consideration of potential impacts of a development on Aboriginal heritage is a key component of the environmental impact assessment process. The EPA Act contains the following parts which impose requirements for planning approval:

- Part 4 generally provides for the control of local development that requires development consent from the local Council; and
- Part 5 provides for the control of 'activities' that do not require development consent and are undertaken or approved by a determining authority.

This project falls under Part 4 of the EP&A Act.

6.1.3 Heritage Act 1977

The Heritage Act protects the natural and cultural history of NSW with emphasis on non-Aboriginal cultural heritage through protection provisions and the establishment of a Heritage Council. While Aboriginal heritage sites and objects are protected primarily by the NPW Act, if an Aboriginal site, object or place is of great significance it can be protected by a heritage order issued by the Minister on the advice of the Heritage Council.

6.1.4 Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Commonwealth)

The Commonwealth protects areas and/or objects which are of significance to Aboriginal people and which are under threat of destruction. A significant area or object is defined as one that is of particular importance to Aboriginal people according to Aboriginal tradition. The Act can, in certain circumstances override State and Territory provisions, or it can be implemented in circumstances where State or Territory provisions are lacking or are not enforced. The Act must be invoked by or on behalf of an Aboriginal or Torres Strait Islander or organisation.

6.2 Local and Regional Archaeological Context

A review of the context of local and regional archaeological assessments, when combined with environmental factors (see **Section 5**), provides the broad basis of a predictive archaeological model for the study area (see **Section 6.5**). The broader cultural landscape (as discussed in **Section 6.4**) is highlighted when there is a modelling of expected site types, frequency of their occurrence and spatial distribution patterns across the wider area.

However, previous archaeological investigations are somewhat limited in their utility regarding site locations, lithic artefact quantities and type. These limitations arise from the variable way archaeologists have previously identified, classified and recorded Aboriginal objects, particularly lithic materials, and Aboriginal sites. Owing to these variations in the amount of data that is included in reports and the terms different archaeologists use to describe artefact types, a comparison of objects and tool types from each site is not considered to be representative or reliable for the purposes of predictive modelling other than on a broad and generalised basis.

Overall, there is a lack of substantial archaeological data for the local and regional area. Many of the existing studies relate to the more southern portions of the Brigalow Belt South Bioregion. Cultural

heritage assessments have been undertaken near to the study area however investigations in search of those assessments have revealed that the assessments were never completed, published or are unavailable for review. The following is a review of reports produced during previous archaeological assessments within the general region of the study area and in regard to the Brigalow Belt South Bioregion.

The previous studies and ethno-histories have been tied to exploration, mining and infrastructure. This can be seen heavily around the Narrabri region with coal mining in particular. The mines are all greater than 5.0 kms away; however, they provide cases of regional assessments. Examples of this type of study include the Maules Creek Coal Project (AECOM 2010), Boggabri Coal (Insite Heritage 2010), Whitehaven and Idemitsu (UQCHU 2017). An alternative energy project in a similar area is the Liverpool Range wind farm with an assessment of the Aboriginal Cultural Heritage. Other infrastructure projects include the Inland Rail (Umwelt 2017) and the Newell Highway (Jacobs and RMS 2018). These projects all involved community consultation with the Gamilaroi People and assessment of cultural heritage values throughout central and northern NSW. The Inland Rail project (Umwelt 2017, pp. 77-81) found 19 new sites consisting of 12 isolated artefacts and 7 artefact scatters. Also mentioned in the ARTC North Star to Narrabri study area is suitable stone for resources. The report specifies a location between North Star and Milguy in the vicinity of Tikitere contains raw silcrete. This is occurring as cobbles in the Tackinbri Creek and Croppa Creek, and a mapped outcrop slightly to the east of the assessment area (Umwelt 2017, p. 43). Silcrete, porcellanite, basalt and dolerite are raw material that if sufficient quality may be used for manufacturing stone artefacts.

The Boggabri Mine approximately 100 kms south east of Meppem has a large number of Aboriginal cultural heritage sites, according to UQCHU (2017, p19-20) with 152 sites recorded, some of which were approved for salvage in 2007 and 2013. Another nearby mine Tarrowonga located 133 sites that included 50 artefact scatters, 59 isolated finds and 24 scar trees. Maules Creek Mine located 67 sites with a mix of artefact scatters (43) and isolated finds (24) (UQCHU 2017, p.19).

The Gamilaroi Peoples' language and practices have been researched and recorded since early colonisation with Sir Thomas Mitchell exploring the area in the 1830's and 1840's, documenting his encounters with the Gamilaroi people including details such as dwellings, food and attire (Mitchell 1838, p.50,55,169-170). O'Rourke (1997, p137) discusses the beliefs of the Gamilaroi such as the worship of Balame or Baayama. Other practices noted through observation were from George Clarke, an escaped convict who lived with the Gamilaroi and undertook ritual scarification and shared his knowledge when he was recaptured by authorities. This sparked interest from explorers about the landscape and rivers in the area especially the Kindur (likely the Gwydir River in flood) (Boyce 1970; AECOM 2010, p. 25).

Other descriptions of the Gamilaroi by R.H. Mathews made a study of ceremonial practices and language with reports published in 1895, 1897, 1898, 1903 and 1917. The descriptions of different Bora rings and the events that occur at sites including Gundabloui, Tallwood, Terry Hie Hie, Kunopia with Mathews (1917, p. 423) describe the Bora grounds as an educational system for initiation of the youths to privileges and obligations of manhood and to instil moral and civil laws of the community. The language of the Gamilaroi is the main study; however, Mathews (1903) also makes comparison to other Aboriginal languages and dialects including the Wirraiarai dialect, the Thurrawal language and Darkinung language, as well as a brief cross examination of languages of Victoria, South Australia and Queensland. This refines variations and similarities between Indigenous languages in Australia.

Kelton (1998) studied a small quarry north of the Tookey Creek. The assessment located five scar trees (three possible scars and two probable) which were not registered on AHIMS. The trees were unspecified box trees, including Bimble Box.

Other site types known to the region are burials, scarred trees, axe grinding grooves, stone arrangements, ceremonial grounds, stone quarries and rock shelters. Underlying sandstone formations associated with deep river gorges are the most common areas conducive to rock shelter formation. Large and stratified sites commonly occur in sand bodies with associated water courses. Sandstone boulders may also provide suitable rock shelters. Koettig and Lance (1986) note that ceremonial (bora) grounds may have traditionally been located some distance from general camping sites and that a hill top location was preferred.

6.3 Aboriginal Heritage Information Management System (AHIMS)

A search of the Aboriginal Heritage Information Management System (AHIMS) register has shown that no Aboriginal sites or objects are currently recorded within 1.0 km radius of the study area. A wider extensive search reveals few registered sites within a 5.0 km radius which are generally associated with the construction of roads, power infrastructure and mines. The basic details of the known registered sites within 5.0 km are itemised below in **Table 1**.

Table 1: Summary results of AHIMS Extensive search.

Site ID	Site Name	Aboriginal site/object
10-6-0057	Ooonobah ST1	Modified Tree (Carved or Scarred)
10-6-0058	Ooonobah IA1	Artefact

The full AHIMS results, details of their specific locations and mapping, are provided in **Appendix 1**. These detailed results have been separated in order to enable the easy detachment of the Appendix and prevent the unnecessary public disclosure of these details. As part of the update for the new haul road design a new AHIMS search was conducted on 27 August, 2020, to include the project area and altered path to the east, no AHIMS sites were identified (results available in **Appendix 1**).

Reliance on the locations provided by the AHIMS searches is tentative. There are many variables that must be considered when using the AHIMS. More particularly, site coordinates, and descriptions are not always correct due to the following:

- Errors resulting from the evolution of subsequent computer systems used by Heritage NSW that have failed to account for or correctly translate old coordinate systems, such as topographic map references, to new systems;
- Errors resulting from human error or incorrect descriptions of locality on the site cards submitted to AHIMS;
- Errors resulting from data input. Most commonly the naming of the correct mapping system used; and
- Few sites have been updated on the AHIMS register to record if they have been subject to a s87 or s90 permit and, as such, what sites remain in the local area and what sites have been destroyed is unknown.

As discussed in **Section 6.2**, variation in the classificatory definitions employed by archaeologists will significantly influence the range of artefact types identified in an assessment. Due to differences in recording techniques, it is difficult to determine how many of each artefact type is represented across the region. Artefact types noted include flakes (broken, retouched,debitage, waste, chips), cores (multi-platform, single and bipolar), geometric microliths, backed blades, bondi points, scrapers, eloueras, burins, blades, hatchets, choppers (unifacial and bifacial), pebble tools, edge-ground axes,

anvils and hammer stones. Due to variations in both the amount of data that is included in reports, and the terms different archaeologists used to describe artefact types, it is not practicable to provide a count of the different artefact types. It is therefore not productive to attempt to quantify the proportionate representation of artefact types identified in previous studies. An analysis of sites according to the number of artefacts present, the distance from water and the landform type may allow for the identification of a number of trends. However, there are various factors influencing these results, including, not limited to:

- A lack of substantial archaeological investigation of privately owned properties surrounding the study area. As the study area and the surrounding locations are part of the earliest properties to be developed and the active protection of Aboriginal heritage has only occurred within the last thirty years, insufficient investigative results are present to make an informed analysis of trends;
- The fact that the landform on which a site area is observed may not necessarily be its origin, for example, artefacts from a crest may be relocated by erosion such that they are recorded further down a slope;
- Effects of biased sampling of landforms due to decisions made by archaeologists and as a result of development area boundaries, levels of exposure on different landforms and variable recording by archaeologists. For example, the large percentage of sites found along creek lines may be (at least partially), a result of the biased focus of many cultural heritage surveys towards this landform. In addition, it was not possible to obtain sufficient information from a large number of site cards and reports; and
- Artefact counts can be skewed due to factors such as the differing fragmentation levels of discrete stone types and levels of ground surface visibility. Typically, a very large number of sites/artefacts are located on exposures and yet very few artefacts are visible away from these exposures.

In the case of this assessment and the study area, little reliance should be placed on the archaeological context due to the lack of information available by way of comparable studies in the locality and on the same landforms. However, some modelling of past Aboriginal use can be derived from the surrounding registered Aboriginal sites. See **Sections 6.4** and **6.5** for further discussion.

6.4 The Landscape and Cultural Heritage

The way that perceptions, beliefs, stories, experiences and practices give shape, form and meaning to a landscape is termed a cultural landscape. An Aboriginal cultural landscape is 'a place or area valued by an Aboriginal group (or groups) because of their long and complex relationship with that land. It expresses their unity with the natural and spiritual environment and embodies their traditional knowledge of spirits, places, land uses, and ecology'. Material remains of the association may be prominent, but will often be minimal or absent (DECCW, 2010). The physical evidence of Aboriginal use of the landscape (such as campsites and art sites), stories and mythology, cultural resources and the landscape itself provide strong cultural links with the past for the present day Aboriginal community (OEH, 2015).

The landscape scale of cultural heritage is similar to the concept of 'whole-of-landscape' in ecosystem conservation - just as there is connectivity between all parts of natural ecosystems (plants, animals, soils and water), there is connectivity between cultural objects and places through past human behaviour patterns. The cultural landscape concept emphasises the landscape scale of history and the connectivity between people, places and heritage items. It recognises that the present landscape is the product of long term and complex relationships between people and the environment.

Aboriginal cultural landscapes are comprised of:

- Significant biodiversity and a diverse range of ecological systems and associations, all of which contributed to the continuing existence of Aboriginal peoples in the region over many thousands of years, and which are valued in different ways by Aboriginal communities today;
- Material remains of this continuing occupation in the form of a diverse array of Aboriginal sites and places known to the Aboriginal communities, some of which will be recorded on the Aboriginal Heritage Information Management System;
- Extensive historical records from 1788 through to today which record observations of Aboriginal people and lifestyles, wars, massacres, social and cultural events, population census, social interactions, language, and which influence Aboriginal community values today; and
- An Aboriginal population made up of people who have traditional association and knowledge of the region, as well as others who live, work and play within the region, all of whom may attribute various values with the area, derived from the distant and recent past, through to the present day.

For Aboriginal people, the significance of individual landscape features is derived from their interrelatedness within the cultural landscape. This means features cannot be assessed in isolation and any assessment must consider the feature and its associations in a holistic manner. This may require a range of assessment methods and will always require the close involvement and participation of Aboriginal people. By consulting with Aboriginal people and using the concept of cultural landscapes, the story behind the features can be told that demonstrates the associations that may exist between Aboriginal objects and other features within the landscape (DECCW, 2010).

Landscapes had social and symbolic dimensions for people and some locations with unusually high or low artefact densities may represent the influence of non-environmental (social and or symbolic) factors (White and McDonald 2010). Aboriginal people have cultural associations with the landscape of Australia deriving from a long pre-contact history, historical interactions during settlement and contemporary attachments.

Consultation was undertaken with Aboriginal stakeholders in the area and in accordance with the ACHCRP. The contemporary submissions regarding the cultural landscape and previous use of the area are limited and discussed in **Section 5.4.3**. However, as stated by Wonaruah descendant, James Miller (1985):

The land held the key to life's secrets. Man was given the knowledge to read the land and for every rock, tree and creek he found an explanation for existence. He did not own the land, the land owned him.

This statement summarises the interconnectedness that Aboriginal people have felt, and continue to feel, to their ancestral lands and accompanying cultural landscape.

6.4.1 Local and Regional Character of Aboriginal Land Use and its Material Traces

The environment of the study area (topography, geology, landforms, climate, geomorphology, hydrology, soils and vegetation) has been described in detail in **Section 5** of this assessment. Environmental factors strongly influence the suitability of a place for human occupation as well as the duration of that use. The known nature and distribution of cultural materials and resources derived

from historical studies and existing known sites, combined with the environmental factors and contemporary cultural accounts, assist in forming a local and regional character of Aboriginal use. Academic investigation and research have expounded a variety of theories regarding the immigration route and timing of Aboriginal people's arrival in Australia (Bowdler, 1977; Horton, 1981, Smith, 1987). Archaeological investigation in the wider region has provided evidence of occupation at Burrill Lake 20,000 years BP, in the southern Tablelands, 10,000 years BP, in Birragai, 21,000 years BP and in the lower Blue Mountains, 17,000 years BP (Rich, 1988). Bowdler (1981) and Koettig (1985) submit that sites south of Sydney increased around 2,500 years ago and that this was indicative of changes in stone tool technology.

About 19,000 years ago, after the Last Glacial Maximum, global temperatures began to warm. Approximately 10,000 years ago the climate is likely to have become broadly similar to that of today. While the fluctuations in the climate during the last 10,000 years is likely to have been complex, the sea reached its present level around 7,000 years ago and environmental changes after that time are likely to have been relatively minor when they are compared with those during the preceding Aboriginal occupation of the region.

It is likely that during this time, Aboriginal populations were small and use of the local area was transient, especially during the severe winter conditions that would have prevailed. Populations may have preferred to live near the coast, where the year-round climate would possibly have been more temperate, although occupation in the interior landscapes is not discounted and was also probable at different times and in different places over this long geomorphic time period.

Archaeologists, historians and ethnographers have regularly considered why Aboriginal people chose specific locations for camps. Predominantly and generally it is considered that camp sites were chosen for:

- Their proximity to fresh water;
- Availability of food supply or other required resource;
- A vantage ground in case of attack from an enemy;
- For spiritual reasons and to be close to areas of ceremony and tribal gatherings; and
- Movement between resource zones, as well as territory and rights of access by and to such resources.

Other uses of the local landscape by Aboriginal people may have included ceremonial sites, corroboree sites, rock shelters (which may have been used for habitation, ceremony, signage and teaching); rock and ochre extraction quarries, fish traps within streams and rivers, trade routes, walking lines and burials.

A general model of forager settlement patterning in the archaeological record has been established by Foley (1981). Foley's model distinguishes the 'home base' site with peripheral 'activity locations'. Home base sites generally occur in areas with good access to a wide range of resources (reliable water, raw materials, and so on). The degree of environmental reliability of these resources may influence the rate of return and length of occupation of sites. Further, Foley (1981) suggests that home base sites generally show a greater diversity of artefacts and raw material types reflecting that they are representative of a greater array of activities performed at both the site and immediate area.

Activity locations occur within the foraging radius (approximately 10.0 km) of a home base camp and served as a focus of a specific activity (Renfrew and Bahn, 1991). Activity locations will show a low

diversity in artefacts and are not likely to contain features reflecting a base camp (such as hearths). However, the location of certain activities cannot be predicted or identified.

Kuskie and Kamminga (2000) established a general model of occupation strategies based primarily upon ethnographic research (see **Table 2**). The model distinguishes between short-term or extended long-term occupation and makes some predictions about the likely location of different foraging and settlement activities. For example, the presence of features that required a considerable amount of labour investment, such as stone-lined ovens, heat-treatment pits or grinding grooves, are likely to occur at places where occupation occurred for extended periods of time. Where band mobility was high and campsites frequently shifted throughout the landscape, artefact assemblages are not expected to contain elements such as grindstones, heat-treatment pits, ovens and the diversity of implements frequently discarded at places of extended residential occupation. **Table 2** has been adapted from Kuskie and Kamminga (2000).

Table 2: Site Descriptions (adapted from Kuskie & Kamminga 2000).

Occupation Pattern	Activity Location	Proximity to water	Proximity to food	Archaeological expectations
Transitory movement	All landscape zones	Not important	Not important	<ul style="list-style-type: none"> • Assemblages of low density & diversity • Evidence of tool maintenance & repair • Evidence for stone knapping
Hunting &/or gathering without camping	All landscape zones	Not important	Near food resources	<ul style="list-style-type: none"> • Assemblages of low density & diversity • Evidence of tool maintenance & repair • Evidence for stone knapping • High frequency of used tools
Camping by small groups	Associated with permanent & temporary water	Near (within 100m)	Near food resources	<ul style="list-style-type: none"> • Assemblages of moderate density & diversity • Evidence of tool maintenance & repair • Evidence for stone knapping & hearths
Nuclear family base camp	Level or gently undulating ground	Near reliable source (within 50m)	Near food resources	<ul style="list-style-type: none"> • Assemblages of high density & diversity • Evidence of tool maintenance & repair & casual knapping • Evidence for stone knapping • Heat treatment pits, stone lined ovens • grindstones
Community base camp	Level or gently undulating ground	Near reliable source (within 50m)	Near food resources	<ul style="list-style-type: none"> • Assemblages of high density & diversity • Evidence of tool maintenance & repair & casual knapping • Evidence for stone knapping • Heat treatment pits, stone lined ovens • Grindstones & ochre

-
- Large area >100sqm with isolated camp sites
-

Hunting would have comprised the major economic role of the men (Kohen 1986). Along the rivers, traps and snares would have been set for bandicoots and wallabies, while decoys for snaring birds were also a commonly employed technique, 'these are formed of underwood and reeds, long and narrow, shaped like a mound raised over a grave, with a small aperture at one end for the admission of the prey' (Tench 1793). Hunting methods included smoking out the animal by lighting a fire in the base of a hollow tree, burning large tracts of land and gathering the stranded animals, as well as cutting toe-holds in trees (Tench 1793).

The wider local vegetation is likely to have provided Aboriginal people in the area with raw materials such as bark and wood for shelters, canoes, containers, and fires, as well as a limited variety of medicinal and food sources. This vegetation would also have supported the habitation of a variety of small land mammals, reptiles and birds which may have been eaten by Aboriginal people.

A sense of the potential range of plants and animals utilised by Aboriginal people can be gleaned by comparing lists of species known to occur in the area with those known regionally to have been utilised by Aboriginal people. Only remnants of the original native vegetation and their associated resources currently exist within the study area today (see **Section 5**). With the loss of this habitat only a few of the faunal species likely to have been utilised by Aboriginal people remain within the study area. The availability of fresh water in the study area would have been tentative and reliant upon rainfall. However, the nearby Myall Hollow Creek would have provided a more reliable and accessible source of fresh water.

There was no real local or district outlook from the study area due to the landscape and surrounding tree canopy. No evidence of significant cultural or spiritual aspects of the study area was found.

Overall, based on the environmental and archaeological context and using Kuskie and Kaminga's model, it is considered that the study area would have been most likely suitable for transitory hunting and foraging as opposed to any lengthy occupation. More preferable areas for occupation with richer resources, such as Myall Hollow Creek, Gehan Creek, Waterloo Creek, the Tycannah Creek (perennial). Using this predictive model with a regional model such as UCHQU (2017, pp. 33-35) which details that sites are more likely to occur within:

- 200m of a named watercourse;
- 100m of a mapped drainage line;
- 50m of a known Aboriginal cultural heritage site;
- On landforms with a slope no greater than 30 degrees, except where sandstone bedrock or limestone outcrops are present; and
- Archaeological deposits may be at depth due to terrace locations that are subject to flooding.

6.4.2 Aboriginal History

Some discussion of Aboriginal history and associated land use within the region and local area is made in **Section 6.4.1**. The use of ethno-historical records is often useful in attempting to reconstruct Aboriginal life at the time of the colonisation of Australia. However, these historical observations are from non-Aboriginal people incorporating their own bias and perspectives possibly leading to

misinterpretation. Usual ethnographic information recorded about Aboriginal people at the time of European arrival include observations about Aboriginal material culture, such as clothing, adornments, body painting and piercings, weapons and tools. Hunting practices, foods consumed, ceremonial gatherings and associated practices, such as funerary beliefs and rites of passage, are also noted throughout the historical and anthropological record.

The records show that the Gamilaroi people and the European Settlers engaged in conflict a number of times. Early accounts from European exploration show that Mitchell (1838, pp. 98, 178, 278) engaged in conflict on his expedition. This at times is related by detailed descriptions of traditions and practices that Mitchell (1838 pp. 33, 55, 160) and his expedition experienced, and also cordial experiences where trade occurred, or directions were asked.

Other Aboriginal history recorded was by Mathews (1895 and 1917) who detailed Bora Ground ceremonies and initiation ceremonies of the Gamilaroi, in which Mathews as an anthropologist observed and recorded the events for posterity and a greater understanding of the Gamilaroi and pre-colonial practices.

Also, atrocities occurred, such as a massacre at Myall Creek near Bingara and Terry Hie Hie. This was preceded by a skirmish at Waterloo Creek north of the study area (Umwelt 2017, p. 47). The Myall Creek massacre is also explored by Ryan et al. (2017) with mapping of massacres that occurred over Australia. Ryan *et al* (2017) list six massacres including the Myall Creek massacre as having occurred in the area between Narrabri and Moree with events as far east as the vicinity of Bingara.

Despite this, Gamilaroi people still reside in their traditional lands to the present day. There does not appear to be any oral or documentary evidence of any specific culturally significant areas within or immediately adjacent to the study area; however, significant occupation and ceremonial sites exist approximately 28 kms east of the study area at Terry Hie Hie and recorded AHIMS sites at a nearby hill approximately 5.0 km south.

6.4.3 Contemporary Cultural Accounts

The physical evidence of Aboriginal use of the landscape (such as campsites and art sites), stories and mythology, cultural resources and the landscape itself provide strong cultural links with the past for the present day Aboriginal community (OEH, 2015). Gamilaroi and many other Aboriginal people have long cultural associations with the landscape of the region deriving from an extensive pre-contact history, historical interactions during settlement and contemporary attachments. Local Aboriginal people are currently researching and reclaiming their cultural practices of the past (pers. comm. Glenda Chalker [Site Officer for Cubbitch Bartha] 9 June, 2016).

Aboriginal people still reside in the area and continue to appreciate, care for and conserve their cultural practices. The presence of numerous rock art sites, a scar tree in the 'Myall Hollow Creek' area, grinding grooves and the bora ground at Terry Hie Hie indicates that the general area was occupied and used by Aboriginal people on subsequent occasions over many years. The Terry Hie Hie Aboriginal area was created in 2005 (NPWS 2018).

Many of the local Aboriginal people identify as being part of the Gamilaroi nation. The Moree Gamilaroi Local Aboriginal Land Council members are the Aboriginal custodians of the study area. It must also be considered that Aboriginal cultures were not static and that clan and tribal boundaries, language groups and dialects most likely changed over many thousands of years. The native title claim is registered under the name of Gomeroi People with the National Native Title Tribunal. This claim was registered in 2012.

For the purposes of this archaeological assessment, and in accordance with current cultural practices, we will refer to the local Aboriginal people as the Gamilaroi Aboriginal people. Advitech Environmental means no offence to any Aboriginal person in this regard and believes that identification of Aboriginal peoples, their traditional lands and their families are a cultural matter for Aboriginal people and separate from this archaeological assessment.

6.4.4 Cultural significance

The Burra Charter (2013) defines 'cultural significance' very broadly to include 'aesthetic, historical, scientific, social or spiritual value for past, present or future generations'. This definition captures places of cultural significance to Indigenous cultures. It also includes places that provide a physical location that is integral to the existence, observation and practice of intangible heritage. The Burra Charter definition of cultural significance encompasses all forms of spirituality, regardless of the culture from which it emanates. Similarly, aesthetic value is not limited to a 'western' perception of aesthetics (taken from ICOMOS Practice Note: The Burra Charter and Indigenous Cultural Heritage Management).

In particular, Terry Hie Hie (approximately 28 kms north west of the study area) was highly significant. Aboriginal storylines exist for the area, such as the story of the Bora ground at Terry Hie Hie which was created by Baiame, and recorded with song, dance, art oral histories and dreaming sites; it is the largest ceremonial Bora ground in north west NSW (OEH 2017 p.12). Baiame is associated with most of the bora ceremonies in NSW.

No items or places of cultural significance were noted or considered to exist within the study area addressed in this report.

6.5 Nature and Distribution of Evidence

Taking into account the environmental context of the study area (see **Section 4**), the archaeological context (**Section 6.2**), the AHIMS register (**Section 6.3**) and cultural heritage and significance associated with the area of Meppem quarry, a predictive model of site types and site patterning for the study area is generally achieved. From these reviews it is possible to obtain a broader picture of the wider cultural landscape highlighting the range of site types throughout the region, frequency and distribution patterns and the likely presence of any sites within the study area. It is then possible to establish an archaeological predictive model for the study area. The aim of a predictive model is to understand the nature of previous Aboriginal occupation and determine the nature of land use.

6.5.1 Predictive Model for the Study Area

The following predictive model of occupation is proposed:

- The study area would have been suitable for use by Aboriginal people for transient camping, hunting and associated resource gathering activities for at least a few thousand years prior to settlement by non-Aboriginal people;
- Open campsites/isolated finds are more likely to occur within 50 metres of reliable water sources or near a confluence of water of sources;
- Complex sites are unlikely as they are found mainly in association with major creeks or a confluence of water sources which are not present within the study area;
- Sites may be present in all landform contexts but are most likely to be near water sources;
- Sites may be located on slopes, crests or ridges;

- A larger number of sites will be found in areas of good surface visibility;
- A wide variety of site types are represented in the region with open campsites (artefact scatters) and isolated artefacts being the most common sites identified. However, in the locality of the study area the predominant site type are rock shelters with art and or a PAD, grinding grooves and solitary artefacts;
- Creek lines, crest/ridges and slopes are the most archaeologically sensitive landforms;
- Sandstone based archaeological sites such as grinding grooves or rock shelter and art sites may occur in areas of suitable geology but these resources were absent from the study area;
- Scarred or carved (modified) trees may occur in areas where mature, native vegetation survives;
- If any artefact types were located in the study area they would most likely have been tools and related debitage arising from the opportunistic discard or repair due to breakage;
- Any sites found will have likely been subject to disturbances including human and natural;
- Sites found within 200m of a named watercourse;
- Sites found within 100m of a mapped drainage line;
- Sites found within 50m of a known Aboriginal cultural heritage site and/or; and
- Sites found on landforms with a slope no greater than 30 degrees, except where sandstone bedrock or limestone outcrops are present.

6.5.2 Limitations on Predictive Model

Predictive modelling can provide a good indication of site types and site patterning in the area. However, it can also be influenced by a variety of factors, including the following:

- Aboriginal people involved in previous studies or surveys may not have disclosed the existence of places with cultural heritage values as they may not have been under immediate threat when the earlier study was undertaken;
- The distribution of surface archaeological material does not necessarily reflect that of subsurface deposits;
- The number of studies recorded or published in the local area. Fewer studies suggest that landscape development occurred prior to introduction of the current regulations and guidelines, or that little development has been undertaken in the area;
- The number of sites may reflect the number of surveys done. For example, a large percentage of sites found along creek lines may be, at least partially, representative of how many cultural heritage surveys focused on these landforms;
- An AHIMS report does not represent a comprehensive list of all Aboriginal objects or places in the local or region of the study area as it lists recorded sites only and is mostly a record of survey effort (OEH, 2011);
- Ground surface visibility and vegetation hinders the finding of site locations;
- Biases due to differential sampling of landforms based on decisions made by archaeologists;
- Levels of exposure on different landforms;

- Artefact counts can be skewed due to factors such as differing levels of fragmentation of material and levels of ground surface visibility. A very large number of sites and artefacts can be located on exposures with either no or very few artefacts visible and away from the exposures;
- In relation to stone artefact raw materials, it is important to note that there is a potential for discrepancies in the way in which archaeologists classify lithic materials. This will consequently affect the proportional representation of raw materials within the recorded assemblages; and
- Variation in the classificatory definitions employed by archaeologists will significantly influence the range of artefact types identified within a study area. For example, the distinction between a waste flake, a debitage flake and a flaked piece may be heavily subject to the perspective of the recorder. Thus, it is not productive to attempt to quantify the proportionate representation of artefact types identified in previous studies.

6.5.3 Predictive Model results

Based on the predictive modelling above, and following an inspection of the study area, a final predictive model for the study area and its archaeological potential, reveals that there is a nil to low likelihood of Aboriginal object(s) being present within the developed and disturbed portions of the study area. More particularly:

- There is a nil to low likelihood that Aboriginal object(s) will be present within the areas to be impacted (see survey units 1, 2 & 3 described in **Section 5.6.2**). This conclusion is based on:
 - The landscape and landforms of the area proposed for impact. The results of contextual archaeological studies indicate a preference for sites within 50 metres of reliable water sources or a confluence of water sources, on ridge lines, spurs and on crests. There is a crest within the study area. The closest reliable water source is approximately 650m, at its closest point, from the proposed impact zone;
 - The moderately disturbed nature of the area proposed for impact due to erosion, intensive clearing, grading, dams, fencing and pastoral practices;
 - The lack of nearby registered Aboriginal sites. The closest registered sites (scar trees and stone artefacts) exist south on or near Myall Hollow Creek at a distance of approximately 5.0 km;
 - The lack of suitable geological material that is, sandstone overhangs for occupation or art sites and water adjacent platforms for grinding grooves. These outcrops are not usually suitable for petroglyphs or grinding grooves;
 - The limited results of past archaeological studies;
 - Any artefact assemblages are not expected to contain elements such as grindstones, heat treatment pits, ovens and the diversity of implements frequently discarded at places of extended residential occupation;
 - The areas of the property where the topsoil has been removed and bleached stony, with hard setting, sandy, clay loam remaining, is unlikely to contain subsurface artefacts; and
 - It is unlikely that burials, grinding grooves and scar trees are located in the study area due to the lack of suitable reliable water surfaces, geological features and highly disturbed ground surfaces and the absence of mature vegetation remaining;

- There is a low potential for the presence of Aboriginal objects within the south western corner of the property (see survey unit 2 described in Section 5.6.2) which is not proposed for impact. This conclusion is based on:
 - The results of contextual archaeological studies indicate a preference for sites within 50 metres of reliable water sources or a confluence of water sources, on ridge lines, spurs and on crests. There are no ridges, crests or confluences of water sources within the survey unit. The closest reliable water source is at Myall Hollow Creek, a 3rd order stream (Strahler 1952) which is approximately 3.8km, at its closest point, from the southern boundary of Survey Unit 1. Waterloo Creek, a 2nd order stream, is approximately 2.8 km from the study area with the closest drainage line running approximately 900 m from the extraction area and 650 m from the haul road. Both of these creeks are listed as non-perennial. Therefore, there is a low potential for Aboriginal objects to exist in the lower 20.0 m in the south western corner of the property; however, this has had continued disturbance from farming practices;
 - Two unnamed drainage lines near Survey Unit 1 and that drain southwards away from Waterloo Creek. These drainage lines would have provided an intermittent source of freshwater during times of rainfall. Whilst it is highly unlikely, due to the nearby presence of Myall Hollow and Waterloo Creeks, Aboriginal use of these drainage lines cannot be completely discounted;
 - The vegetation appears to have been previously cleared as there are limited suitable mature trees remaining. There is no potential for the presence of trees modified by Aboriginal people;
 - The lack of nearby registered Aboriginal sites. The closest registered sites (scar trees and stone artefacts) exist south on Myall Hollow Creek at a distance of approximately 5.0 km;
 - The lack of suitable geological material that is, sandstone overhangs for occupation or art sites and water adjacent platforms for grinding grooves. Small outcrops exist along the unnamed drainage lines but they are not considered suitable for petroglyphs or grinding grooves;
 - The limited results of past archaeological studies;
 - No artefacts were located on the ground surface during survey. However, the existence of sub-surface deposits cannot be completely discounted; and
 - Any artefact types located in this area would most likely be tools and related debitage arising from the opportunistic discard or repair due to breakage.

In summary, the study area would have provided little by way of suitable resources for Aboriginal people due to the environmental factors. The limited previous assessments within a similar environmental context indicate that, within an area with limited water availability, as is the case of the majority of the study area, there is a low potential for isolated finds and/or low density artefact scatters. This is due to the fact that water is essential for survival and as such occupation and regular camping in areas with reduced and unreliable water supply would not have been suitable for extended stays or base camps. However, Myall Hollow Creek and Waterloo Creek, considered to be reliable water sources (though non-perennial), are approximately only 3.8 and 2.8 km distance from the study area. Previous assessments have noted that elevated landforms above reliable water sources within 50m are preferred camp site locations. Therefore, a low potential remains for isolated finds or artefact scatters remains in the proposed impact area.

6.6 Archaeological assessment, survey and data collection

6.6.1 Methodology

The purpose of an archaeological assessment is to record all material traces and evidence of Aboriginal land use that are visible on the ground surface or are otherwise exposed. It is also important to physically identify where areas may be inferred as being likely to contain Aboriginal objects beneath the ground surface.

The study area was surveyed via pedestrian survey of transects approximately 10-30m apart to ensure adequate visibility and coverage (see **Figure 3**). The survey was undertaken by Jake Brown (archaeologist). Ground visibility was considered average to good with limited vegetation cover obscuring visibility.

Areas with the greatest exposure of ground surface and with landforms suitable for occupation across the study area were targeted in the field survey. **Figure 3** below denotes the walking transects taken during the survey.

6.6.2 Survey Units

Landscape forms were divided into survey units. Survey units within the study area are defined in **Table 3** and illustrated in **Figure 4**.

Table 3: Survey Units.

Survey Unit No.	Definition	Landforms	Disturbance
1	Disturbed area at top of paddock below incline of the summit. Figure 4 .	Waning Lower Slope	Highly disturbed. Cleared and graded for development of access, fencing, and farming structures. Pastoral use.
2	The relatively undisturbed portion of the study area as indicated in Figure 4 .	Waning mid-slope	Cleared access track to summit plateau with vegetation either side of track.
3	Cleared with regrowth and moderately disturbed portion of the study area as indicated in Figure 4 .	Crest	Disturbed. Clearance of vegetation with some regrowth, fencing and pastoral use.

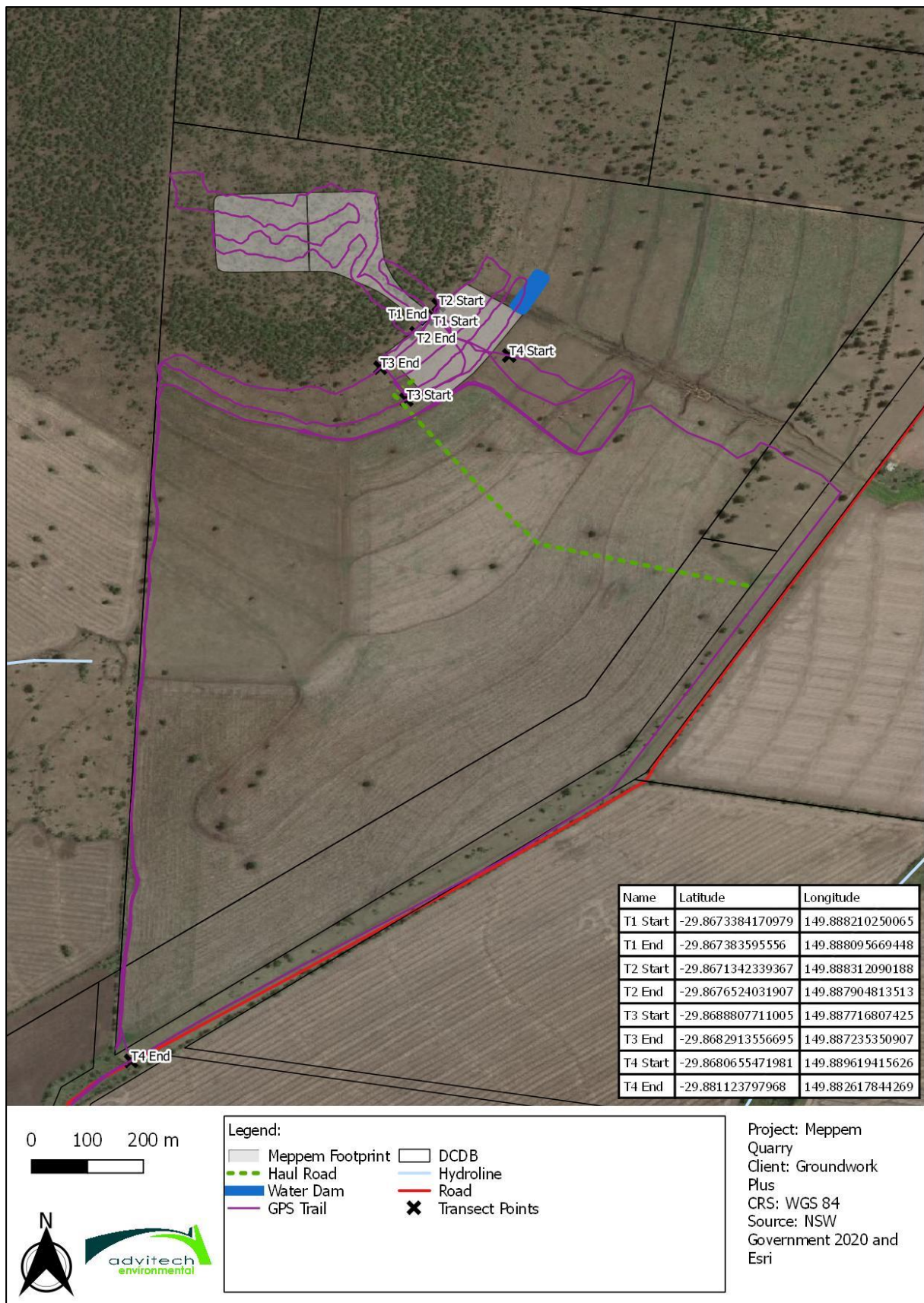


Figure 3: Transects and driven tracks taken during survey illustrated on GPS layer.



Figure 4: Survey units.

6.6.3 Effective survey coverage

The detection of Aboriginal objects is dependent on a number of environmental factors including:

- Surface visibility (which is determined by the nature and extent of ground cover including grass and leaf litter and so on);
- The survival of the original land surface and associated cultural materials; and
- The exposure of the original landscape and associated cultural materials (by water, sheet and gully erosion, ploughing, vehicle tracks and so on).

Combined, these processes and activities are used in determining the likelihood of both surface and subsurface cultural materials surviving and being detected. Effective coverage is known as an estimate of the amount of ground that could be observed during the survey taking into account local constraints on site discovery such as development, vegetation and soil cover. There are two components used to determine the percentage of the survey's effective coverage: visibility and exposure.

The first component in establishing effective coverage is to calculate the amount of ground exposure. Exposure is an estimate of the area with a likelihood of revealing subsurface cultural materials rather than just an observation of the amount of bare ground. Exposure is the percentage of land for which erosion and exposure is sufficient to reveal cultural materials on the surface (OEH 2010).

The second component is visibility. This is the amount of bare ground visible on exposures which may reveal artefacts or other cultural materials. Visibility is hampered by vegetation, plant or leaf litter, loose sand, stony ground or introduced materials (such as rubbish). On its own, visibility is not a reliable factor in determining the detectability of subsurface cultural materials (OEH 2010).

The effective coverage for the study area, on a survey unit basis, was determined for both visibility and exposure and **Table 4** details the calculations used. As indicated in **Table 4**, the effective coverage for the study area illustrates the overall effectiveness of the survey.

Table 4: Effective coverage.

SU	Landform	Area (ha)	Vis. %	Exp. %	Effective coverage area (ha)	Effective coverage (%)	%of landform effectively surveyed
1	Waning Lower Slope	12.2	90%	85%	10.98	90	90
2	Waning mid-slope	1.37	75%%	65%	1.23	90	90
3	Crest	6.31	85%	75%	5.67	90	90
Total effective coverage					18.52ha	90	90%

A discussion of each survey unit, effective coverage and disturbances, past and present follows:

Survey Unit 1

This survey unit relates to the southern part of the study area (see **Figures 4, 5 and 6**) and includes part of the ancillary operations area and haul road. This survey unit has been extensively cleared, graded, ploughed and highly developed for agriculture. It contains the tracks, fences, a water tank and windmill. Items such as the water tank and windmill were outside of the study area and the lower slope was extensively ploughed.

The lowest record GPS trail was conducted in a vehicle along a raised track which connects with the track running along the western fence line. In addition to the foot traverse of the western fence access track, another visual inspection was made from the vehicle. Effective survey coverage for this survey unit was calculated at 90%. Disturbances included land clearance, grading/ploughing, construction (farming and ancillary), access roads and paths, fencing and irrigation. The limiting factors to visibility were the ground disturbance at the eastern edge as part of irrigation.



Figure 5: View looking south across SU1.



Figure 6: View looking north across SU1.

Survey Unit 2

This survey unit relates to the slope between the 320m and 340m contour lines (see **Figure 1**). The area intended for use has had an access track cleared through the vegetation to the crest. The survey unit included edges of uncleared area either side of the track. (See **Figures 4, 7 and 8**). Effective survey coverage for this survey unit was 90%. However, aside from the construction of the road in the already cleared track for access to the crest no other impacts are proposed to this survey unit. Aside from minor erosion occurring during times of high rainfall, little other disturbances have occurred. The limiting factors to visibility were the grasses, shrubs, trees and leaf litter.



Figure 7: Cleared track to crest.



Figure 8: Vegetation east of cleared track in survey unit 2.

Survey Unit 3

This survey unit relates to the crest which is the main area proposed for impact and consists of a largely cleared area with some original and regrowth vegetation. Disturbances include fencing, remnants of test drill holes and evidence of cattle grazing. It currently contains no structures other than fencing. Effective survey coverage for this survey unit was 90%. The limiting factors to visibility were vegetation (see **Figure 9**).



Figure 9: Crest with test drill hole visible.

6.7 Consultation

Advitech contacted (by phone and email) the relevant Local Aboriginal Land Council to determine if they would be interested in participating in the due diligence field survey. No reply was received as to the intended participation of the LALCs or individual representative of the local Aboriginal community prior to the surveys (see **Appendix II - consultation log**).

7. RESULTS

Overall, 90% of the land was effectively surveyed. Current disturbances on the property include commercial (farming), ancillary, fencing, cattle grazing, alteration of land surfaces by grading/ploughing, fill or excavation, sheet and gully erosion and historical and modern clearance of vegetation on the property.

Effective coverage was considered acceptable in all survey units. Effective coverage was achieved either due to the number of passes within a transect, good visibility during survey, additional areas assessed where possible and additional paths over the same area traversed to better understand the landscape. It is considered that there is nil to low potential for the presence of Aboriginal objects in survey units 1, 2 and 3.

The alteration to the footprint with a new haul road going through the middle of survey unit 1 instead of the side does not ultimately affect the results (**Figure 4**). The area is still characteristic of survey unit 1 with disturbance from farming, land clearance, and the general modern/historical use of the property.

7.1 Sites and Potential Archaeological Deposits recorded

A 'site' can be defined by various factors. For this study a 'site' was defined on the combination of the following interrelated factors:

- Landform;
- Exposure and visibility; and
- Predictive modelling.

Site complex refers to sites that occur in groups. For example, complexes may consist of burial grounds and carved trees, artefact scatters that represent different stages of procurement and manufacture or artefact scatters and shell middens. Complexes may also consist of artefact scatters that are connected across a landscape with the scatters being either specific activity centres (such as tool manufacturing sites) or larger base camp areas (with greater numbers of artefacts/variety of artefacts). No sites or site complexes were recorded during this survey.

The term 'Potential Archaeological Deposit (PAD)' and 'area(s) of archaeological sensitivity' are used to describe areas that are likely to contain subsurface cultural deposits. These sensitive landforms or areas are identified based upon the results of fieldwork, the knowledge gained from previous studies in or around the subject area and the resultant predictive models. Any or all of these attributes may be used in combination to define a PAD. The likelihood of a landscape having been used by past Aboriginal societies and hence containing archaeologically sensitive areas is primarily based on the availability of local natural resources for subsistence, artefact manufacture and ceremonial purposes. The likelihood of surface and subsurface cultural materials surviving in the landscape is primarily based on past land uses and preservation factors.

No PADs or areas of archaeological sensitivity were noted during the survey.

However, and as a safeguard, it is recommended that the following occur in regard to all future works impacting ground surfaces as follows:

- The persons responsible for on site management will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is

the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974; and

- In case of unexpected potential Aboriginal objects identified during any excavation works, an 'Unexpected Aboriginal Object Procedure' should be created and provided to all workers, contractors, sub-contractors and employees at their time of their work induction to the site. The 'Unexpected Heritage Items Procedure' should:
 - Define an Aboriginal object in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011); and
 - Contain provisions that if an Aboriginal object is incidentally discovered and it is likely to be disturbed damaged or destroyed by excavation, works must be suspended in that area and an archaeologist and a Registered Aboriginal party should be contacted to assess and, if necessary, register the find; and should any skeletal remains be found, all works should cease and the NSW Police Service and the Office of Environment and Heritage be immediately contacted.

7.2 Assessment of Impacts

The archaeological record is a non-renewable resource that is affected by many processes and activities. The Code of Practice describes impacts to be rated as follows:

- a) Type of harm: is either direct, indirect or none;
- b) Degree of harm is defined as total, partial or none; and
- c) Consequence of harm is defined as either total loss, partial loss, or no loss of value.

As no Aboriginal objects or potential archaeological deposits were recorded prior to or during the archaeological investigation no impacts or harm to Aboriginal heritage or the wider Aboriginal cultural landscape are considered to occur as a result of the development.

7.3 Cumulative Impacts

As no Aboriginal objects or potential archaeological deposits were recorded prior to or during the archaeological investigation, the proposed development will not impact any archaeological resources. The cumulative impact to Aboriginal heritage in the area is considered to be nil.

8. RECOMMENDATIONS

8.1 Further Investigation

As no Aboriginal objects or potential archaeological deposits were found during the archaeological investigation and no Aboriginal parties have advised that cultural significance is attached to the study area (see **Section 5.7**), no further archaeological investigation is required. No Aboriginal Cultural Heritage Assessment is recommended at present.

8.2 Management and Mitigation Measures

Specific strategies, as outlined through the Code of Practice, are suggested below for the management of any unexpected finds within the study area.

In case of unexpected potential Aboriginal objects identified during any excavation works, an 'Unexpected Aboriginal Object Procedure' should be created and provided to all workers, contractors,

sub-contractors and employees at their time of their work induction to the site. The 'Unexpected Heritage Items Procedure' should:

- Define an Aboriginal object in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011);
- Provide that if an Aboriginal object is incidentally discovered and it is likely to be disturbed damaged or destroyed by excavation, works must be suspended in that area and an archaeologist contacted to assess and, if necessary, register the find; and
- Provide that should any skeletal remains be found, all works should cease and the NSW Police Service and the Office of Environment and Heritage be immediately contacted.

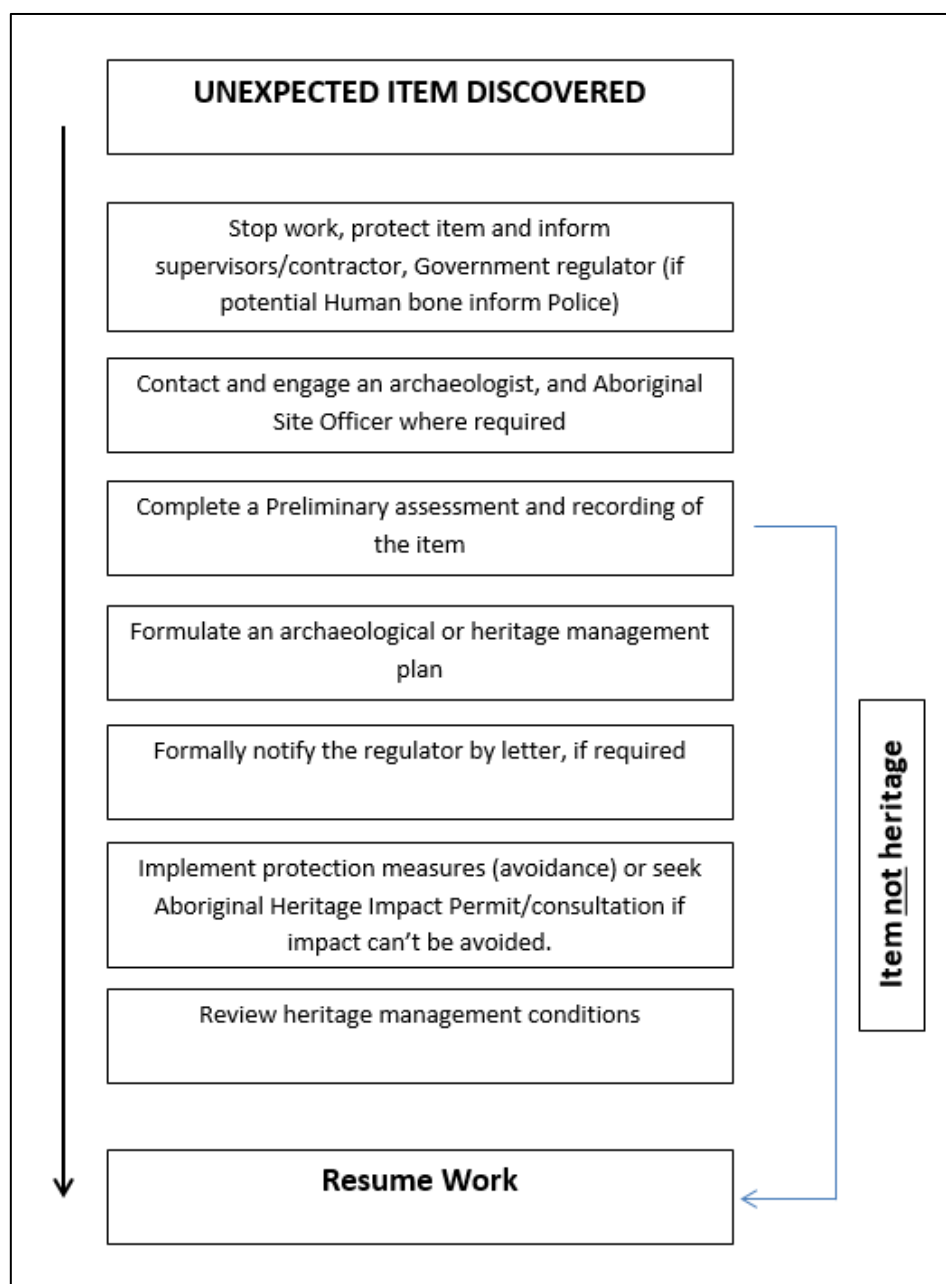


Figure 10: Unexpected finds procedure flow chart.

9. CONCLUSIONS

This Aboriginal Due Diligence Heritage Assessment did not locate any Aboriginal objects or potential archaeological deposits during the field survey on 8 January, 2019. When conducting work, care should be taken to maintain vigilance for unexpected finds even though there is a nil to low likelihood of Aboriginal object(s) being present. If an item is thought to have been located the unexpected finds flow chart should be followed (see **Figure 10**). No Aboriginal Cultural Heritage Assessment is recommended.

10. REFERENCES

The following information was used in the preparation of this report:

- AECOM Australia Pty Ltd 2010, Maules Creek Coal Project Environmental Assessment prepared for Hansen Bailey. Viewed 4/1/2019
<<http://www.whitehavencoal.com.au/environment/docs/appendix-j-indigenous-heritage-report.pdf>>.
- Australian Bureau of Statistics (ABS) 2018, *2016 Census Quickstats - Bellata*, viewed 11/12/2018
<http://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SC10266>.
- Australia ICOMOS 2013, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 1999, with associated Guidelines and Code on the Ethics of co-existence*. Viewed 19/12/2018 <<http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf>>.
- Bastin G and the ACRIS Management Committee 2008, *Brigalow Belt South bioregion, Rangelands 2008 – Taking the Pulse*, published on behalf of the ACRIS Management Committee by the National Land & Water Resources Audit, Canberra. Viewed 10/12/2018 <<https://www.environment.gov.au/system/files/resources/a8015c25-4aa2-4833-ad9c-e98d09e2ab52/files/bioregion-brigalow-belt-south.pdf>>
- Bowdler, S. 1977, *The Coastal Colonisation of Australia*. In Allen, J. Golson, J. and Jones, R (eds) Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia, Academic Press, London.
- Bowdler, S. 1981, Hunters in the highlands: Aboriginal adaptations in the eastern Australian uplands. *Archaeology in Oceania* 16 (2): 99-111
- Boyle, M. 1970, Clarke of the Kindur, bushranger, explorer, Melbourne University Press, Melbourne, Australia.
- Department of the Environment and Energy (DEE) 2018, EPBC Act Protected Matters Search Tool.
<<http://www.environment.gov.au/epbc/pmst/>>
- Department of the Environment, Water, Heritage and the Arts (DEWHA) 2013, Significant Impact Guidelines 1.1. Matters of National Significance <<http://www.environment.gov.au/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance>>
- Department of Industry 2018, Lands, Reserves and Cemeteries. <<https://www.industry.nsw.gov.au/lands>>
- Department of Planning and Environment - Resources and Energy (DPE) 2018a, MinView.
<<https://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/geoscience-information/services/online-services/minview>>

- Department of Planning and Environment - Resources and Energy (DPE) 2018b, NSWGeologyPlus Interactive Geological Maps of NSW. < <https://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/geoscience-information/products-and-data/maps/geological-maps>>
- Department of Urban Affairs and Planning (DUAP) 1996, Extractive Industries - Quarries EIS Guideline. <<http://www.planning.nsw.gov.au/~media/Files/DPE/Guidelines/extractive-industries-quarries-eis-guideline-1996-10.ashx>>
- Foley, R. 1981, A Model of Regional Archaeological Structure. In *Proceedings of the Prehistoric Society*. 47:1-17.
- Green D., Burrell M., Petrovic J., Moss P. 2011, *Water resources and management overview - Gwydir catchment*, NSW Office of Water, Sydney
- Gunn, J. 1989, *Along Parallel Lines: A History of the Railways of New South Wales*, Melbourne University Press, Carlton, Victoria, Australia.
- Heritage Council of NSW, 2006, Historical Archaeology Code of Practice.
- Heritage Office 2001, Assessing Heritage Significance. NSW Heritage Office. Sydney.
- Heritage Office (HO) and Department of Urban Affairs and Planning (DUAP) 1996, Regional Histories: Regional Histories of New South Wales. Sydney.
- Heritage Office and Department of Urban Affairs & Planning. 1996, Regional Histories of New South Wales.
- Heritage Office 2006, Photographic Recording of Heritage Items Using Film or Digital Capture
- Horton, D. R. 1981, *Water and woodland: the peopling of Australia*. Australian Institute of Aboriginal Studies Newsletter 16.
- Insite Heritage 2010, Aboriginal Cultural Heritage Impact Assessment Report for the Continuation of Boggabri Coal Mine. Report to Hansen Bailey Pty Ltd.
- National Parks and Wildlife Service (NPWS) 2018, Terry Hie Hie Aboriginal Area. Viewed 14/1/2019 < <https://www.nationalparks.nsw.gov.au/visit-a-park/parks/terry-hie-hie-aboriginal-area>>.
- NSW Heritage Office 1998, Skeletal Remains - Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977.
- Jacobs and Roads and Maritime Services, 2018, *Newell Highway - Heavy Duty Pavement Upgrade between Narrabri and Moree - Review of Environmental Factors*, viewed 11/12/2018 <<https://www.rms.nsw.gov.au/documents/projects/western-nsw/north-moree-heavy-duty-pavement/nh-north-moree-review-of-environmental-factors-2018-06.pdf>>.
- Kelton, J. 1998b, An archaeological survey of the proposed "Tookey" gravel quarry, rear Bellata, North-Western NSW. Report to Terra Sciences Pty Ltd.
- Koettig, M. and Lance, A. 1986, An Aboriginal resources planning study for the city of Goulburn, NSW. Report to Goulburn City Council
- Koettig, M.K. 1985, *Archaeological investigation of three sites on Upper Mill Creek, near Lucas Heights, Sydney*. Unpublished report to MWDA. Report held NSW NPWS.
- Kohen, J.L. 1986, *Prehistoric Settlement in the Western Cumberland Plain*: Resources, Environment and Technology. Unpublished PhD Thesis. Macquarie University.
- Kuskie, P. J. and J. Kamminga. 2000, Salvage of Aboriginal Archaeological Sites in relation to the F3 Freeway near Lenaghans Drive, Black Hill, New South Wales. Vol. A: Report. Unpublished

report by South East Archaeology to Roads and Traffic Authority, New South Wales (Major Projects, Northern Region, Newcastle).

- Mathews, R.H. 1895, The Bora, or Initiation ceremonies of the Kamilaroi Tribe. Journal of the Anthropological Institute, Vol. XXIV, pp.318-339. Viewed 11/1/2019 <<https://downloads.newcastle.edu.au/library/cultural%20collections/pdf/mathews1895-96.pdf>>.
- Mathews, R.H. 1897, The Burbung of the Darkinung. Proceedings of the Royal Society of Victoria, Vol. 10, No. 1, pp.1-12.
- Mathews, R.H. 1898, Division of Queensland Aborigines. Proceedings of the American Philosophical Society, Vol. 37, No. 158, pp.327-336.
- Mathews, R.H. 1903, Languages of the Kamilaroi and other aboriginal tribes of New South Wales. Anthropological Institute of Great Britain and Ireland, Vol. XXXIII, pp. 259-283.
- Mathews, R.H. 1917, Two Bora Grounds of the Kamilaroi Tribe. Journal and proceedings of the Royal Society of New South Wales, Vol. 51, pp. 423-430.
- Mitchell, T.L., 1838, Three Expeditions in the Interior of Eastern Australia, with descriptions of the recently explored region of Australia Felix and of the present colony of New South Wales. Viewed 4/1/2019 <<http://adc.library.usyd.edu.au/data-2/mitthre.pdf>>.
- Moree Plains Shire Council (MPSC) 2011, Moree Plains Local Environmental Plan
<<https://www.legislation.nsw.gov.au/#/view/EPI/2011/646/historical2016-03-11/full>>
- Moree Plains Shire Council (MPSC) 2013, Moree Plains Development Control Plan 2013.
<<https://www.mpsc.nsw.gov.au/index.php/hot-topics/docman/planning-and-development/697-moree-plains-development-control-plan-dcp-2013-including-gateway-precinct-chapter/file>>
- Moree Plains Shire Council (MPSC) 2016, Section 94A Development Contributions Plan.
<<https://www.mpsc.nsw.gov.au/hot-topics/docman/planning-and-development/584-section-94a-development-contributions-plan/file>>
- NSW National Parks and Wildlife Service 2003, 'The Bioregions of New South Wales: their biodiversity, conservation and history', NSW National Parks and Wildlife Service Hurstville.
- NSW Government 2018, Sharing and Enabling Environmental Data (SEED).
<<https://datasets.seed.nsw.gov.au/>>
- Office of Environment and Heritage (OEH) 2018f, Search for NSW heritage.
<<http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx>>
- Office of Environment and Heritage, No date, Bellata Police Station and Residence. Accessed 6 June 2016.
<<http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=4180157>>.
1. Office of Environment and Heritage
 - Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.
 - Aboriginal Cultural Heritage. Protecting local heritage places: a guide for communities, Australian Heritage Commission, Canberra, ACT 1998.
 - Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010.
 - Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW 2010.
 - Environmental Planning and Assessment Act 1979 (NSW).

- Espade, NSW Soil and Land Information. Downloaded 10 January, 2019 from <http://www.environment.nsw.gov.au/eSpadeWebapp/>.
- *Heritage Act, 1977*.
- NSW Heritage Manual (1996 - 2001) particularly:
 - Archaeological Assessments;
 - Historical Archaeological Sites;
 - Guidelines for Photographic Recording;
 - Heritage Assessment Guidelines;
 - Assessing Heritage Significance;
- Draft Plan of Management, Terry Hie Hie Aboriginal Area 2017; and
- *What is an Aboriginal Cultural Landscape?* Fact Sheet 2 2010

O'Rourke, M.J. 1997, The Kamilaroi Lands. Michael O'Rourke. Griffith, NSW.

Renfrew, C. and Bahn, P. 1991, *Archaeology: Theories, Methods and Practice*. Thames & Hudson.

Ryan, Lyndall; Richards, Jonathan; Pascoe, William; Debenham, Jennifer; Anders, Robert J; Brown, Mark; Smith, Robyn; Price, Daniel; Newley, Jack Colonial Frontier Massacres in Eastern Australia 1788 - 1872, v2.0 Newcastle: University of Newcastle, 2017, <http://hdl.handle.net/1959.13/1340762> (accessed 30/10/2017). This project has been funded by the Australian Research Council (ARC).

Smith, M.A. 1987, Pleistocene occupation in Arid Central Australia. *Nature*, Vol. 328 (20 August).

Strahler, A.N. 1952, Hypsometric (Area-Altitude) Analysis of Erosional Topography. *Geological Society of America Bulletin* Vol. 63, No. 11.

Tench, W. 1793, Complete Account of the Settlement at Port Jackson. G. Nicol and J. Sewell, London. Viewed 11/1/2019 <<http://setis.library.usyd.edu.au/ozlit/pdf/p00044.pdf>>.

Umwelt 2017, Australian Rail Track Corporation Inland Rail Narrabri to North Start EIS Non-Aboriginal Heritage Impact Statement, Newcastle, Australia.

University of Queensland Culture & Heritage Unit 2017, Aboriginal Heritage Conservation Strategy: Maules Creek Coal Mine, Tarrawonga Coal project, Boggabri Coal Mine, and Related Offset Areas. Prepared for Whitehaven Coal Limited and Idemitsu Australia Resources.

White, B. and McDonald, J. 2010, Lithic Artefact Distribution in Rouse Hill Development Area, Cumberland Plain, New South Wales. *Australian Archaeology*, No. 70, June.

Appendix I

AHIMS Search

Advitech Pty Limited

Date: 06 December 2018

PO Box 207

Mayfield New South Wales 2304

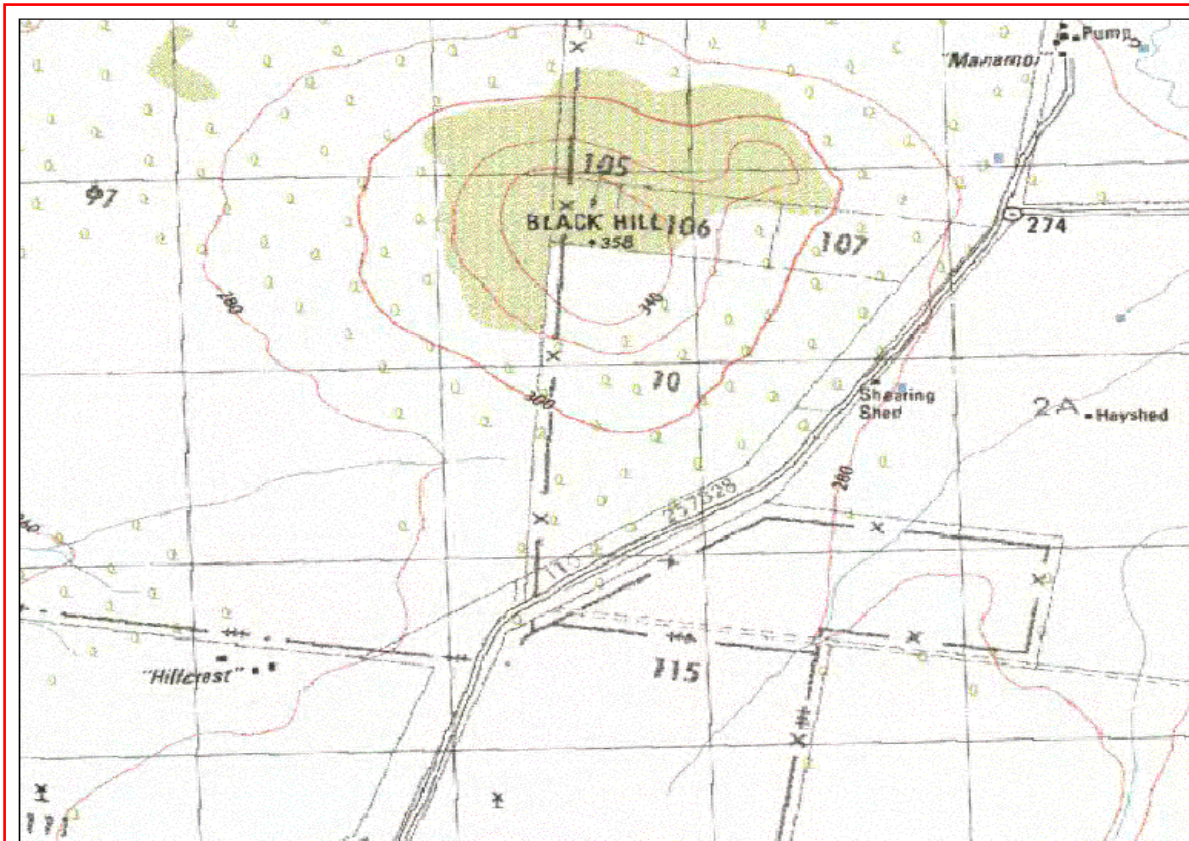
Attention: Rod Bennison

Email: rod.bennison@advitech.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -29.8816, 149.8825 - Lat, Long To : -29.8636, 149.8891 with a Buffer of 1000 meters, conducted by Rod Bennison on 06 December 2018.

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 \(http://www.nsw.gov.au/gazette\)](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.

Advitech Pty Limited

PO Box 207

Mayfield New South Wales 2304

Attention: Rod Bennison

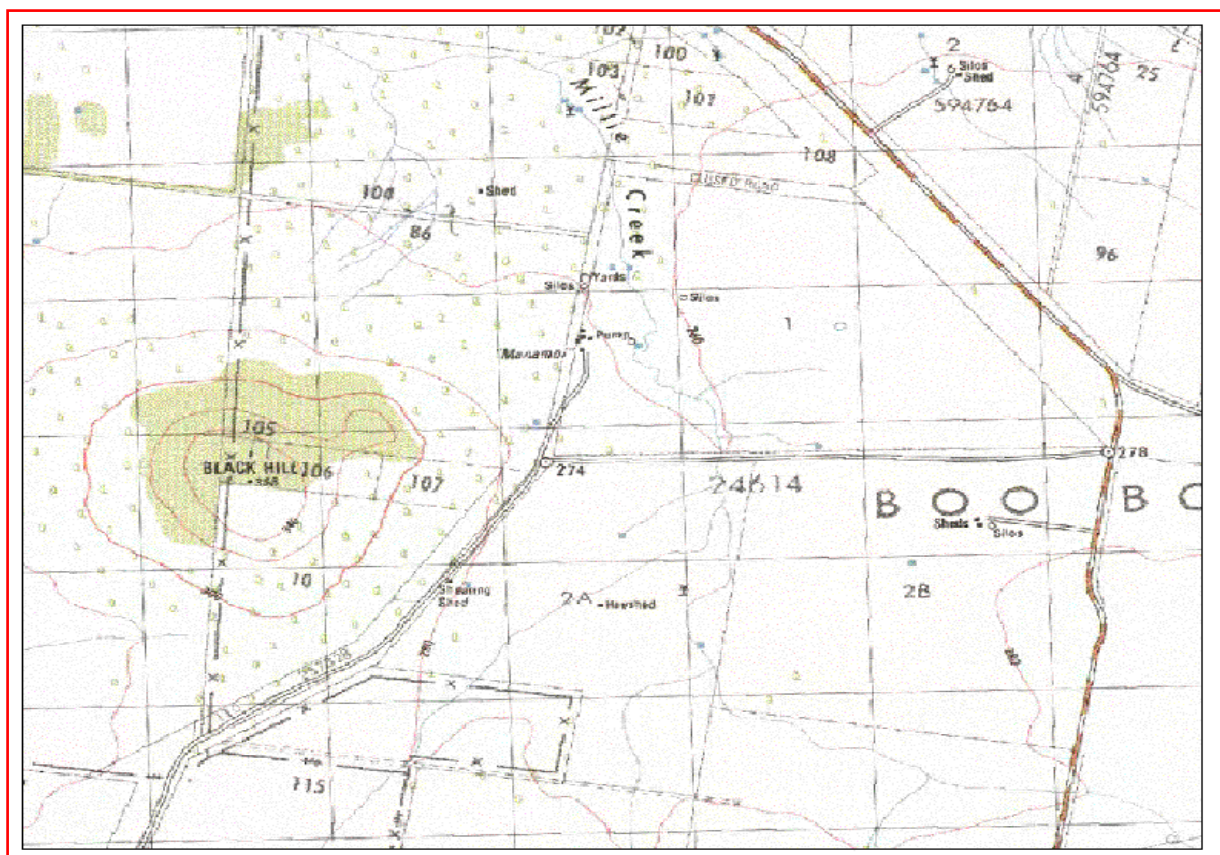
Email: rod.bennison@advitech.com.au

Date: 27 August 2020

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -29.8816, 149.8728 - Lat, Long To : -29.8399, 149.9388 with a Buffer of 50 meters, conducted by Rod Bennison on 27 August 2020.

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. *

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- 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.

Appendix II

Aboriginal Consultation Log

Client:	Groundwork Plus	Date commenced:	7/12/2018
Author:	Jake Brown	Job #:	J0180305
Topic:	Meppern Quarry Bellata	Folder #:	F15822

Engineering	Environment	Sustainability	Project Management	Risk Management
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