Archaeological Report:

Proposed Sand Extraction, 79 Rushy Road, Moama, NSW 2731 (Lot 97 DP751140)

Prepared for EMM Group Pty Ltd

October 2020

ASSOCIATES

Archaeology and Heritage

Aboriginal Cultural Heritage Management

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79 Rushy Road, Moama, NSW 2731 (Lot 97 DP751140)

Associates Archaeology & Heritage Pty Ltd

29 Hannan Street, Maroubra, NSW 2035

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

EMM Group are proposing an extension to existing sand extraction operations at Rushy Road, Moama NSW (Lot 97 DP751140) (Figure 1, Table 1). Extension is intended for two areas adjoining current operations (Figure 2) to provide for a wider range of materials and a longer-term resource base.

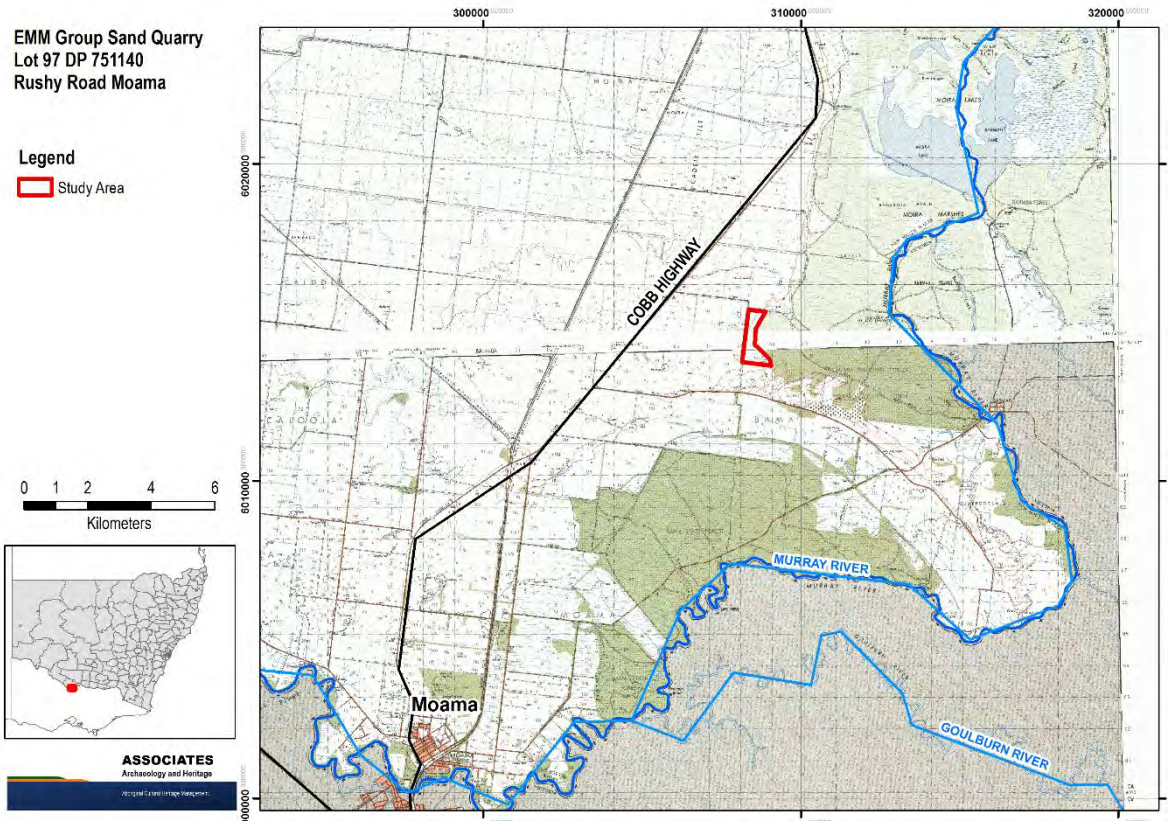


Figure 1: Location

In response to a DA application in 2016 Murray River Council sought guidance from OEH (now DPIE) which was that a DA should not be issued until a formal Aboriginal Cultural Heritage Assessment (ACHA) had been completed, inclusive of test excavation (letter from Peter Ewin (OEH to Margaret Stork (Murray River Council), 13/10/2016). These recommendations were made with reference to a previous Aboriginal cultural heritage assessment of the study area in 2016 by Jo Bell Heritage Services (Bell & Edwards, 2016) that had located three artefact sites and recommended the excavation. The DPIE correspondence noted that they had undertaken a "good, systematic surface survey" and the work was otherwise also very thorough with regards to background research and consultation with the Aboriginal community.

Following Bell's work, Red-Gum Environmental Consulting (Damian Wall) was engaged to complete further assessment with the assistance of Oliver Brown (Associates Archaeology & Heritage) in order to obtain any AHIP that might be required for sand extraction to proceed. We undertook an additional site inspection and archaeological survey broadly confirming Bell's findings, in preparation for the

recommended test excavation. It was also determined that the necessary archaeological test excavation could not be done under the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and would itself need to be subject to an AHIP. This is because any single test excavation unit cannot be greater than 3m^2 under "the Code" and it was known that the depth required testing of a sandhill that could not safely be done within this limit. It was also determined that excavation would need to be done using mechanical excavation, again due to safety restrictions.

This approach towards mechanical test excavation under an AHIP was discussed at a meeting on 4th May 2018 at the DPIE office in Albury between Andrew Halloran (EMM Group), Andrew Fisher (DPIE), Jon Gilding (DPIE), Damian Wall (Red-gum) and Oliver Brown (Associates A&H). It was also discussed that positive results had been found elsewhere (RPS Australia, 2017) using Ground Penetrating Radar and that this was seen as a useful approach by DPIE. GPR was subsequently undertaken in January 2019 (Fogel, 2019) and did not indicate any anomalies that might indicate human burials within the proposed extraction areas. In a response from DPIE, it was noted that this, however, did not provide any indication of the likelihood of stone artefacts being present.

In November 2019, an application was made for an AHIP for mechanical archaeological test excavation. This was issued in January 2020 (AHIP No. C0005513). Test excavation then occurred in March 2020. The test excavation led to the identification of no artefacts although one (1) silcrete artefact was recorded in the northern part of the investigated area through intensive surface survey.

Our conclusion, following two (2) separate archaeological surveys, GPR investigation and archaeological test excavation is that Aboriginal cultural heritage material is confined to sparse surface or near surface artefacts and not the sort of artefact concentration generally considered to be a significant Aboriginal cultural heritage site. The likelihood of human remains or other cultural material is considered to be very low and does not present any significant risk of harm to Aboriginal cultural heritage values.

Additional background research presented an issue with the formal site listings that is also being resolved through the current reporting. The sites recorded by Bell & Edwards for sites named 'Moama Sand Quarry 1, 2 and 3" seem to have been mistaken for sites listed in 1993 named "Moama 1, 2 and 3" and assumed to have been allocated their site numbers; 59-2-0017, 59-2-0018 and 59-2-0019. In reality, it seems the site listings were either not submitted or not processed. Our solution is to submit new listings that incorporate all known Aboriginal cultural heritage material, inclusive of the more recent investigations and the PAD described by Bell & Edwards that was not previously included in a formal site. These also provide an administrative context for the current AHIP application and allows for recommendations for ongoing avoidance of harm for the currently unaffected other parts of the property.

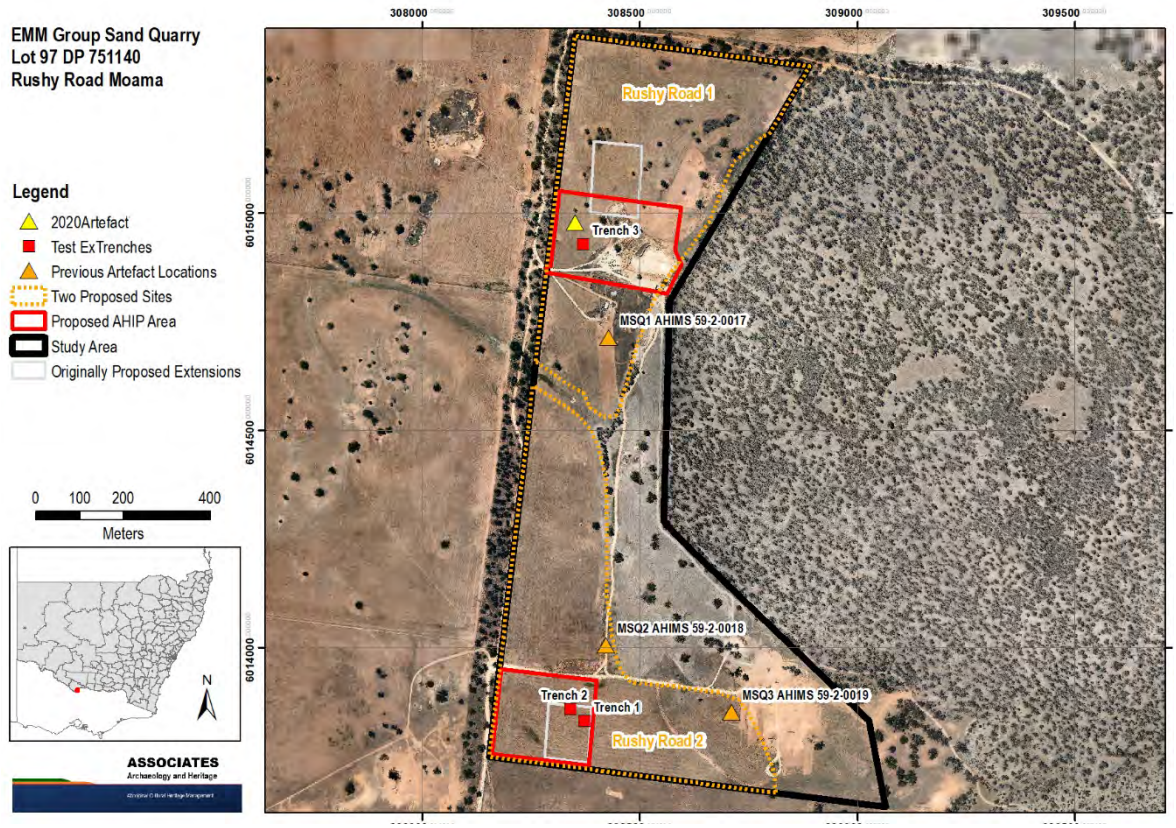


Figure 2: Location of previously recorded artefact sites and proposed extensions

For those areas where sand extraction is proposed, our recommendation is then that an AHIP can be applied for without further requirements for archaeological investigation or mitigation work. Rather than the AHIP application being for the exact area where further sand extraction is proposed (as originally assessed and shown in Figure 2), two (2) parcels are now delineated as relevant areas where harm will be minimal in which the proponent can more efficiently follow deposits of greatest use ('Rushy Road 1 and 2').

This report constitutes part of the documentation required for that application, being:

- An Archaeological Report following the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b).

This reporting has previously been issued as a combined report for review by Registered Aboriginal Parties and since be split for submission to DPIE without change to the substance other than which results from feedback. The other part of this submission comprises:

- An Aboriginal Cultural Heritage Assessment following the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011).

The major issue raised in consultation has been about the general harm to the landform of the raised land of the Caddell uplift and the sand hills sitting on it. This is regardless of the finding that 'Aboriginal objects' (as defined and protected under the NPW Act) will not be subject to significant harm. The landscape feature itself is held as having cultural significance and is tied to important local stories. This led to an agreement that two issues would be pursued:

1) Recognition be made of the Aboriginal cultural values of the landform. There was disappointment that a planned meeting to discuss this with all RAPs on site for an additional day was not held (due to Coronavirus issues), however it is considered that this process will be partly made up for in a somewhat separate process that has arisen from the project – being a proposal to rename the Caddell Fault to a local language name[1].

2) That commitment to these Aboriginal cultural values be shown through effective rehabilitation of the landform after sand extraction and that this should be done in collaboration with local Aboriginal people.

1.2 Report Structure

Application for an AHIP requires that an ACHA is prepared as a separate document from an appended Archaeological Report. The contents and format of an ACHA are prescribed by the Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH, 2011) whereas the Archaeological Report must follow the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010b). Because these two guides require much of the same content, the result is that the ACHA is inevitably a document with an appendix (Archaeological Report) that duplicates much of its content. In general, the ACHA focuses more on aspects of community consultation and the evaluation of cultural significance and associated management measures, whereas the Archaeological Report deals more with the outcomes of archaeological investigation.

To facilitate review by Registered Aboriginal Parties (RAP), a single volume was produced as a consultation draft. This has been separated into an ACHA and an Archaeological Report (this volume) for final production and submission with an AHIP application.

1.3 Contributors and Acknowledgements

This report has been produced by Associates Archaeology & Heritage and written by Oliver Brown, Damian Wall and Joe Dortch (Table 1). The work presented here relies very heavily, with significant

[1] A) Background research has found that Francis Caddell, after whom the larger geological feature is named, was expelled from the colonies of Australia for 'blackbirding' (slavery); B) the uplift occurred as a cataclysmic event causing a great damming and flooding of the Murray within the time of Aboriginal occupation and remarkably appears to be remembered in Aboriginal stories, inclusive of the new course of the river having been dug out by Aboriginal people near Barmah; and C) it is considered that a more appropriate Aboriginal name for the landform should be used. Kevin Atkinson (on behalf of his family descended from the late Uncle Sandy Atkinson and other knowledge-holders has stated that: "We strongly recommend as mentioned above that it would be most appropriate for such a significant landmark to be named '*dunggudja nanit*', meaning 'great earthquake', as our family has known it". This is being pursued as a separate matter to the current project.

verbatim quoting (all duly attributed), on the 2016 assessment commissioned by the proponent from Jo Bell Heritage Services (Bell & Edwards, 2016). This represents due recognition of the standard of that work as well as a reasonable commercial commitment to not have EMM Group essentially pay twice for the same services. The GPR work of Fogel (2019) is also heavily used. Fieldwork contribution came from all four RAP groups: Moama LALC, Cummeragunja LALC, Bangerang Aboriginal Corporation and Yorta Yorta Nation Aboriginal Corporation.

Table 1: Proponent and consultant contact details

	Heritage Consultant	Proponent
Company	Associates Archaeology & Heritage	EMM Group Pty Ltd
Contact person	Oliver Brown	Kane Henson
Email	oliver@archassociates.com.au	kane@emmgroup.com.au
Address	29 Hannan Street, Maroubra NSW 2035	26-42 Old Aerodrome Rd, Echuca VIC 3564
Phone	0427 414 226	03 5480 6665

2 PROJECT DESCRIPTION

2.1 STUDY AREA AND PROPOSED WORKS

The study area is located approximately 16km northeast of Moama and 8km west of Barmah with Murray Valley National Park to the east and agricultural land on all other boundaries.

The proposed extensions are intended to increase the range of material available to EMM Group and to provide for an ongoing resource base to continue operations. The southern area is used for extracting mostly fine sand, with coarser material available in the northern area. The following information is drawn from the 2016 Flora and Fauna report (Hamilton Environmental Services, 2016, p. 4):

> *"The Northern Area is considered of more value because of its extent and available material, followed by the Southern Area, which is potentially somewhat impacted as a resource by the presence of deeper dune sands in the eastern side of the area.*
>
> *It is unlikely that EMM Group would ever seek to excavate all of these areas; the total available sand resource across these three areas combined can provide over 1 million cubic metres of sand (varying grades; Bell Cochrane and Associates 2015), and given that EMM Group currently only excavate 20-30,000 cubic metres/annum to meet the demands of the Echuca-Moama market with no expansion of distribution or current activity planned or likely (Andrew Halloran pers. comm. 2016). … only at the exhaustion of these resources would 'new' areas within the proposed development extent be utilised (Kane Henson pers. comm. 2016).*
>
> *It is likely that only areas of up to 1 ha would be utilised for extraction at any time in each of the proposed Northern and Southern Areas when the existing extraction areas are exhausted (Andrew Halloran pers. comm. 2016). These areas are likely to provide sufficient resource for at least a 5-10 year period given the stated current local demand (Kane Henson pers. comm. 2016), and therefore, the development footprint in the short-to-medium term across the property is likely to be < 2 ha in total of new excavation".*

The nature of the proposed extraction activity is described by Bell and Edwards (2016) as:

- "Excavation of sand from the proposed development areas down to a depth of approximately 3m in the south and approximately 6m in the north;
- On-site screening of excavated material;
- On-site storage and stockpiling of excavated material ready for supply;
- Formalisation of internal farm access tracks;
- Protection of buffer areas; and
- Rehabilitation of extraction areas following extraction completion".

3 STUDY AREA SETTING

Plate 1: View from top of sandhill in southern area

Plate 2: View southwards of rise up onto the level land in northern area

3.1 ENVIRONMENTAL CONTEXT

3.1.1 GEOLOGY AND SOILS

The study area is on Shepparton Formation (Nws) geology, characterised by 'unconsolidated to poorly consolidated, mottled, variegated clay, silty clay with lenses of coarse to fine sand and gravel, including interlayered red-brown palaeosols' (Deniliquin 1:250 000 Geological Map, NSW DPI 2000).

Soils as observed comprise deep sandy-loam alluvial soils, described by Bell and Edwards (2016) as comprising "undulating dune formations associated with the Barmah Sand Hills, a formation resulting directly from the uplift of the Cadell Fault and the down-throwing of the Echuca Depression (Palaeo Lake Kanyapella) some 30,000 years ago (Cochrane, Quick, & Spencer-Jones, 1995; McPherson, Clark, Cupper, Collins, & Nelson, 2012)".

Geotechnical testing by Bell Cochrane & Associates (Bell Cochrane & Associates, 2015) found that that the northern area contained an average overburden of 3m overlying the sand resource layer of 7m. The Southern Area contained an average overburden of 1.7m overlying the sand resource layer of 10.3m.

The 2019 and 2020 field investigations and subsequent excavation has highlighted that the southern and northern area are hugely different geomorphologically. The south is essentially a late Pleistocene aeolian sand body with some potential overlap with Aboriginal occupation. In the north, rather thin soils directly overlie deep clays and a gravel body that predates Aboriginal occupation.

3.1.2 VEGETATION

The study area is currently cleared agricultural land with surrounding Grey Box Woodland in surrounding road reserves. The pre-invasion plant community has been assessed (Hamilton Environmental Services, 2016, p. 5) as likely comprising a mixture of three Plant Community Types (PCTs):

- PCT ID 7 – Inland Riverine Forests - River Red Gum-Warrego Grass-herbaceous riparian tall open forest wetland mainly in the Riverina Bioregion. The lower-lying eastern boundary area of the property (Fig. 2-2) is a modified remnant of this PCT, while the adjacent sections of the Murray Valley National Park to this area are a more intact form of this PCT;
- PCT ID 75 – Riverine Sandhill Woodlands - Yellow Box-White Cypress Pine grassy woodland on deep sandy-loam alluvial soils of the eastern Riverina Bioregion and western NSW South Western Slopes Bioregion. The southern and south-western sections of the property elevated above the floodplain were likely to be this PCT, although little indigenous vegetation remains across this area on the property or the 11 Mile Road reserve;
- PCT ID 80 – Floodplain Transition Woodlands - Western Grey Box-White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion. This PCT would have covered most of the elevated north and north-western sections of the property; only tree remnants of this PCT remain on the property, while the vegetation of the 11 Mile Road reserve is a more intact representation.

3.1.3 BIOREGION CHARACTERISTICS AND WATER

The activity area is located in the Riverina bioregion of New South Wales:

> 'This bioregion is dominated by river channels, floodplains, backplains, swamps, lakes and lunettes that are all of Quaternary age. The region comprises three overlapping alluvial fans centred on the eastern half of the Murray Basin. Features of each fan differ slightly because of differences in the discharge of the streams. The Lachlan fan is mainly clay as this smaller stream does not have the competence to carry sand. The other two fans are similar except that the Murray is more confined and has more active anabranch channels where it is forced to flow around the obstacle of the Cadell fault near Echuca. At times of extreme flood flow, water from the different streams can cross the fan surfaces and enter channels of another system'. (NPWS, 2003, p. 92)

3.2 LAND USE HISTORY

Title searches undertaken by Jo Bell Heritage services (Bell & Edwards, 2016) indicates that the property was gazetted in 1900 and was subject to an agricultural lease by 1914. The extent of previous grazing following earlier settlement of the Riverina from the 1830s has not been determined. Aerial imagery from 1961 indicates that the existing extent of vegetation clearance had occurred by that time and remains essentially unchanged in imagery from 1996 (Figure 3 and Figure 4). The property was purchased by EMM Group in 2005 for the purpose of sand extraction and was operating in the two current areas within a few years.

It is reported that the land has been subject to both cropping and grazing (Hamilton Environmental Services, 2016), meaning that disturbance in the top 20cm of soil is certain, but without having removed any material (i.e. artefacts). Deeper deposits are considered likely to remain essentially intact.

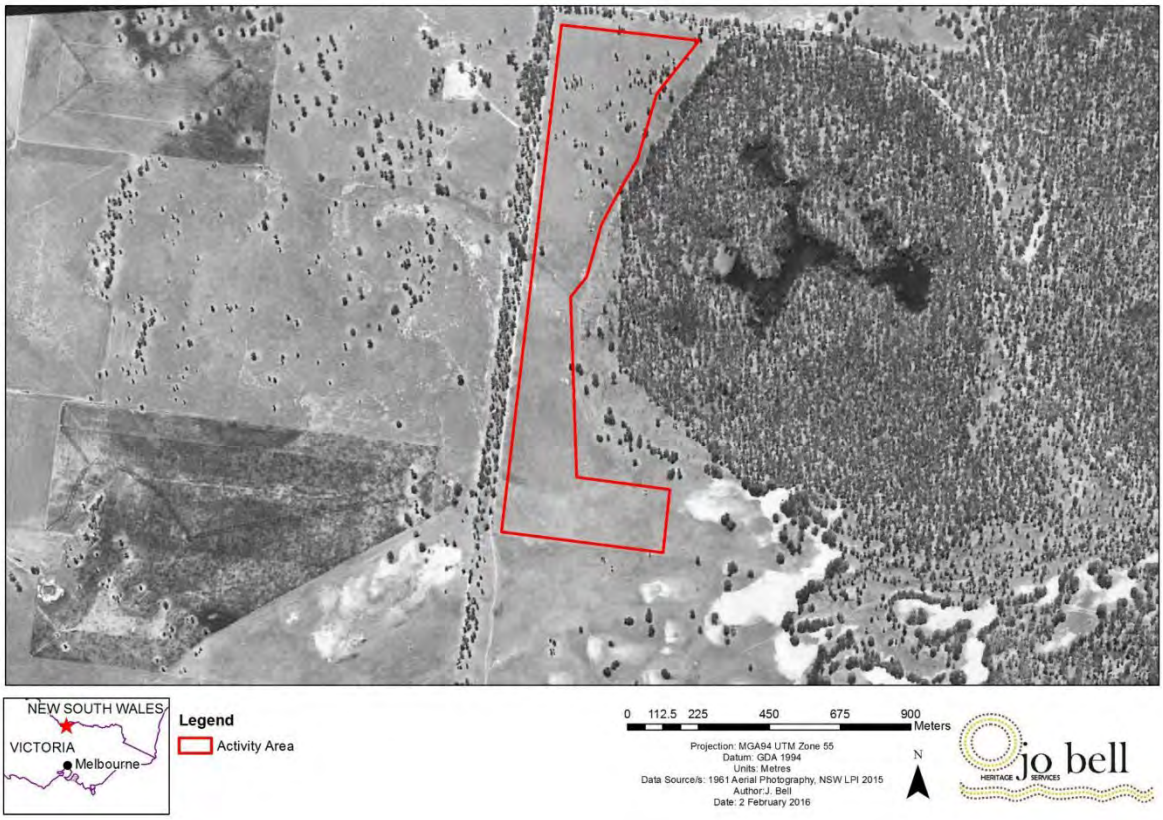


Figure 3: 1961 aerial image reproduced from Bell & Edwards 2016

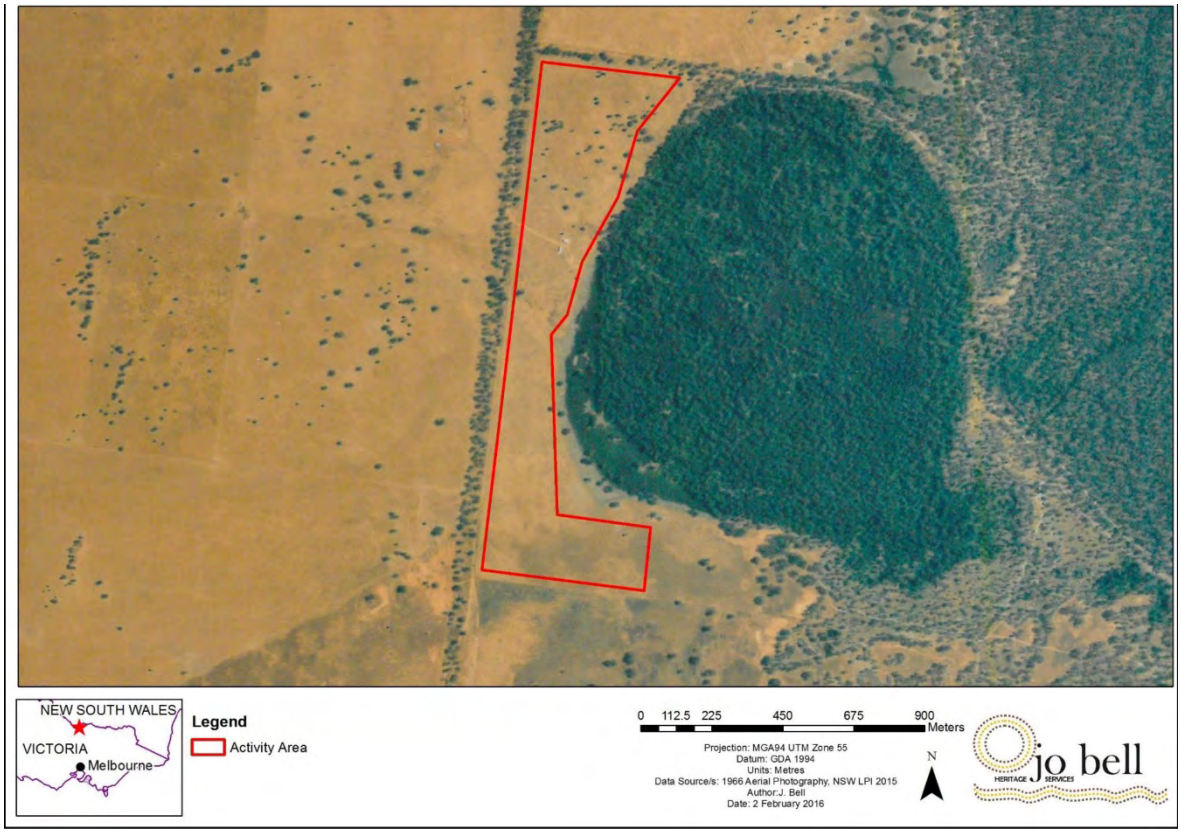


Figure 4: 1996 aerial image reproduced from Bell & Edwards 2016

4 ARCHAEOLOGICAL CONTEXT

4.1 AHIMS DATA

The AHIMS search conducted by Bell & Edwards (2016) on October 22nd 2015 (Client Service ID: 196232) found results for a total of 59 sites within a 10km radius of the study area. An updated search undertaken just prior to report finalisation (Client Service ID: 507545) on 22nd May 2020 found a list of 67 sites and one Aboriginal Place in a 10km x 10km search area surrounding the study (**Figure 5**).

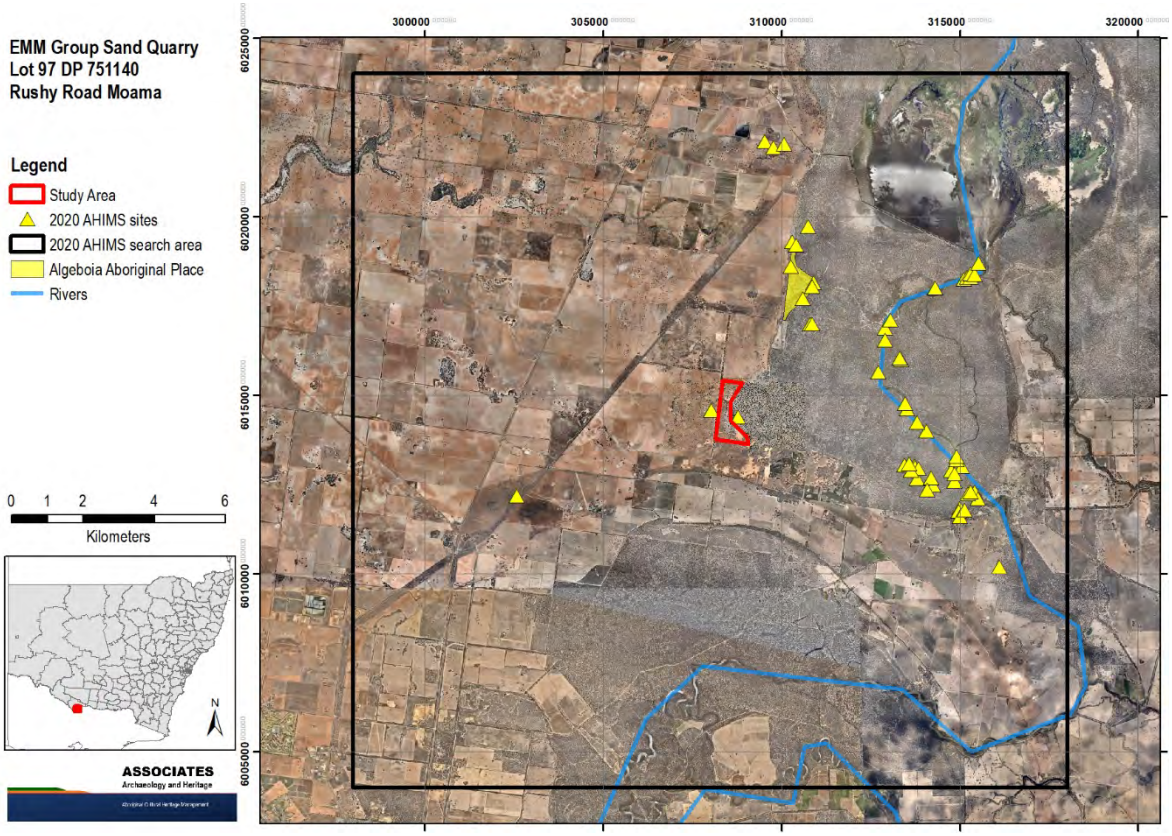


Figure 5: Distribution of 67 AHIMS listed sites in 10km x 10km around study area

Of the nearby listed sites (Figure 6), seven in total, none are actually correctly listed. A scarred tree (AHIMS 54-5-0248; 'Many Waters Scar Tree 4') mapped within the adjoining palaeo-lake forest in Murray River National Park is actually about 70km to the north on the banks of the Wakool River outside of Deniliquin. Similarly, three separate scarred trees in a paddock on the other side of Rushy Road with the same coordinates have been found to be incorrectly mapped and are also a long way to the north on the Edwards River (John Gilding, DPIE, pers comm.).

Even more strangely, the sites described by Bell & Edwards (2016) did not come up in the search, even though they are reported with AHIMS site numbers and so were presumably on the register somewhere. The resolution of this did not occur until after the completion of test excavation and is documented in Section 10, "Site Definition".

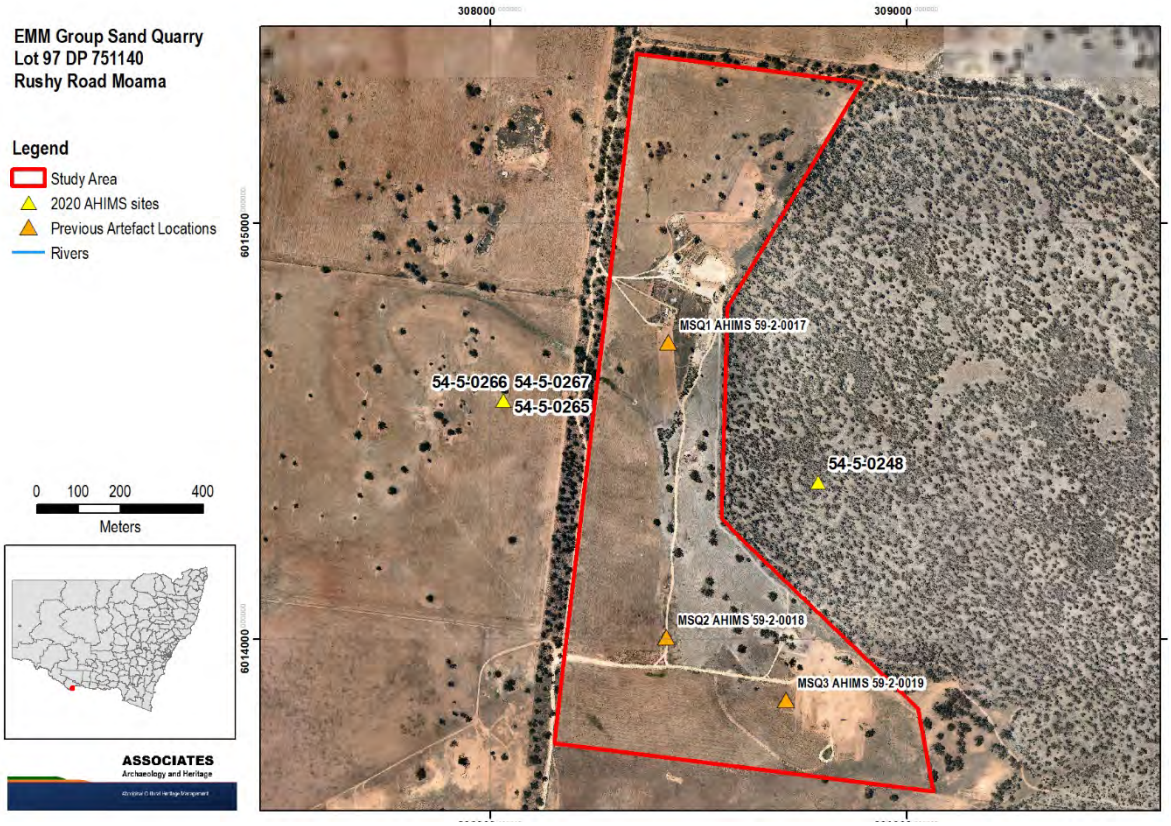


Figure 6: Locally listed sites – all with irregularities

Site types in the wider search area are dominated by scarred trees and complex sites classified around the presence of earth mounds but also associated with other features including scarred trees, hearths, shell midden and/or artefacts. Three are also associated with burials (making a total of four in the search).

Table 2: Site types in the area

SITE TYPE	No.
Mound / Midden Multiple	36
Scarred tree	23
Aboriginal Ceremony and Dreaming	3
Artefact	1
Burial	1
Fish Trap	1
Mound	1
Ochre Quarry	1
TOTAL	67

Broad spatial patterns in the data are:

- A distinct clustering of sites along the banks of the Murray River;
- A clustering of sites in the southern end of the Kanyapella palaeolake ephemeral wetland which may represent a clustering of sites near the former occupation areas on raised ground that have since become Barmah and Cummeragunja, or a concentration of cultural heritage surveys in that area associated with the community there, or both;
- A cluster of sites around the Algeboia Aboriginal Place, an area of distinct amenity on raised land near resources of the ephemeral wetland;
- A general paucity of site listings across grazing lands that is likely to represent some genuine site sparseness relative to the river and palaeolake, but also a relative paucity of Aboriginal cultural heritage survey.

4.2 PREVIOUS WORK

Previous archaeological investigations (Lance & Webb, 1985; Lance, 1985; Edmonds, 1990 ; Lloyd, 1993; Craib, 1991; Stone, An Archaeological Survey of the Corridor of a Proposed Levee Bank near Moama, NSW, 1999; Navin Officer Heritage Consultants, 2009) in the surrounding region were well summarised in Jo Bell's previous assessment (Bell & Edwards, 2016), reformatted into Table 3:

Table 3: Previous assessments documented by Bell & Edwards 2016

Reference	Location / Survey Type	Landform	Results	Summary copied from Bell & Edwards 2016
Lance, A. & Webb, S. G. 1985 An Archaeological Investigation of a Sand Dune on the Murray River at Moama, NSW. Report to the NPWS, NSW. ANU Archaeological Consultancies: Canberra.	Sand quarry 2km east of Moama / Foot survey and test excavations	Sand dune, 300m from Murray River main channel	Ancestral remains of 3 individuals identified in spoil. No remains identified during test excavations. Excavations and augering to a depth of 2.7m. Unit A - humic-rich soil horizon overlying Unit B - red sand horizon (some charcoal associated with carbonized tree roots), overlying Unit C - mottled red sand (leached from Unit B), overlying Unit D – yellow sand (horizontal bedding planes), overlying Unit E – riverine clays	This study reports on an investigation of a sand quarry 2km east of Moama, which was prompted by reports of human remains at the property (up to 15 individuals). An inspection of the site resulted in the identification of the skeletal remains of a child at the site. A number of 1x1m pits and auger holes were excavated on the property. No human remains were identified during the excavation however the remains of a further two individuals were identified in some spoil dumps. The report assesses the site as of relatively low scientific significance and claims that the reports of 15 individuals being removed from the site as 'exaggerated'. The report considered it unlikely that additional remains would be found at the property.

Reference	Location / Survey Type	Landform	Results	Summary copied from Bell & Edwards 2016
Lance, A. 1985 An Archaeological Investigation of the Algeboia Shell Midden in the Moira State Forest, Murray Valley, NSW. Report to the Forestry Commission of NSW. ACT Archaeological Consultancies: Higgins.	Moira State Forest / Foot survey and excavation	Low sandy rise bordering Murray River floodplain	Shell midden disturbed through quarrying. Site contained freshwater mussel shell, fish and mammal bones, charcoal, stone flake, a hammerstone and scarred trees. Dated to 1,100 years BP	This report details the results of an investigation into a shell midden situated on a low sandy rise bordering the Murray River floodplain that was disturbed by quarrying. The site is located only 3km northeast of the activity area. The site contained freshwater mussel shell, fish and mammal bones, one stone flake, one hammerstone and scarred trees. An excavation of the site was carried out revealing a deposit of shell, bone, charcoal, stone artefacts and clay. The site was dated to 1,100 BP.
Bonhomme, T. 1990 An Archaeological Survey of the Barmah Forest. Report prepared for Victoria Archaeological Survey and Department of Conservation and Environment.	Barmah Forest, Victoria 9km north of Barmah township / Foot Survey of linear transects for sampling	Varied – River and creek margins, floodplain, sand dunes and plains	182 Aboriginal sites recorded, including scarred trees, mounds, burials and stone artefact scatters	
Edmonds, V. 1990 An Archaeological Survey of the Proposed Echuca-Moama RSL and Citizen's Club Site, Moama, New South Wales. Report prepared for Echuca-Moama RSL and Citizen's Club Ltd.	4ha area for the Echuca – Moama RSL site, 1km northwest of Moama / Foot survey	Floodplain – 500m from northern bank of Murray River	No cultural heritage identified	Edmonds conducted a survey of the 4ha site, located 1km northwest of Moama. No Aboriginal sites were identified during the survey.
Craib, J. L. 1991 Archaeological Survey of the Moira-Millewa State Forests. Report for National Parks and Wildlife Service	Moira-Millewa State Forests, 20km north of Moama / Area foot survey	Varied – River and creek margins, floodplain, sand dunes and plains	146 Aboriginal sites recorded, including burials, mounds, middens, scarred trees and artefact scatters	Craib surveyed an area of the Moira-Millewa forest, 20km north of Moama. A total of 146 sites including burials, mounds, middens, scarred trees and artefact scatters were identified during the survey across a variety of landforms. Based on the results of the survey, together with Bonhomme's 1990 survey results from the Barmah Forest, Craib developed a prediction model for the Moira-Millewa forest area. The current activity area contains sand dunes which, according to Craib's prediction, could contain open artefact scatters and burials in low densities and mounds in higher densities.

Reference	Location / Survey Type	Landform	Results	Summary copied from Bell & Edwards 2016
Lloyd, A. 1993 Archaeological Survey of Proposed Moama Sewerage Treatment Works, Moama, New South Wales. Report to Moama Shire Council.	431ha north of Moama / Foot survey	Plain	18 Scarred trees and one mound identified	Lloyd surveyed an area of 431ha north of Moama (11.5km southwest of the activity area). A total of 18 scarred trees and one mound were recorded during the survey. Lloyd suggests that scarred trees and mounds are likely to occur across all landform types 'rather than being landform specific'.
Stone, T. 1999 An Archaeological Survey of the Corridor of a Proposed Levee Bank near Moama, NSW. A report to Sinclair Knight Merz.	5km linear alignment, north of Moama / Foot survey	Plain, terrace edge of Murray River	No cultural heritage identified	Stone surveyed a 5km corridor north of Moama. No Aboriginal sites were identified during the survey.
Navin Officer Heritage Consultants 2009 Deniliquin to Moama 132kV Transmission Line Route: Aboriginal and Historical Archaeological Assessment. A report to Sinclair Knight Merz.	69km linear alignment between Moama and Deniliquin / Field Inspection	Varied	9 scarred trees were identified	Navin Officer Heritage Consultants conducted a survey of a 69km alignment between Moama and Deniliquin. Nine scarred trees were identified during the survey of the alignment, none of these were close to the activity area.

Other than the two investigations reported on here in Section 7 below, the study area was previously surveyed in 2006 at the commencement of sand extraction operations by Cummeragunja LALC on 29 May 2006. In Bell and Edwards 2016:15 it is stated that:

> *"According to a letter from Cummeragunja LALC Sites Officer Neville Atkinson (provided by the proponent), Mr Atkinson conducted a site survey of the 'Rushi Farm' property in 2006. In conclusion, Mr Atkinson states:*
>
> > *'The proposed quarry sites [are] in the general area where land has been cultivated over a long period of time for cereal cropping…There were no visible signs of any Aboriginal heritage listings suggesting the possibility of finding any on the surface in the near future is very remote taking into consideration all the previous land disturbance that has taken place in the past'.*

Presumably, the survey took place only for the two quarry sites that are currently in existence and not the rest of the property that is currently being investigated. It should be noted that whilst the statement considers surface material, it does not make any consideration of the potential for buried Aboriginal cultural heritage to be identified during works.

4.3 PREDICTIVE MODELLING

Archaeological predictive modelling is a well-developed approach that applies known patterns of site distribution established through previous investigations and applies them to comparable landforms and environments. Proximity to water is usually the main consideration based on the understandable (as well as tested and established) tendency for people to be more likely to undertake activities that lead to an archaeological record where they have access to drinking water. In arid and semi-arid regions, this tendency also ties into the prevalence of food resources. Amenity then becomes the next most significant consideration, again in relation to understandable factors. Raised sandy terraces near water are favoured over low-lying floodplains (even if slightly further from water) for a host of reasons, such as being less damp, clearer of vegetation, offering a better vantage point, having better breeze, fewer annoyances like mosquitoes or snakes, etc.

Conditions encouraging larger aggregations of people or more frequent use create archaeological 'signatures' of the type of activities undertaken. Camps mean hearths for example, while cooking large game and Combungi (*Typha* sp. bulrushes) results in mounds with heat retainers. People spending time in a camp would use some time for stone tool manufacture and maintenance, with resulting patterning of flaked stone pieces providing perhaps the most enduring archaeological record of the use of the Australian landscape by Aboriginal people.

Prominent rises, like sandhills, would also attract certain activities, even if distant from water. People 'out and about', foraging, traveling or hunting would be drawn to stop on hilltops for orientation and to be able to see game and other people at greater distances. In some cases, a prominent landform might also become the site of ceremonial activity, inclusive (in the Riverina) of human burial. Burials are also known to have occurred at camping locations on sandy rises and in some mounds, even if it meant that these locations were then abandoned for a period of time.

Following these principles, the site prediction statement made by Bell and Edwards (2016, p. 25) was that:

> *"Based on the results of the desktop assessment, it is predicted that scatters of stone artefacts and mounds or hearth material are the most likely site types to be found in the activity area, and usually occur relatively close to the surface. These site types are likely to represent campsites and stone working areas as the undulating sand hills of the activity area overlook a low-lying wetland that would have provided both food and water resources. The sand hills themselves would have provided dry ground for habitation and high ground for a long-range view of the surrounding area.*
>
> *It is also possible that ancestral remains could be identified at some depth within the sand deposits on the property. The likelihood of the survival of skeletal remains would depend on the amount of erosion and re-deposition of sediment, which is linked to land-use practices including clearing of vegetation and subsequent dune instability".*

We reached the same conclusion, adding that:

- Concentrations of artefacts resulting from overnight camps are most likely in those raised sandy area closest to the palaeolake forest. This corresponds with the northeast and southeast corners of the overall study area and may not extent significantly into the proposed activity areas.;
- Some artefact concentration from dedicated tool manufacture might be further set back from the terraced edge to keep the abundance of sharp debitage away from other activities;
- The sandhill in the southern area, while relatively prominent is not particularly distinguished as such compared to others and may not have anything more than sparse artefact occurrences

5 ARCHAEOLOGICAL INVESTIGATION

The archaeological survey reported on here relies significantly on the detailed work undertaken by Bell & Edwards in 2016 and is complemented by work by the current authors in 2018 and 2020. Each section below covers methodology (including sampling strategy), and results for the respective surveys. Maps below show survey coverage.

5.1 BELL & EDWARDS 2016

5.1.1 METHODOLOGY

From Bell and Edwards (2016, p. 26):

> "The field team was to consist of two archaeologists and a representative from each of the RAPs. The proposed field methodology included a systemic survey of the entire activity area as a group, walking transects where possible across the survey units, Areas 1 to 4 (after Burke & Smith 2004). This survey methodology was to include the inspection of all mature Eucalypts and exposed ground as the entire area is a landform known to be sensitive for Aboriginal cultural heritage (sand dune).
>
> It was proposed to record any Aboriginal cultural heritage places directly onto AHIMS site recording forms. Areas of potential Aboriginal cultural heritage sensitivity identified during the surface assessment were to be noted for further investigation during subsurface testing (as necessary)".
>
> "The field survey was carried out over two days on 6-7 December 2015 Jo Bell and Bridget Grinter (Archaeologists, Jo Bell Heritage Services Pty. Ltd.) with Brett Hamilton (Bangerang), Mick Bourke (Yorta Yorta), John B. Kerr and John Kerr (Moama LALC) also in attendance.
>
> The activity area for survey was divided into survey units 1 to 4. These areas were defined by internal farm tracks, laid out across the undulating sand dune (Map 3 [Figure 5 below]). The activity area was surveyed on foot by the field team, focusing on exposed areas with good visibility (Map 4 series [Figure 6 to Figure 8 below]; Plates 1-2). The buffer zones, which will not be subject to ground disturbance, were not assessed".

5.1.2 RESULTS

From Bell and Edwards (2016, p. 26):

> *"Visibility and exposure in the activity area was quite variable, ranging between 0% where weed and grass growth was high to 100% where crop stubble had not yet given way to new growth, or the A-horizon had been completed eroded (Tables 4-5 [**Table 4** and **Table 5** below]; Plates 3-4 [**Plate 5** and **Plate 6** below]).*
>
> *The activity area as a whole, contained very few trees. Isolated mature Eucalypts were mostly confined to Area 3 (see Plate 4 [**Plate 6** below]). These were all examined in detail, however none showed evidence of cultural scarring. A small stand of young regrowth Eucalypts were identified in Area 2 within the buffer zone. A shallow saddle between two rises in Area 2 was also noted, acting as an ephemeral drainage line (see Plate 2 [**Plate 4** below]). A house site, sheds, garden and slope down to a nearby dam comprised Area 4. Areas 1-3 had been planted (and harvested) to either oats or vetch. Geotechnical test pit and bore locations were also observed throughout the activity area (see Plate 1 [**Plate 3** below])".*

Table 4: Table 4 in Bell and Edwards 2016 - Estimated Survey Coverage

Survey Unit	Landform	Survey Unit Area (m2)	Visibility (%)	Exposure (%)	Effective Coverage Area (m2)	Effective Coverage (%)
Area 1	Sand dune / sheet	117,000	20	60	14,040	0.12
Area 2	Sand dune / sheet	164,000	40	50	32,800	0.2
Area 3	Sand dune / sheet	190,000	50	40	38,000	0.2
Area 4	Sand dune / sheet	21,000	10	10	210	0.01

Table 5: Table 5 in Bell and Edwards 2016 - Estimated Landform Coverage

Landform	Landform Area (m2)	Area of Landform Effectively Surveyed (m2)	% of Landform Effectively Surveyed	Number of Sites	Number of Artefacts or Features
Sand sheet / dune	492,000	85,050	0.172	3	60+

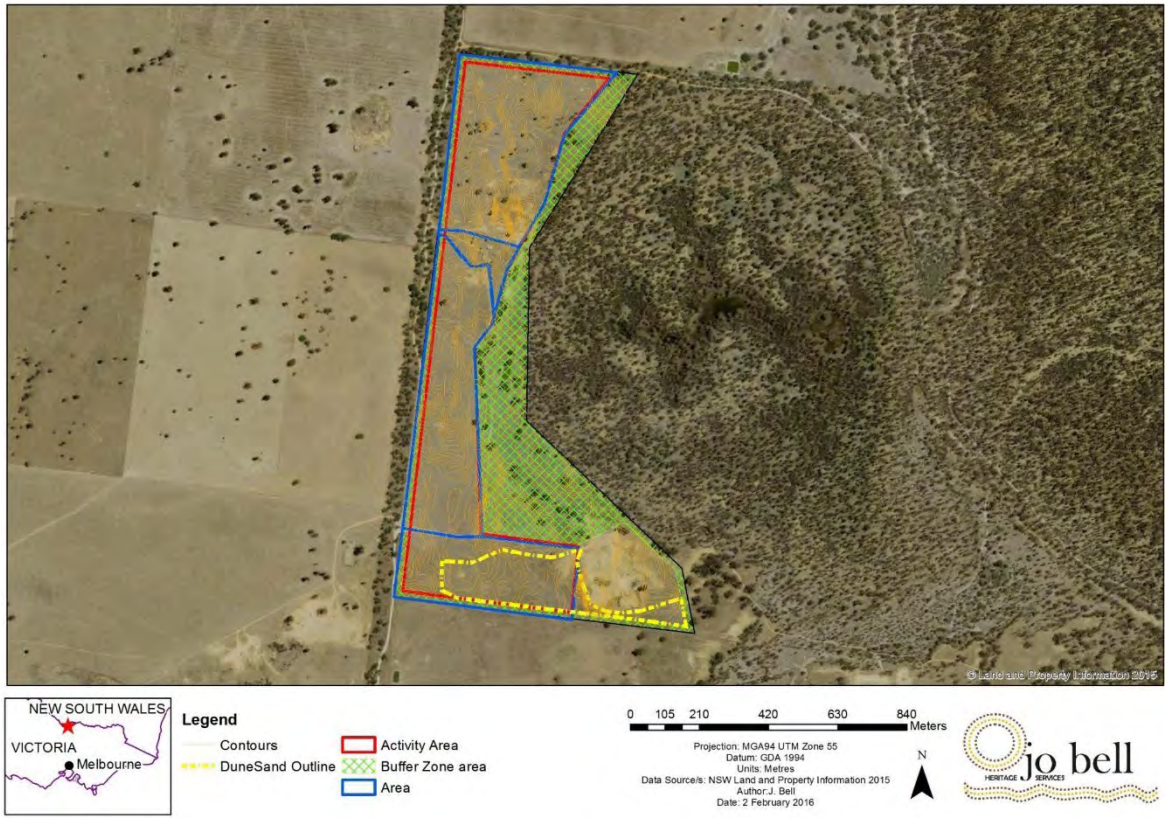


Figure 7: Map 3 in Bell and Edwards 2016 "Survey Units and Landforms in the activity area"

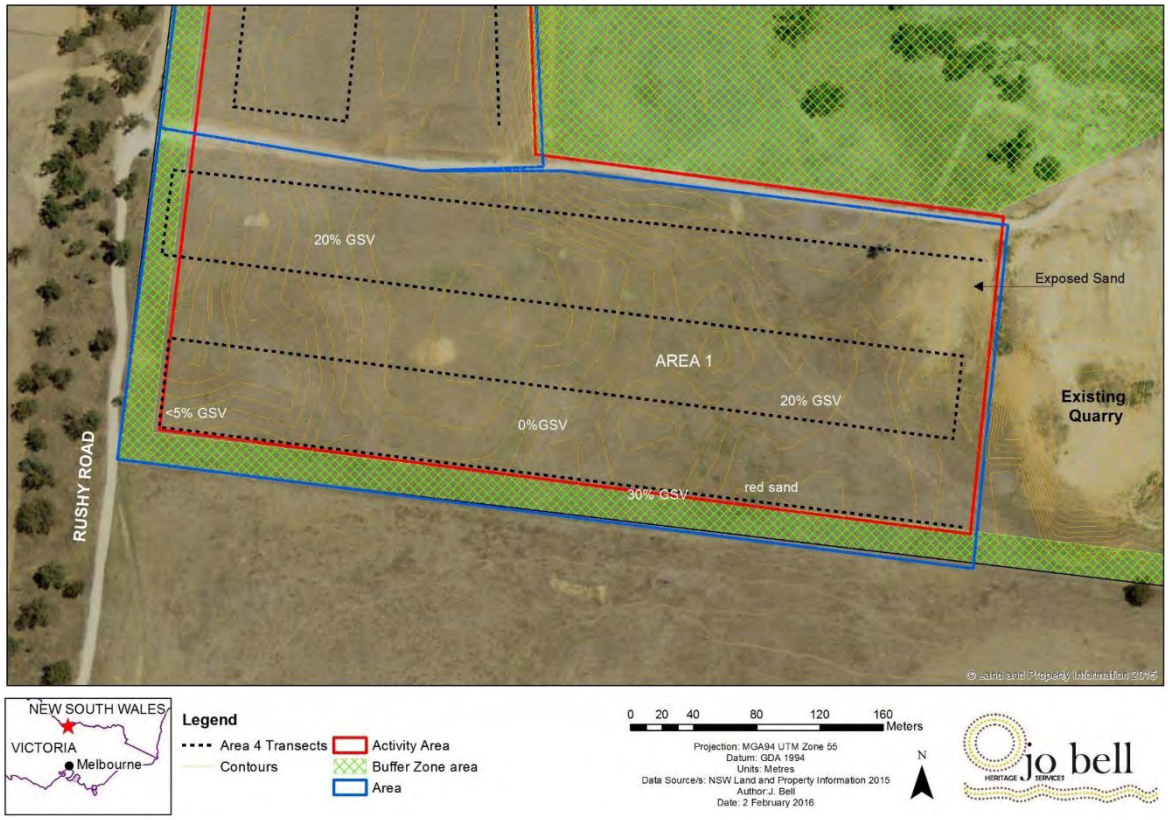


Figure 8: Map 4a in Bell and Edwards 2016 "Survey Results – Area 1"

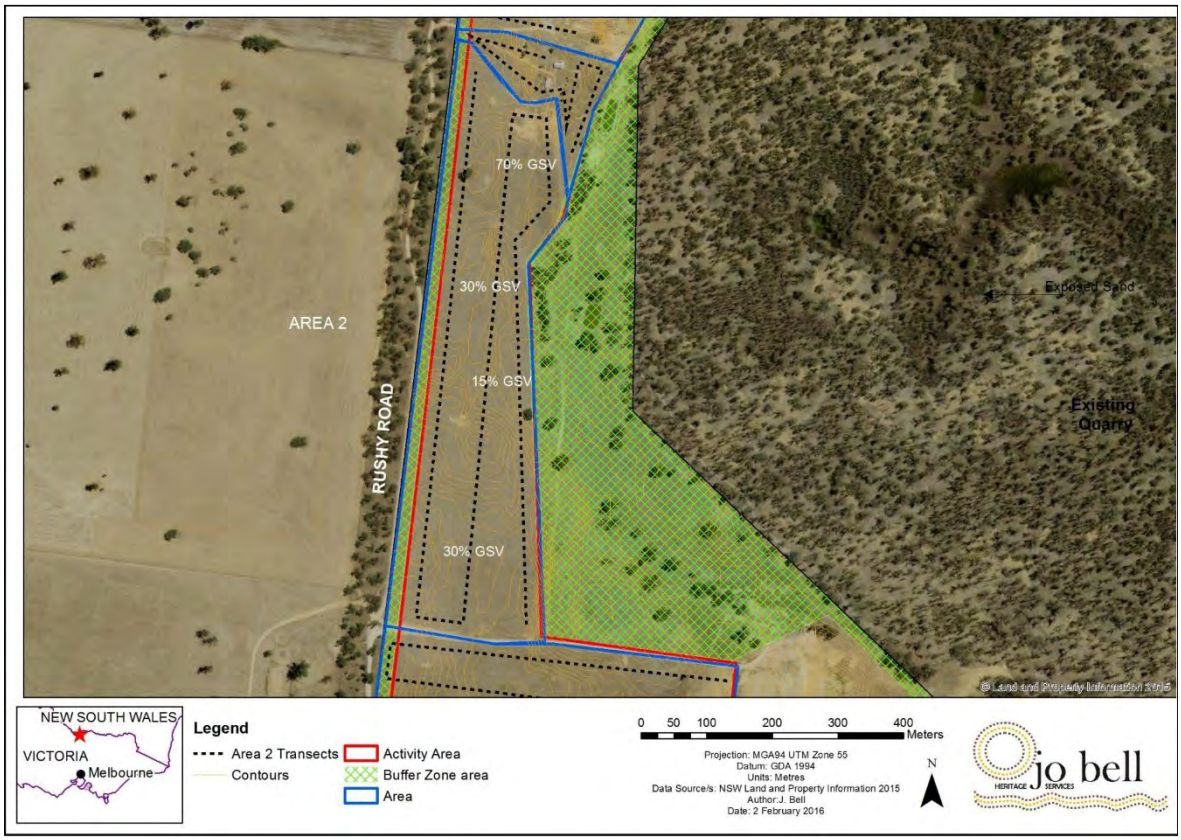


Figure 9: Map 4b in Bell and Edwards 2016 "Survey Results – Area 2"

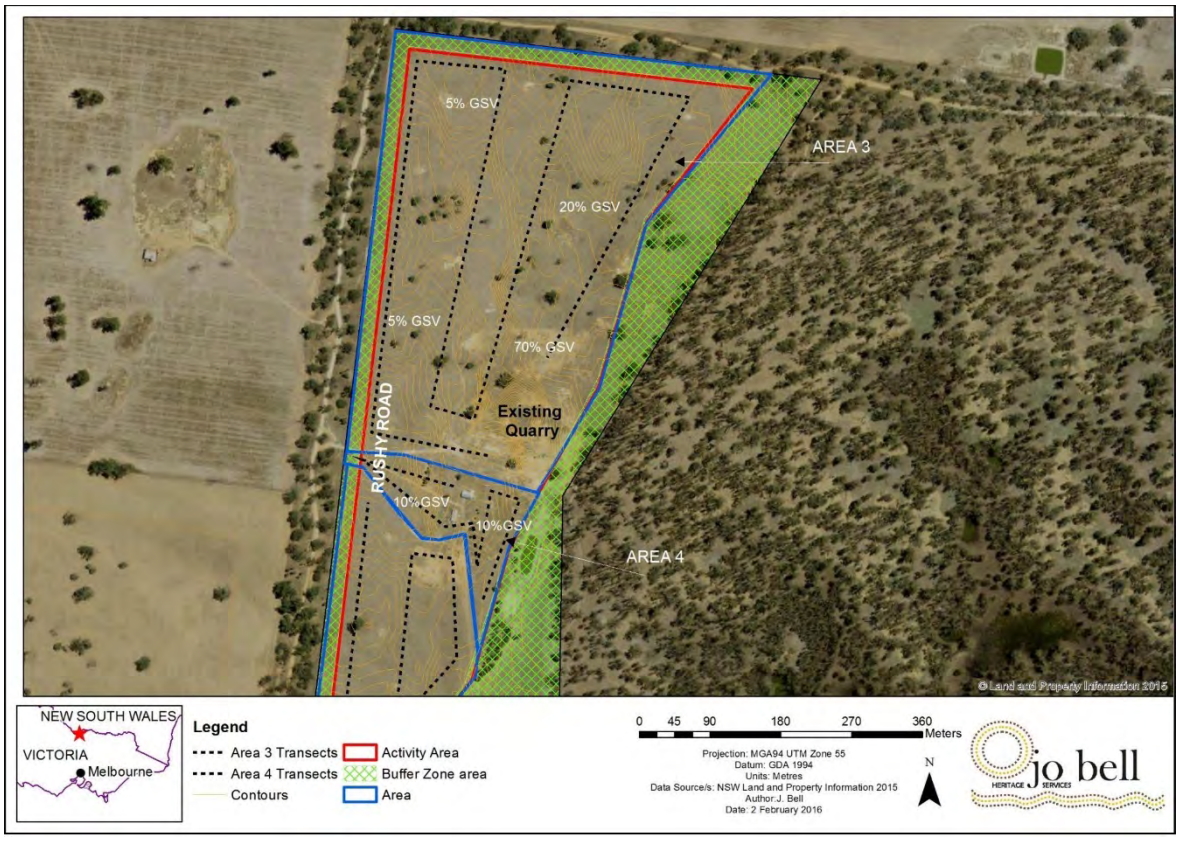


Figure 10: Map 4c in Bell and Edwards 2016 "Survey Results – Areas 3 & 4"

Plate 3: Bell and Edwards 2016 Plate 1 ""Area of excellent ground surface visibility in Area 1. Note backfilled geotechnical testing trench, facing 80° (Photo: J.Bell 6/1/2016)"

Plate 4: Bell and Edwards 2016 Plate 2 ""Looking down at Area 2 from top of hill and good ground surface visibility, facing 190° (Photo: J.Bell 6/1/2016)"

Plate 5: Bell and Edwards 2016 Plate 3 "Area 1 showing limited ground surface visibility, looking towards existing quarry, facing 90° (Photo: J.Bell 6/1/2016)"

Plate 6: Bell and Edwards 2016 Plate 4 "Area 3 showing plough furrows and isolated trees, facing 190° (Photo: J.Bell 6/1/2016)"

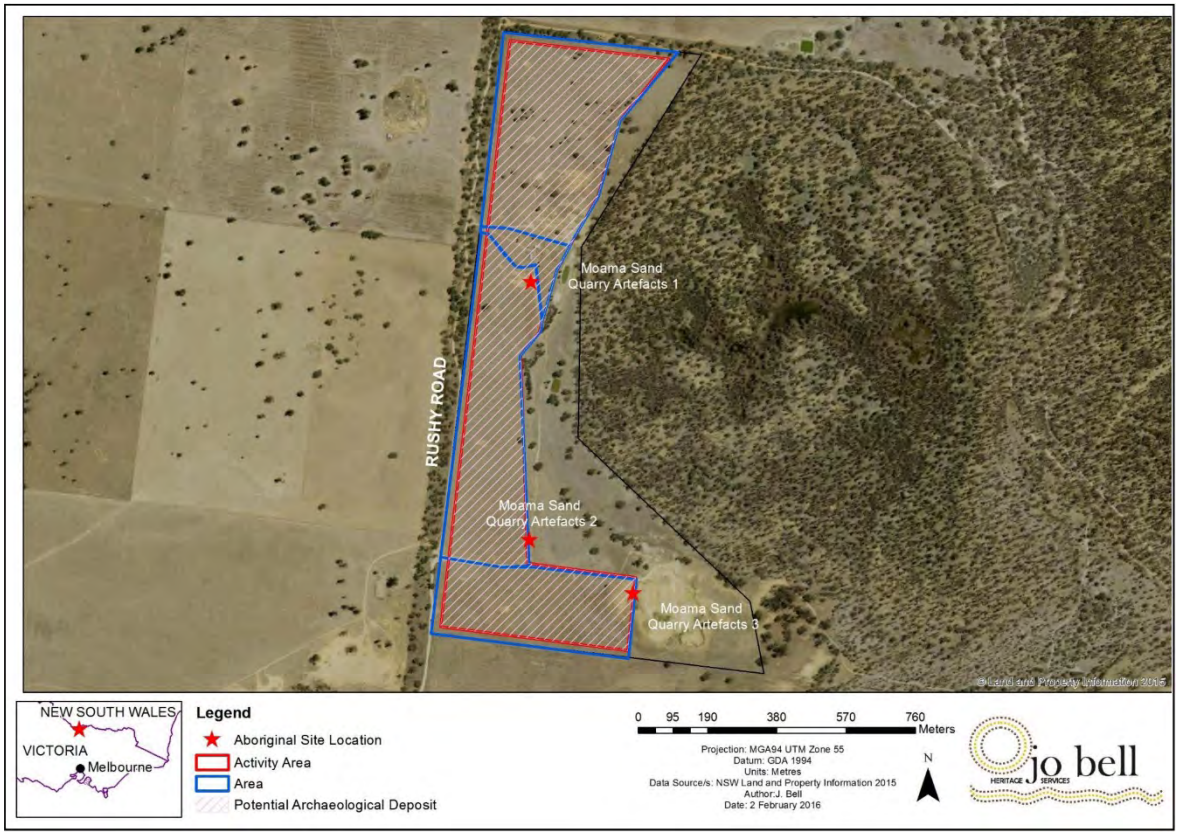


Figure 11: Map 5 in Bell and Edwards 2016 "Location of sites and PADs in the Activity Area"

The archaeological investigation by Bell and Edwards identified three sites comprising varying densities of stone artefacts as described below (Bell & Edwards, 2016, p. 32):

> *"Two isolated artefact occurrences were identified in Area 2: one in the northern sector of the survey unit, south of the shed in the cropped paddock (Moama Sand Quarry Artefacts 1); and another in the southern sector of the survey unit, close to the access track in the cropped paddock (Moama Sand Quarry Artefacts 2). A dense artefact scatter was identified close to the current extent of the southern extraction pit (Excavation Site 1) (Moama Sand Quarry Artefacts 3) (Map 5). These are described further below. AHIMS registrations are detailed in Table 6 [below]".*

Table 6: Table 6 in Bell and Edwards 2016 "Sites identified during the survey"

Site Number	AHIMS # (incorrect)	Feature(s)	Survey Unit	Landform
Moama Sand Quarry Artefacts 1	(AHIMS 59-2-0017)	Artefact Scatter	Area 2	Sand sheet
Moama Sand Quarry Artefacts 2	(AHIMS 59-2-0018)	Artefact Scatter	Area 2	Sand sheet
Moama Sand Quarry Artefacts 3	(AHIMS 59-2-0019)	Artefact Scatter	Area 1	Sand dune

Moama Sand Quarry Artefacts 1

"This Aboriginal place [using Victorian terminology rather than the statutorily defined meaning in NSW] is represented by two flaked quartz artefacts; a flake and a core, situated approximately 18m apart in a ploughed paddock. The artefacts were found towards the top of a dune at an elevation of 106.826m (AHD). The place does not represent an in situ deposit (Figure 9; Plate 5). Artefact analysis is provided in Appendix 3".

Moama Sand Quarry Artefacts 2

"This Aboriginal place is represented by a single mudstone axe blank, identified exposed in a ploughed paddock near an access track at an elevation of 106.275m (AHD). The artefact does not represent an in situ deposit (Figure 10; Plate 6). Artefact analysis is provided in Appendix 3". [Note that neither we, nor RAPs present during 2020 survey, consider this to be an genuine artefact, being soft sedimentary rock].

Plate 7: Bell and Edwards 2016 Plate 5 "Context of Moama Sand Quarry Artefacts 1 in Area 2 (Photo: J.Bell 7/1/16)"

Plate 8: Bell and Edwards 2016 Plate 6 "Moama Sand Quarry Artefacts 2 (Photo: J.Bell 7/1/16)"

Moama Sand Quarry Artefacts 3

"This Aboriginal place is represented by a scatter of stone artefacts exposed in disturbed sand on the edge of the existing extraction pit in the southern sector of the property (see Figure 10; Plates 7-8). The topsoil has been scalped and stockpiled as part of the extraction process. The exposed cultural heritage lies at an elevation of between 99.5m and 100.6m (AHD). Artefacts were identified exposed in the wall of the extraction pit as well as on top of the as yet unexcavated portion. A sample of the artefactual material was analysed (see Appendix 3), and included smoky quartz, crystal quartz, rose quartz, milky quartz, quartzite and silcrete. Artefact types included complete flakes, broken flakes, angular fragments and cores. Charcoal was also identified embedded in the exposed and crusted B-horizon. Its origin or significance could not be determined without excavation".

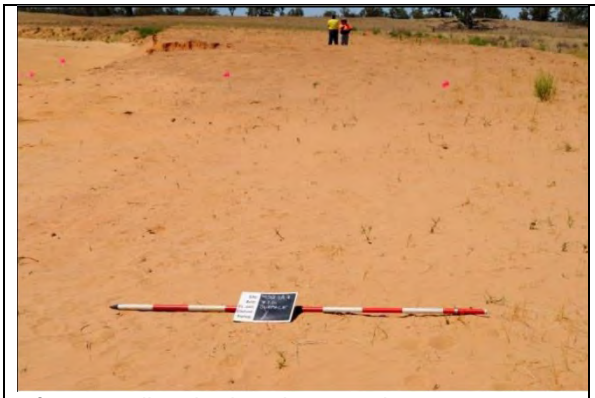


Plate 9: Bell and Edwards 2016 Plate 7

Plate 10: Bell and Edwards 2016 Plate 8

Potential Archaeological Deposits (PADs)

"The activity area comprises a sector of sand dunes associated with the Cadell Fault to the west, overlooking a wetland area to the east. Similar dune landforms in the area, both to the west and east, have been shown to contain ancestral remains, shell midden, mound and hearth material, artefact scatters and scarred trees. Dating of shell and charcoal indicate an age of approximately 1,100 years BP.

Geotechnical testing has identified 'dune sand' in the south of the activity area (Area 1) and other sand deposits within Areas 1-3. On this basis, the entire activity area must be identified as a PAD as these areas are likely to contain Aboriginal cultural heritage (see Map 5)".

Figure 12: Figure 9 in Bell and Edwards 2016 – MSQA 1 (AHIMS 59-2-0017)"

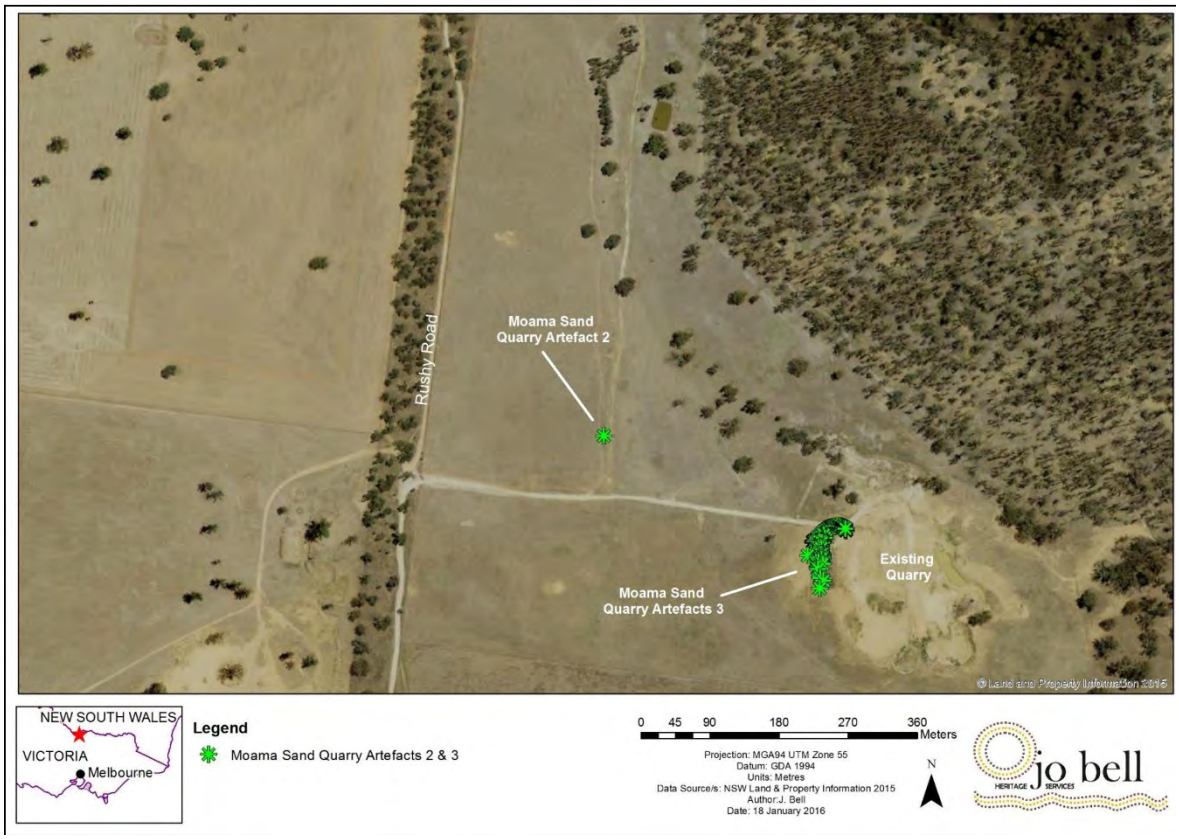


Figure 13: Figure 10 in Bell and Edwards - MSQA 2 (AHIMS 59-2-0018) and 3 (AHIMS 59-2-0019)"

5.2 2018 Archaeological Survey

5.2.1 Methodology

Survey in 2018 comprised a reconnaissance and site-familiarisation visit by Oliver Brown and Damian Wall.

5.2.2 Results

Results can be summarised as:

- Both areas proposed for expanded quarrying work were inspected and with no artefacts found in either;
- Particularly intense survey was undertaken on the sandy hilltop in the southern area – these results are factored into survey results from 2020 reported in Section 7.3 below
- MSQ1 was not relocated although the visibility and exposure were considered to be less than the 40% and 50% respectively observed by Bell and Edwards;

- MSQ2 was relocated and considered not to be a genuine artefact. As can be seen in Plate 8, the petrology simply seems too weak for use as a hatchet, there is no polish indicating edge grinding and no reason to think it should have been transported so far as a blank. It seems more likely to be river cobble transported to the site and deposited immediately alongside a track through any of a number of random but plausible processes that would occur in the operation of a quarry.
- MSQ3 was observed briefly although not subject to any verification or additional recording as it lay outside of the areas being directly assessed.
- Further considerations made in the wider area were that:
    - Of the land within the subject property, the area with the greatest potential based on amenity lies at the far northern end where raise level land comes closest to the edge of the ephemeral wetland; and
    - Areas along the southern margin of the ephemeral wetland to the southeast of the subject property among small irregular dunes (mostly outside the subject property but including remnants of MSQ3), are also considered to have locally high archaeological potential.

5.3 2020 Archaeological Survey

5.3.1 Methodology

Additional survey undertaken in 2020 took the form of intensive survey in areas adjacent to the test excavation trenches to provide complementary data to them.

In the northern area, which was done first, this was highly formalised and intense, with a four-person team taking 3 return passes, meaning a total of six transects each and 24 total transects across the 50m x 50m area. This resulted in all areas being searched with a maximum distance of less than 2m to a surveyor. Under these circumstances is considered that most, if not all, surface artefacts would be detectable.

In the southern area, two return passes by two archaeologists provided a total of 8 transects and all areas searched with a maximum distance of approximately 3.5m to a surveyor. We consider the complementary intense survey of exactly the same area in 2019 to bolster the survey intensity to parity with the method applied in the northern area.

Plate 9: Ground surface visibility in southern area of approximately 20%

Plate 10: Ground surface visibility in northern area of approximately 85%.

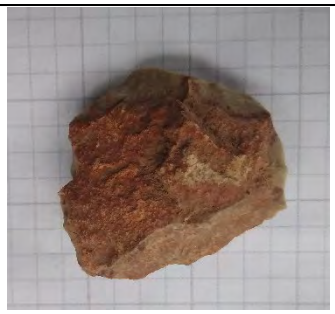
Table 7: 2020 Survey data

Survey unit	Area (m2)	Visibility (%)	Effective area (m2)	Artefacts
Southern	2500	20	500	0
Northern	2500	85	2125	1

5.3.2 RESULTS

One artefact was located in the survey in the northern area, as mapped in Figure 14, being a grey silcrete cortical flake / core. The artefact may have been used as a very small portable core with additional possible utility as a scraper. As such, with enough utility to be a part of a portable toolkit and in the absence of associated nearby survey or excavated artefacts, it can reasonably be interpreted as an isolated find.

Table 8: 2020 Survey artefact



Material	Grey silcrete
Type	Single platform core
Max Dimension	28mm
Orthogonal Dimension	22mm
Thickness	9mm
No. of scars	7
Dorsal surface	90% cortex
Easting (MGA 55)	308351
Northing (MGA 55)	6014976

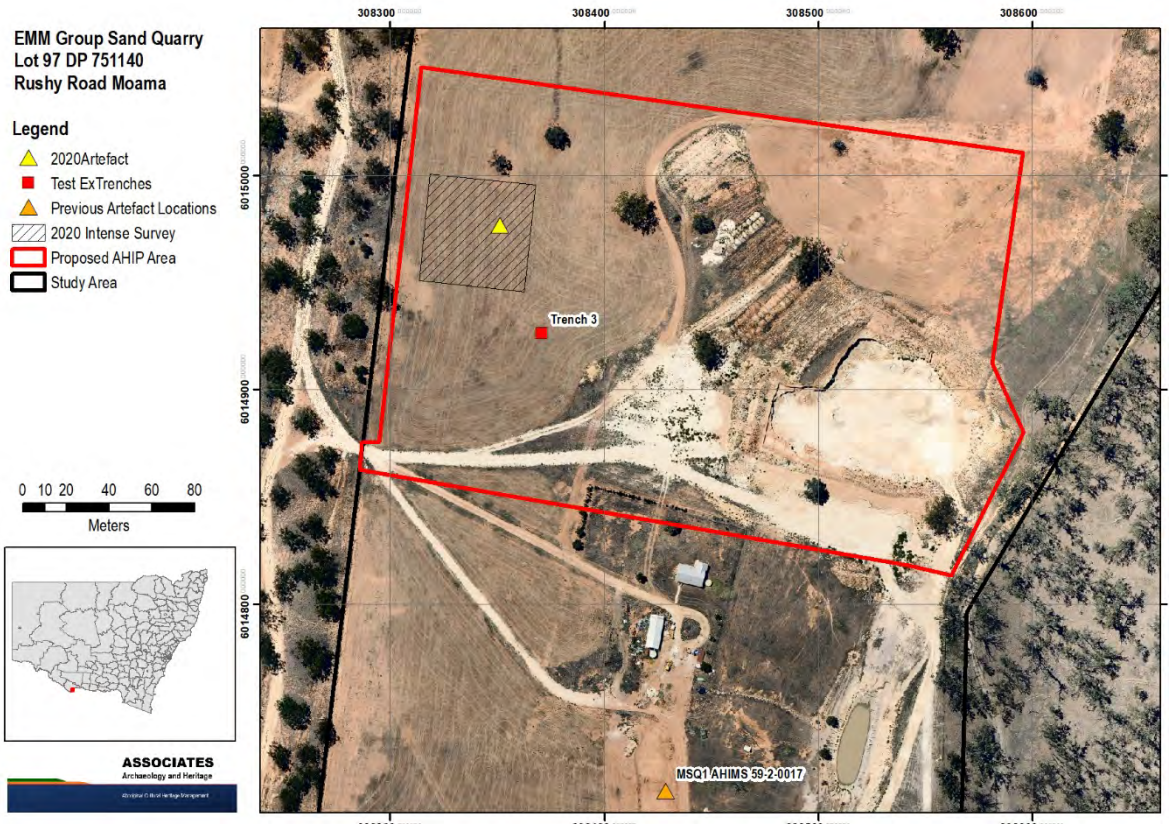


Figure 14: Northern survey area

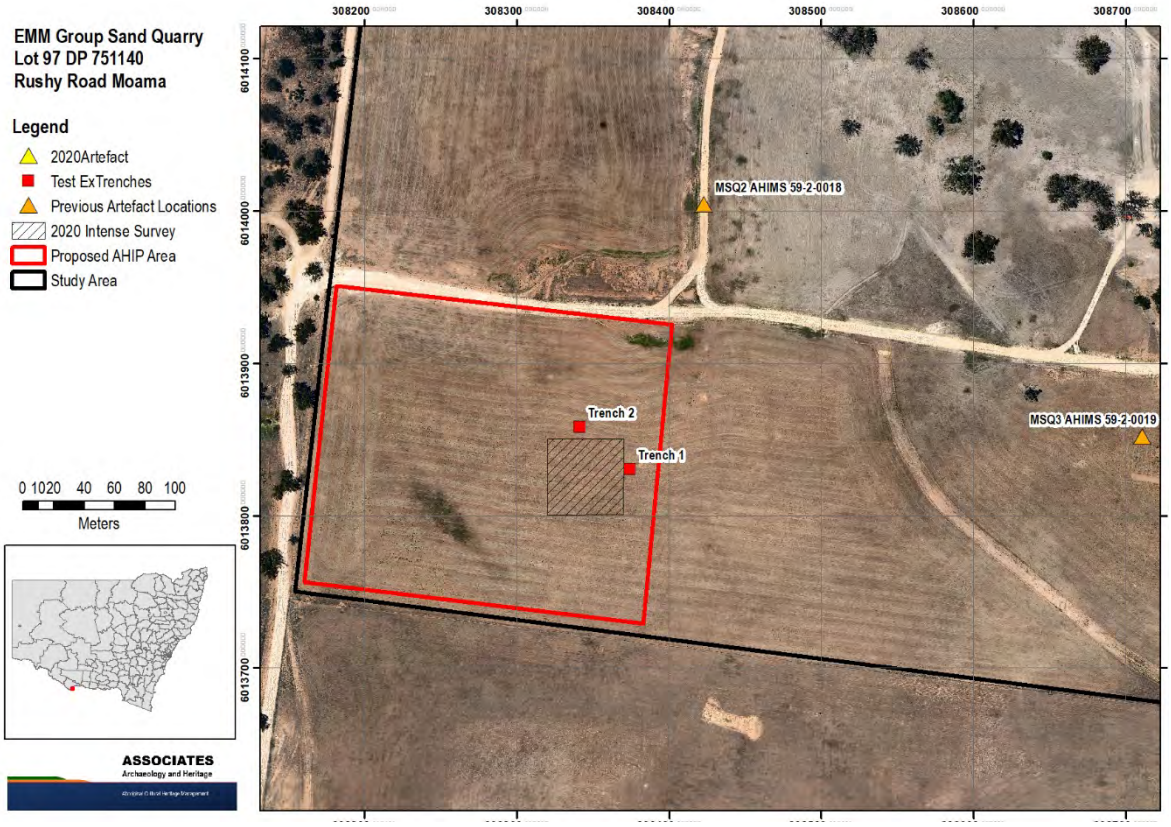


Figure 15: Southern survey area

Ground Penetrating Radar

Following an indication from DPIE (in a meeting with John Gilding and Andrew Fisher 4th May 2018) that ground penetrating radar had been found to be a useful form of investigation in relation to potential Aboriginal burials in the area (RPS Australia, 2017), a study by the same contractors was commissioned for the current study area. This was undertaken in January 2019 (Fogel, 2019).

The investigation covered the two areas of proposed extraction extension, one being 150m x 150m in extent and the other 200m x 160m (Figure 12). Rather than addressing any and all potential Aboriginal cultural heritage material, the target was specifically on burials. No anomalies indicative of burials being present were located.

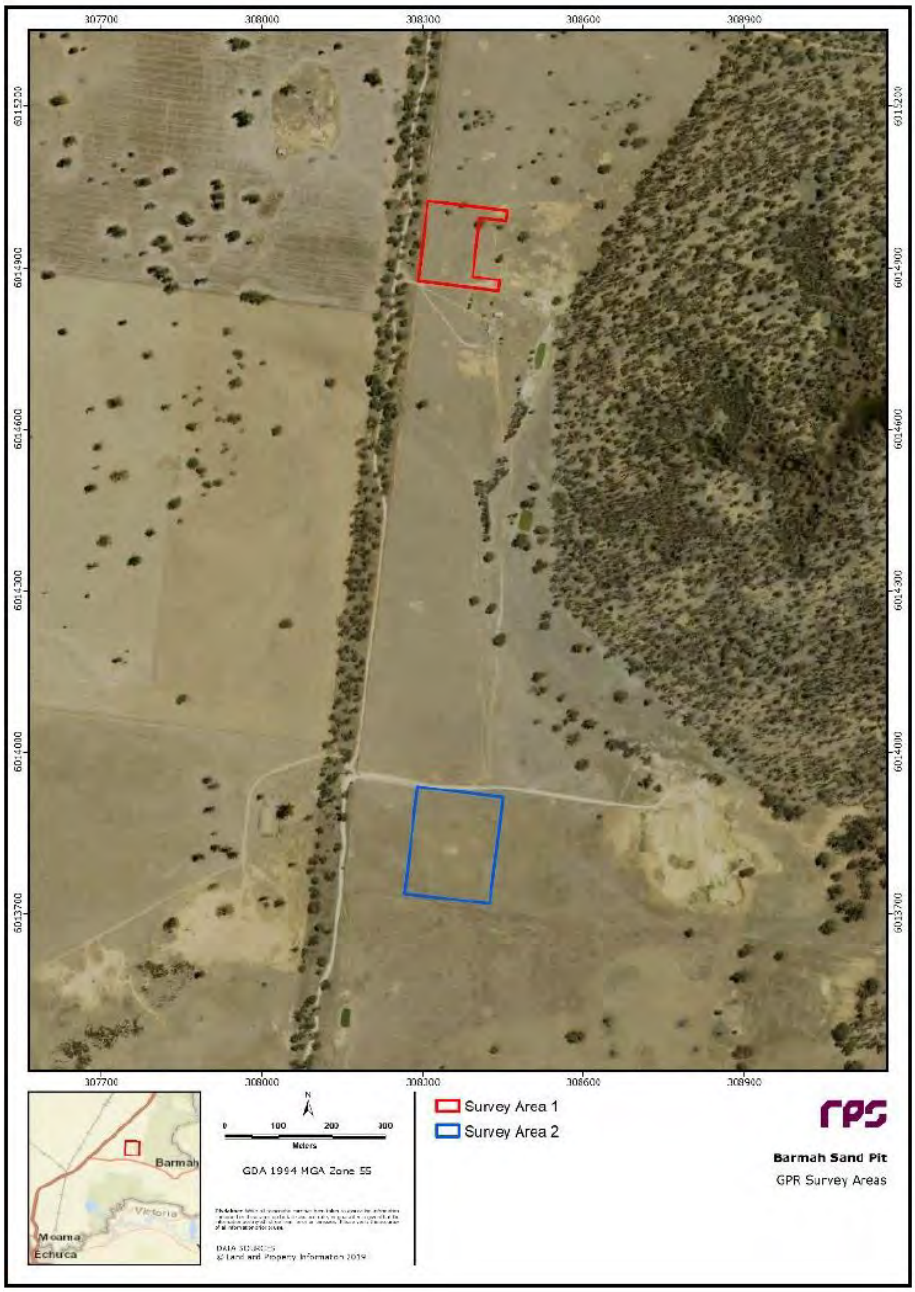


Figure 16: Fogel 2019 Figure 1 - location of GPR testing

The Executive Summary of the 2019 Fogel report is reproduced below and the report in its entirety in Appendix 4.

> *"RPS Heritage was engaged by EMM Group to undertake a ground penetrating radar (GPR) survey at Barmah Sand Pit, 11 Mile Rd, Moama NSW. This survey has been implemented to determine the potential for human burials to be present. Ground surface conditions were suitable for the collection of high-quality GPR data. Soil conditions were also suitable with effective imaging of the subsurface to depths below where remains are expected to be located, if present.*
>
> *Survey Area 1 is in a geomorphic context with a low likelihood of burials being present. Overwhelmingly, anomalies present in the data can be attributed to modern use of the area. GPR reflection patterns consistent with human burials have not been identified.*
>
> *Survey Area 2 is in a geomorphic context much more amenable to be utilised by past Aboriginal peoples for human interment. As in Survey Area 1, surface disturbance from modern/historic period activity is present. Burrowing activity is prevalent through much of the area below the modern disturbance to depths up to approximately 1.5 metres. Below this, most variability in the GPR data has been attributed to geology. GPR reflection patterns consistent with human burials have not been identified".*

5.4 TEST EXCAVATION

5.4.1 INTRODUCTION

Bell and Edwards (2016) considered that their finds were consistent with regional distribution patterns, with their proposed sites on the edge of raised ground closest to the wetland area to the east; although no artefacts could be found in the proposed extraction areas slightly further away. However, they nominated the activity area as a whole as a potential archaeological deposit (PAD) and it is logical to assume that there would at least be some sparse or isolated artefacts that may be harmed. The GPR report (Fogel, 2019) found that there were no anomalies indicative of human burial contexts, but also noted that the results did not provide any indication of the likelihood of artefacts being present or absent. Our own site inspection is in line with these findings – as, indeed, are the final results.

With regard to concentrations of stone artefacts, the distance of the proposed extraction areas from water suggests that there would not be any complex sites derived from repeated campsite use, but the general amenity of being raised sandy areas in the general vicinity of a resource-rich wetland suggests that some artefacts should be present.

In relation to human burials, although sandhills are a common enough context for such sites, sandhills with burials also tend to be adjacent to a significant resource or occupation area or at least stand out in the wider landscape in some way that might predictably draw such ceremonial activity. This is something that does not apply to the one in the proposed extraction area (the southern area). This was a view shared by local Aboriginal archaeological staff with an understanding of site distribution based on extensive local familiarity with burial sites (Uncle Ned Atkinson, pers comm.).

Nonetheless, given the enormous gravity of even a remote possibility, and that test excavation to confirm artefact density had been recommended, it was considered that the excavation should be undertaken to a depth to better consider the possibility for deeply buried material, inclusive of human remains.

To dig to the required depth, excavation could not follow the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and therefore required an AHIP. This was applied for in November 2019 and issued January 2020 as AHIP number C0005483 (AHIMS Permit ID 5433).

5.4.2 AIMS

The aims of testing were to:

- Record stratigraphy in way that can be used to interpret the GPR results to better understand the results as indicative of burials being unlikely;
- To sieve a significant enough volume of subsurface deposit to determine:
    - the presence or absence of artefacts in any detectable abundance;
    - if present, their relative abundance in a way that can inform a distribution model

This information was required in order to:

- Assess whether the proposed sand extraction will harm Aboriginal objects; and
- If so, whether that harm may be permitted or needs to be subject to measures to avoid, minimise or mitigate harm.

5.4.3 METHODS

The methods, as proposed in an earlier ACHAR submitted for the AHIP generally followed the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) where possible, with the major exception being the requirement to use a rotating cab excavator to safely dig at the depths involved.

1. Three excavation trenches were opened across the two proposed sand extraction areas (see Figure 17), two in the southern area and one in the north (one less than planned once digging to depth was found to be redundantly into culturally sterile, pre-Aboriginal deposits).

2. Excavation trench width was set by the use of a common straight edged 'batter bucket' at 1200mm. The trench length was constrained by the excavator boom length to a practical maximum of 4000 mm and minimum of 3000 mm required to manipulate the bucket to remove level spits of deposit. This was considered sufficient to reach the extent limit of even remotely possible cultural layers.
3. Excavation occur at as close to 10cm spits as was practicable. Even allowing for an expert professional operator, there was some variation which was corrected for in subsequent spits to the extent possible
4. Sections were recorded by direct observation in upper layers and then a combination of observations from the surface and of excavated material where depth precluded safe access to the trench.
5. Material was sieved through 5mm mesh on commercial sand and gravel sorting equipment noting the original location of each sieved unit in the event of artefact finds.
6. Photographic and hand-drawn records of final sections were taken.
7. Excavation continued either to a layer that could be established as: a) pre-dating 100,000BP on geomorphological grounds; or b) to point no longer possible with the equipment being used.
8. Test excavation trenches were backfilled on the day of excavation.

5.4.4 RESULTS - GENERAL

- Excavation was achievable to depths considered to cover the full possible timespan of Aboriginal occupation of Australia.
- No (zero) artefacts were recovered in an area and volume of material considered sufficient to model nil-sparse artefact distribution at all levels (8.4m^2 excavation in the southern area and 4.8m^2 in the southern area; a total of 13.2m^2 (or 52 standard 50cm x 50cm test pits)).
- In the southern area on the sandhill, the generally homogenous nature of the deposit conforms with the GPR observations and demonstrates a deposit that should have been able to show disturbances related to human burials should they have been there.
- In the northern area, it was determined that the extent of the deposit with potential cultural material is confined to a surprisingly thin topsoil layer over dense clay. The target deposit to be quarried is considered best not thought of as sand (as a context which might predict Aboriginal cultural heritage material) but a fine gravel which, like the overlying clayey subsoil, would predate Aboriginal occupation.

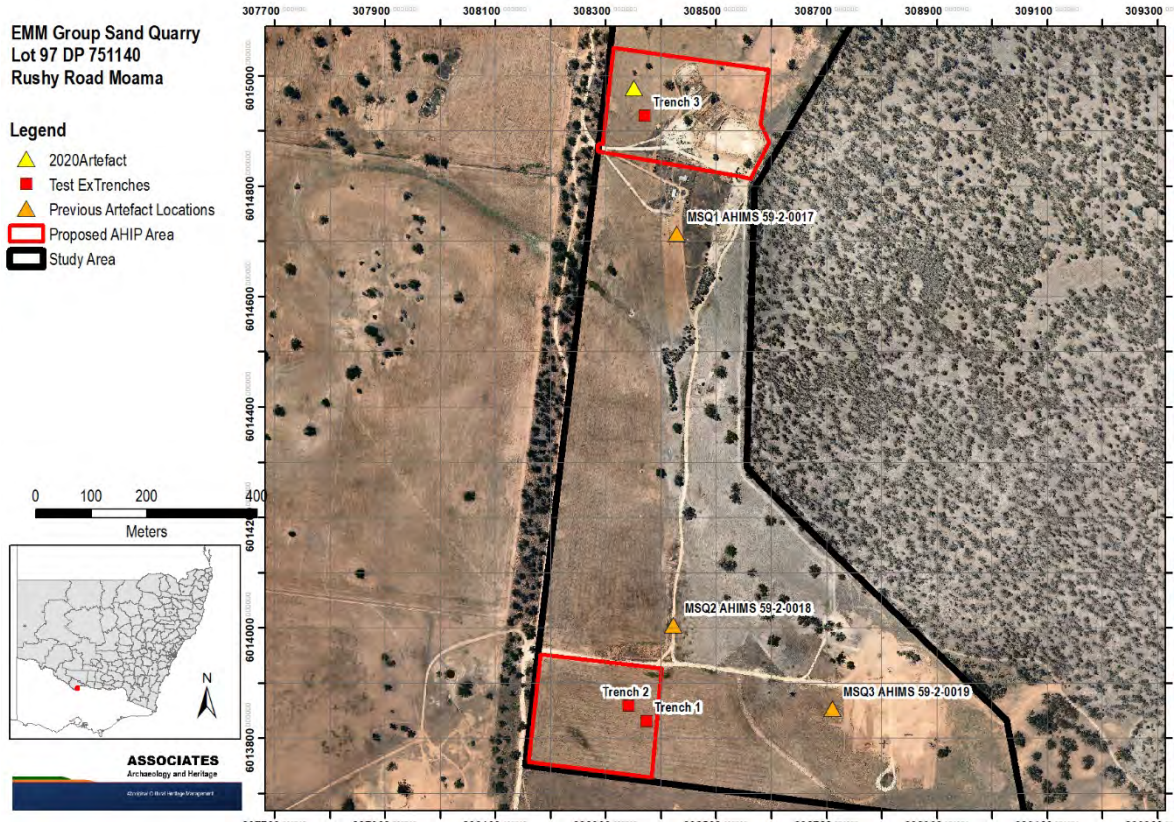


Figure 17: Trench locations

5.4.5 RESULTS - SOUTHERN AREA

5.4.5.1 Trench 1

Trench 1 was on the crest of the hill in the southern area (114m asl; 308375E 6013830N). The excavated surface area was 4m x 1.2m (4.8m2). The deposits comprised a ~100mm root zone loosely binding yellowish red sand that then essentially continued with a gradual transition most notable at approximately 2 metres down to a practical limit of excavation at 4 metres (interpolating from Trench 2, a clay base is considered likely to have occurred within another metre).

Plate 11: Trench 1 surface

Plate 12: Trench 1 upper layer

Plate 13: Trench 1 general section view

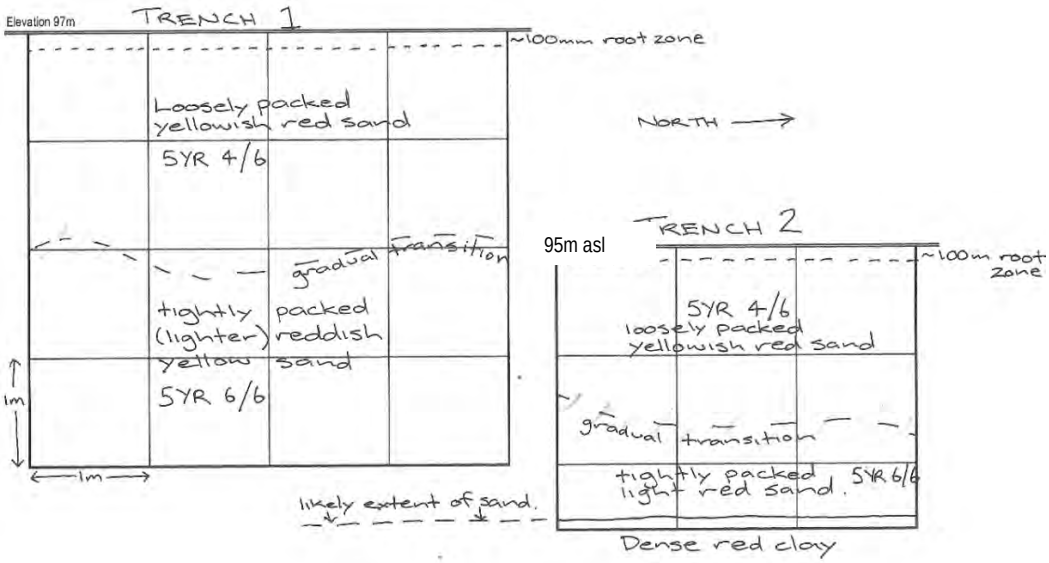


Figure 18: Trench 1 and 2 sections

5.4.5.2 Trench 2

Trench 2 was downslope of Trench 1 at 95m asl (308340E 6013860N). The excavated surface area was 3m x 1.2m (3.6m^2). The deposits were broadly similar to those of Trench 1 but with narrower bands of the same deposits. A basal layer of dense red clay was encountered at ~2.5m which will be the limit of quarrying activity and is also considered to be a geomorphic layer predating human occupation.

5.4.6 RESULTS - NORTHERN AREA

5.4.6.1 Trench 3

Only one trench was excavated in the northern area, one less than planned, because further excavation in the northern area was found to be redundant once it was determined that material at depth was in fact culturally sterile (pre-Aboriginal deposition). This is consistent with the GPR study noting that it was a deposit entirely unlikely to contain burials. In this, we concede to some error in an overly cautious concern with Aboriginal cultural heritage in sand extraction in the Riverina. In doing so, we initially missed the geological understanding that the target deposit is in fact a deep and entirely pre-human fine gravel layer and not at all a late Pleistocene sand body that would have triggered greater concern.

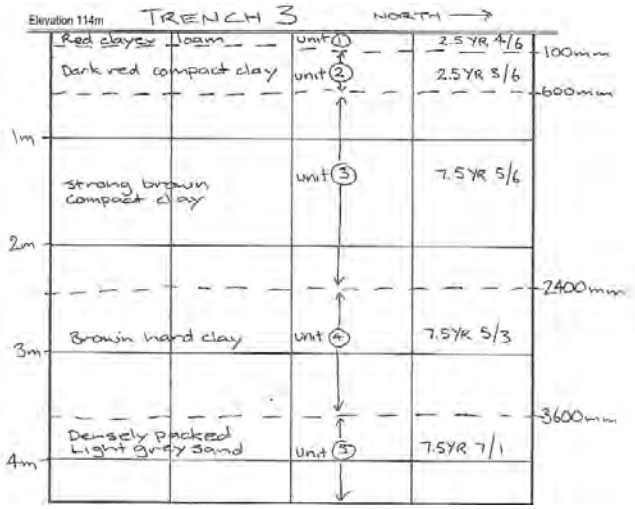


Figure 19: Trench 3 section

Plate 14: Trench 3 surface

Plate 15: Trench 3 upper layer

Plate 16: Trench 3 general section view

5.5 DEFINITION OF SITES

The Aboriginal cultural heritage within the study area had been defined in terms of the sites proposed by Bell & Edwards right through until the test excavation in good faith that the sites, complete with AHIMS numbers, were indeed properly registered. Subsequent correspondence from DPIE to Council in 2016, our engagement for the follow up work, the ACHAR we prepared for the testing AHIP and the AHIP itself all faithfully continued to reference the same numbers.

However, an updated search was undertaken to ensure Code compliance in the final reporting made it apparent that the AHIMS site numbers and the sites described by Bell & Edwards do not match. The numbers given (AHIMS 59-2-0017, 59-2-0018 and 59-2-0019) apply to three sites "Moama 1, 2 and 3" listed in 1993 by Anne Lloyd and describe scarred trees near the Moama Sewage Treatment Plant some 12km away. The similarity in name with "Moama Sand Quarry 1, 2 and 3" may be the source of the error.

The testing AHIP only specified these sites as no harm areas, with testing allowed elsewhere specifically within the current study area. This AHIP was not breached. In recovering no artefacts, none were harmed.

From here, it is considered that we are now best to ignore the previous listings and create new ones. These new listings are intended to:

- Better reflect current knowledge of Aboriginal cultural heritage on the property following further archaeological investigation and community consultation;
- Capture all known and potential Aboriginal cultural heritage within the study area (Bell & Edward's PAD had been described but not included in formal site descriptions);
- Provide a better administrative framework for the AHIP proposed in this report; and
- Create listings that provides better statutory protection for the two areas of higher archaeological potential on the property outside of the proposed AHIP areas.

This results in the listing of two sites:

- Rushy Road 1 covers the northern part of the study area and is largely considered to comprise a low density artefact distribution or isolated finds. This includes the two flakes previously described as MSQ1 and the one artefact located during the 2020 survey (see Table 8) as well as Potential Archaeological Deposit (PAD) as a listed feature. We consider that there is one part in the north of the mapped area with higher potential than elsewhere – where the level, raised land comes closest to the palaeolake woodland and may have provided a high amenity location during times of high resource availability after pluvial periods. This is provided as the point coordinates in the site listing, giving the listing an ongoing role highlighting the potential need to protect that area.

- Rushy Road 2 covers the southern part of the study area and incorporates the previously described MSQ2 and MSQ3. It is listed with the location given for the concentration of artefacts described as MSQ3 as for its coordinates. The remainder incorporates the PAD described by Bell & Edwards. The proposed hatchet head previously described as MSQ is not considered to be an actual artefact here, but in any case, it remains within the bounds of the site as described and has no harm proposed to it. Much opf the PAD extending at greater distances from the palaeolake forest is not considered to have low potential and only low density 'background scatter' occurrences of artefacts. The concentration of artefacts described as MSQ3 is considered to be part of an area of higher archaeological potential on the low sandhill bordering the palaeolake forest (excluding the area of former sand extraction). While the site listing is primarily intended to give an administrative context for the application for an AHIP in the area of low (or even nil) artefact density, it is also intended to confer statutory protection as a listed site for the area considered to have higher potential (not currently subject to proposed harm).

Without having any Aboriginal cultural heritage objects or other basis to include the low-lying parts of the study area within a formal site listing, we do not preclude such values being present or potentially ascribed in future.

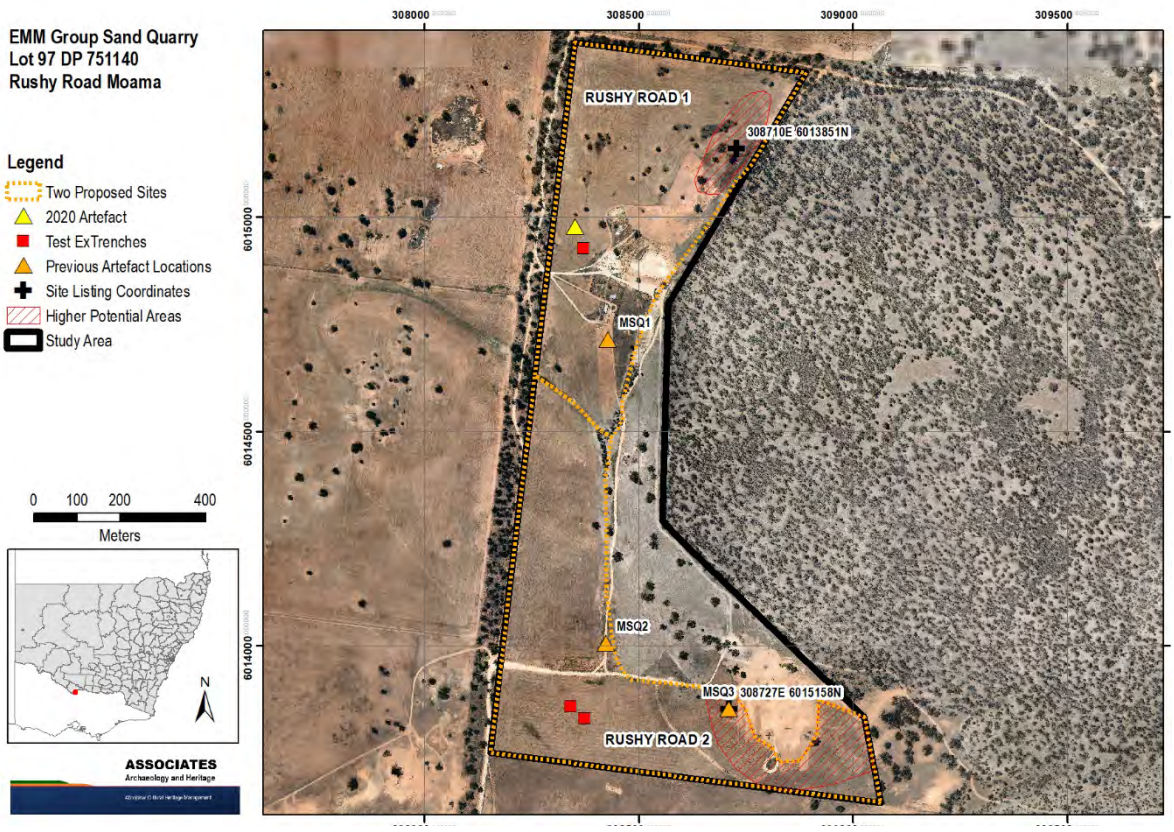


Figure 20: Site Definition

6 SCIENTIFIC VALUES ASSESSMENT

The structuring of the process used to assess scientific significance has been outlined by Bowdler (1981) as the specific consideration of the interrelated issues of research potential and the rarity and/or representativeness of a site. In a development context, we also find it useful to add integrity as a separately assessed co-factor to both of these issues.

6.1 RUSHY ROAD 1

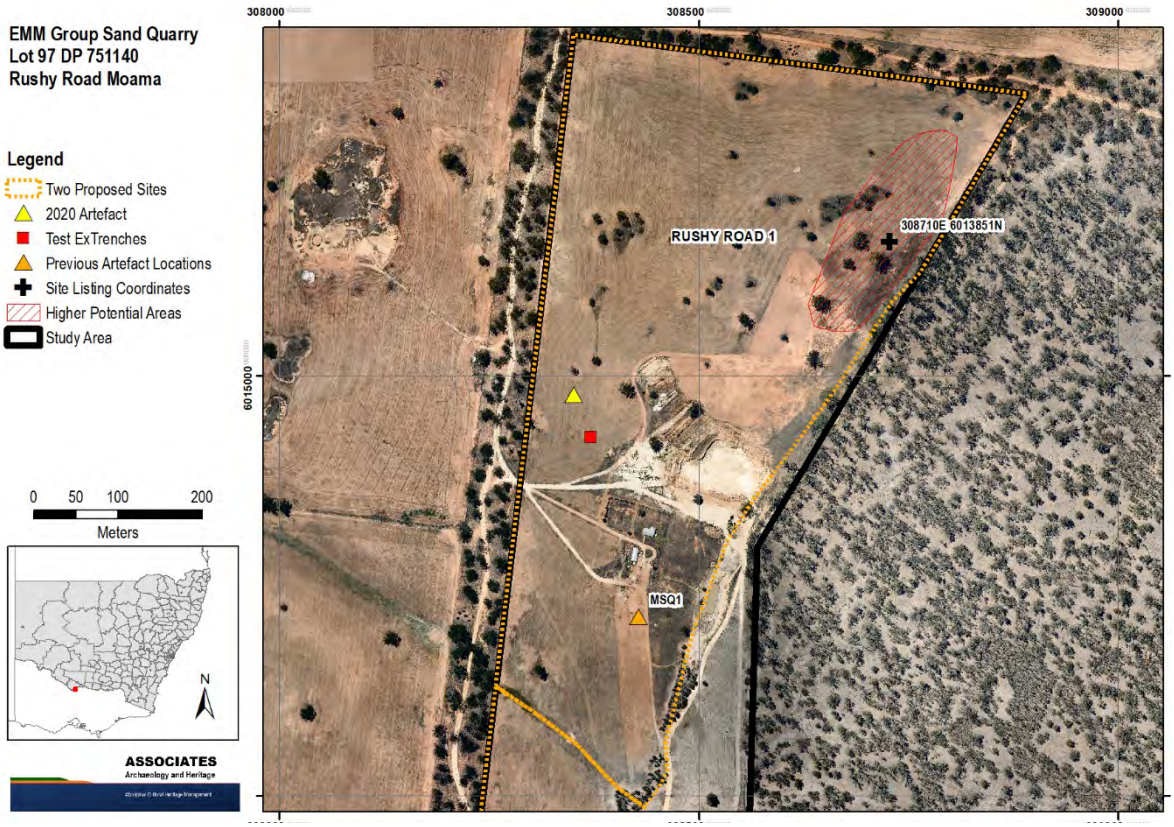


Figure 21: Rushy Road 1

Rushy Road 1 is considered to largely to be a PAD with artefacts occurring in variable density from nil to sparse across the proposed activity area with some potential for moderate density artefacts occurring in the northeast corner for which no disturbance is proposed. One artefact was recorded in the site in the 2020 survey and it also covers the location with two artefacts described by Bell & Edwards as MSQ1.

For MSQ1, considered as a site covering just the two isolated artefacts, Bell and Edwards (2016, p. 41) stated:

> *"This Aboriginal site is represented by two flaked quartz artefacts, identified in a disturbed context (see Section 4.2.1).*

In terms of aesthetic, social and historic significance, John Kerr stated that the Aboriginal site was of low cultural significance because the paddock had essentially been cleared and ploughed, only two artefacts were identified and neither were in situ. Brett Hamilton and Wade Morgan concurred that the site was of low significance.

In terms of scientific significance, the site is represented by a limited number and range of cultural materials, which are not in their original context. The site type is also known to commonly occur within the landscape units being assessed. It is assessed as having low scientific significance".

Adding in the wider area of the site, inclusive of PAD, we also consider there to be low archaeological significance; although noting that this remains to not completely assessed for the remant part in the northeast corner that will not be impacted.

Table 9: Scientific significance assessment for the affected part of " Rushy Road 1"

Research Potential:	It is unlikely that any notable research questions could be addressed through further investigation. Conclusion: Low research potential
Rarity and Representativeness:	Occurrences of flaked lithics in open contexts without any apparent high density focus are very common. The site is therefore not rare and is well represented elsewhere in reasonable conservation contexts. Conclusion: Not rare; well represented elsewhere
Integrity and Disturbance:	The site is significantly disturbed by agricultural land use, inclusive of ploughing. Conclusion: Disturbed but with moderate site integrity
SUMMARY:	Taken as a whole, "Rushy Road 1" is considered to have low archaeological significance.

6.2 RUSHY ROAD 2

The major focus of this site in terms of significance is in the eastern area that was described by Bell & Edwards as MSQ3, for which they stated (2016, p. 41):

"This Aboriginal site is represented by a scatter of stone artefacts exposed in disturbed sand on the edge of the existing extraction pit in the southern sector of the property (see Section 4.2.1).

Following discussion, John Kerr stated that since charcoal and artefacts were found embedded in the deposit, the landscape below the scalped area was in fact relatively intact. It was also a relatively sheltered area and likely to be a campsite due to the artefact density. Brett Hamilton agreed that it was more likely to be in situ given its location between the hill and the wetland area. John Kerr added that the campsite was probably directly related to the use of the wetland, a point which was reiterated by Wade Morgan. All RAP representatives agreed that this site was of high cultural significance in relation to aesthetic, social and historic values.

In terms of scientific significance, the site is represented by a large and diverse range of cultural materials and artefacts. It is also largely intact with material still embedded in the deposit although

slumping of sand in the excavated wall made an assessment of any potential stratification impossible. Whilst further investigation is needed to investigate and interpret the site fully, intact deposits such as this are not common in the area, having been either destroyed through extraction activities or not yet uncovered. It is assessed as having high scientific significance."

Being outside of the area of proposed impact and not subject to any significant additional analysis, we concur with the high significance assessment attributed to MSQ3 and suggest that it remains relevant for the area of higher potential we ascribe within the site Rushy Road 2 in guiding the avoidance of any further harm there.

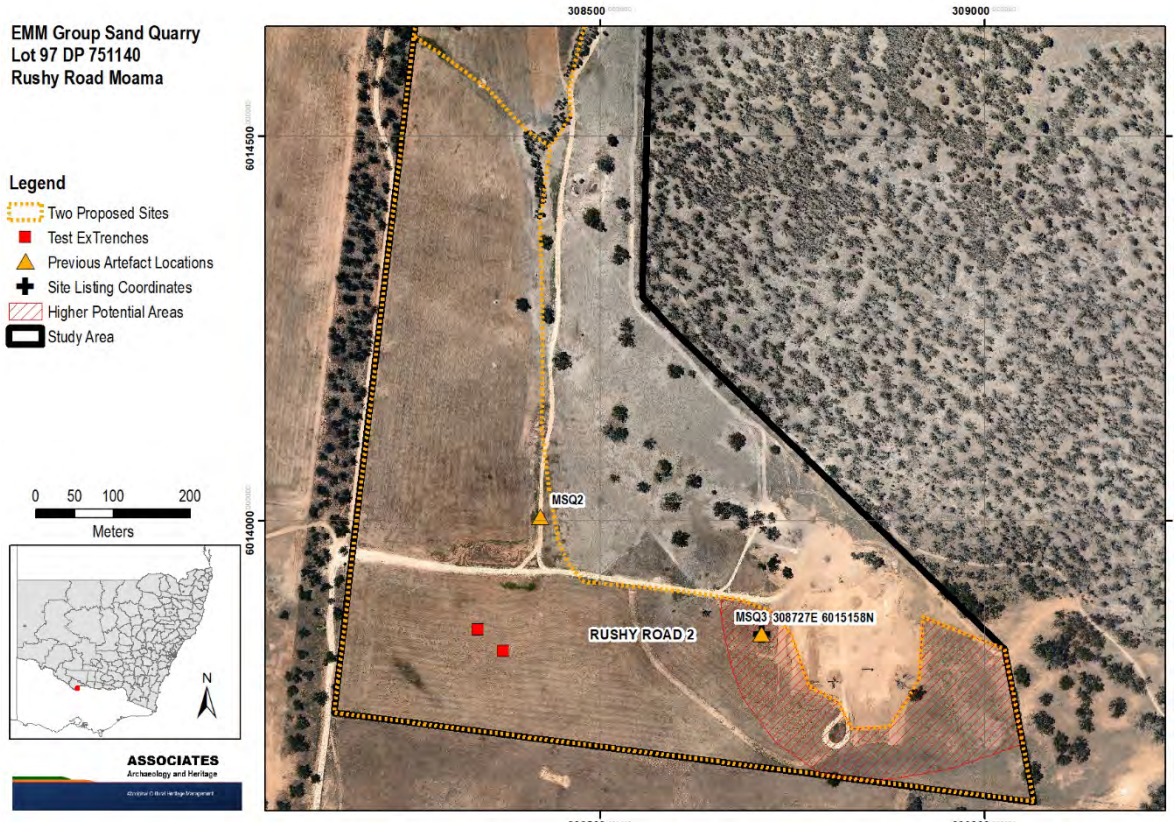


Figure 22: Rushy Road 2

For the other parts of Rushy Road 2, the assessment by Bell and Edwards (2016, p. 41) for MSQ2 is more appropriate – notwithstanding that we question whether the "axe blank" is in fact an artefact, it is relevant for the wider area of the PAD they nominated and which we include within Rushy Road 2. They stated:

> *"In terms of scientific significance, the site is represented by a limited number and range of cultural materials, which are not in their original context. However, the axe blank does provide evidence of the manufacturing process of ground-edge axes. The site type is known to commonly occur within the landscape units being assessed. It is assessed as having low scientific significance".*

Table 100: Scientific significance assessment for "Rushy Road 2" within proposed impact area

Research Potential:	Notwithstanding potential that there may be in the area with higher potential, the area proposed for impact is considered to have artefacts in nil-sparse density unlikely to be useful addressing any 'timely and significant research questions. Conclusion: Low research potential
Rarity and Representativeness:	Occurrences of flaked lithics in open contexts without any apparent high-density focus are very common. The site is therefore not rare and is well represented elsewhere in reasonable conservation contexts. Conclusion: Not rare; well represented elsewhere
Integrity and Disturbance:	The site is significantly disturbed by agricultural land use, inclusive of ploughing. Conclusion: Disturbed but with moderate site integrity
SUMMARY:	Taken as a whole, "Rushy Road 2" is has low archaeological significance outside of the higher potential area where harm is being avoided. In the area where there will be no further impact, there is moderate to high archaeological significance.

7 DISCUSSION AND RECOMMENDATIONS

7.1 POTENTIAL IMPACT

7.1.1 ASSESSMENT BY BELL & EDWARDS 2016

The assessment by Bell and Edwards (2016, p. 41)states:

> *"In terms of the proposed activity, sand extraction will require the removal or disturbance (in the case of the stockpiling of overburden material) of all deposit within the identified sand extraction areas on the property [noting that AHIP areas are now proposed in which only some areas will be impacted]. The depth to which the activity will impact the underlying sub-strata will depend on the depth at which the underlying sand resources are found, and the depth to which the sand deposit will be extracted [we note that this can be presumed to include the full depth of deposits covering Aboriginal occupation].*
>
> *The activity therefore is likely to impact on any Aboriginal cultural heritage that may be identified within the activity area. Based on geomorphological studies, it appears that the Cadell Fault uplift, which resulted in the creation of the palaeo Lake Kanyapella, occurred at around 25-30,000 years ago, with the lunette associated with Little Kanyapella on the dry Kanyapella lake floor dating to 18.9+/-1.1Kya* (Stone, 2006; McPherson, Clark, Cupper, Collins, & Nelson, 2012)*. Aboriginal occupation of this newly modified landscape that we know today as the Barmah Sand Hills, is likely to contain Aboriginal cultural heritage that may date to beyond the last glacial maximum. However previous investigations suggest that evidence of occupation prior to the last glacial maximum may be sporadic and/or comprise low density distributions.*
>
> *The impact of the activity on known sites and areas of archaeological potential in the activity area is summarised in Table 7 [Table 11].*
>
> *The proponent has determined that harm to the artefact scatters (Moama Sand Quarry Artefacts 1-3) located within the activity area can be avoided by amending the location of the extraction footprint accordingly. Stage 1 (fine sand extraction) has now been reduced to approximately 1ha, situated in the southwest corner of the property. Stage 2 (coarse sand extraction) has now been reduced to approximately 1ha, situated in the northern area, north of and adjacent to, the existing pit."*

Table 11: Table 7 in Bell and Edwards 2016 - Impact Assessment

Site Number	Type of Harm	Degree of Harm	Consequence of Harm
Moama Sand Quarry Artefacts 1	None	None	No loss of value
Moama Sand Quarry Artefacts 2	None	None	No loss of value
Moama Sand Quarry Artefacts 3	None	None	No loss of value
PAD	Direct	Partial	Total loss of value within extraction footprint

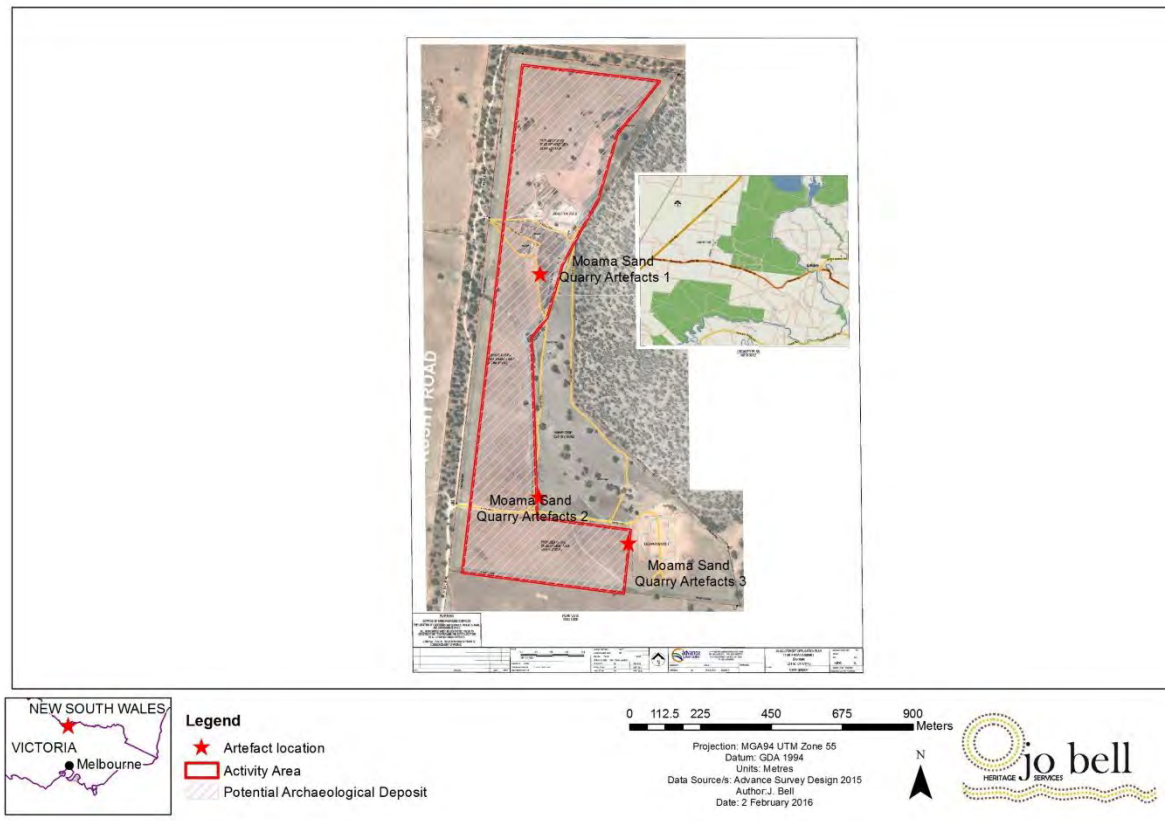


Figure 23: Figure 11 in Bell and Edwards 2016 "Sites and PADs in the activity area shown on the concept plan"

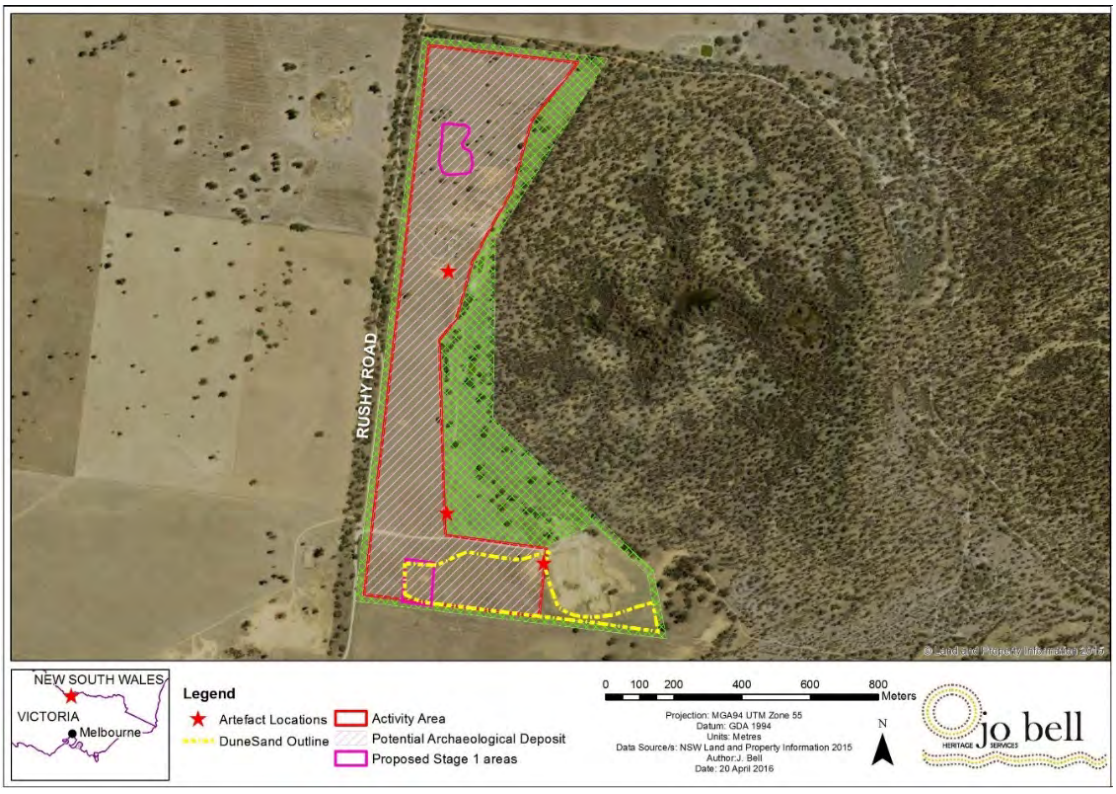


Figure 24: Figure 12 in Bell and Edwards 2016 "Sites and PADs in the activity area shown in

relation to the updated proposed extraction area to avoid harm"

7.1.2 UPDATED ASSESSMENT

The updated assessment of potential impact, following review of Bell and Edwards work, the contribution made by GPR investigation (Fogel, 2019), further survey and test excavation is that the harm to Aboriginal objects will be insignificant. That is, that there remains a likelihood that some sparsely distributed (low density or 'background scatter') artefacts will be disturbed, but that intact cultural deposits of any significant density will not be harmed.

A further update involves changes to the proposed expanded activity areas. These are based on discussions with the proponent following the findings of the investigation to allow more leeway in the direction of proposed extraction. The areas will be within – though by no means to the full extent of – the proposed AHIP areas are mapped below in Figure 22 and Figure 23. That is, the changes are not related to the amount of material to be extracted (a determination resting with other local and regional planning authorities). The extension of the AHIP areas takes into account the fact that they extend into areas assessed as having low potential for harm.

Northern Area

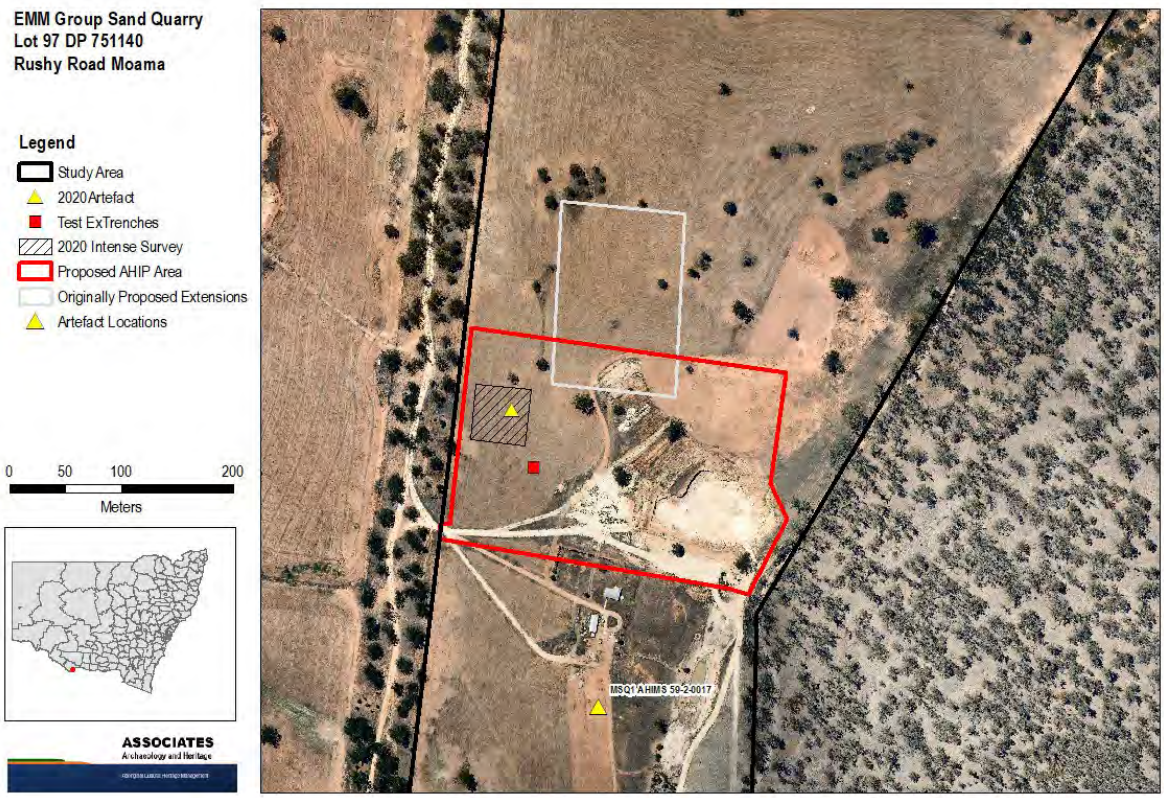


Figure 25: Northern proposed AHIP area

In the Northern area, it has been confirmed that archaeologically relevant material only occurs in the upper layers and that the targeted material predates Aboriginal occupation of Australia. Being confined to the upper layers, which are a repeatedly ploughed topsoil with excellent surface visibility and

exposure at the time of fieldwork (both for Bell & Edwards and us in 2019), we can be assured that artefact density is low, at least for the proposed AHIP area.

In the context of the AHIP area being larger than the original proposal, this factors in the inclusion of previously disturbed areas so that they can be incorporated into ongoing operations and allow very clear delineation of areas that may and may not be subject to quarrying activity. For example, rather than shifting operations entirely, the proponent intends to continue the existing working face of the quarry through the proposed AHIP area in the direction of best yield while maintaining existing access routes and keeping sorting machinery and stockpiles within the existing disturbed footprint.

Southern Area

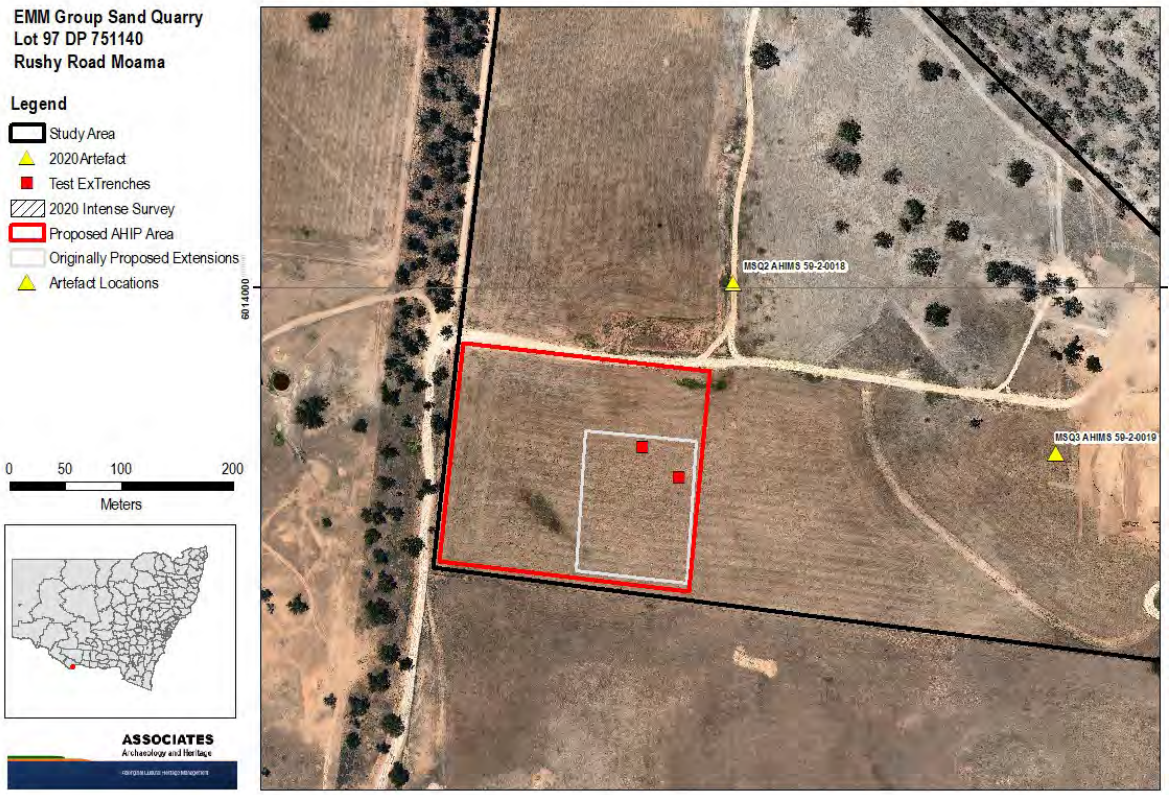


Figure 26: Southern proposed AHIP area

In the southern area it has been confirmed that the sand body, dating to the late Pleistocene and with quite likely temporal overlap with Aboriginal occupation is highly unlikely to contain significant Aboriginal cultural deposits. This is most conclusively demonstrated by the GPR; and then supported by the test excavation results. Of greatest importance is the finding that harm to human remains is considered very unlikely. While no surface or excavated artefacts were found in the area, it remains likely that some sparse occurrences would inevitably occur in the area, even if just as 'isolated finds' such as might occur in any landscape.

7.2 ALTERNATIVE OPTIONS TO AVOID HARM

In response to harm to proposed harm to Aboriginal objects, it is required that consideration be given to options to avoid, minimise or mitigate that harm. It is noted that the specific artefact sites identified by Bell and Edwards (2016) are outside of the proposed areas of expansion and will not be impacted. Shifting activity to the west, away from the edge of the palaeolake forest and remnants of site MQSA3 is reported to be in response to Bell & Edwards findings and aimed at harm avoidance.

Confirmation that the work in the currently proposed footprint will most likely limit harm only to sparse or isolated artefact occurrences suggest that any further avoidance of harm is unlikely to be achievable. In the larger regional picture, where other sand resources certainly are in more archaeologically sensitive areas, the outcome can be seen as generally positive for the management of Aboriginal cultural heritage.

7.3 MANAGEMENT STRATEGY

The management strategy for Aboriginal cultural heritage material in development contexts where potential impact is being considered should follow (and has followed) a general approach of:

- *Identifying any need for assessment.* This occurred through advice during the initial environmental assessment process and advice provided by Red-gum Environmental Consulting, leading to the current assessment.
- *Undertaking archaeological assessment as required* (following OEH guidelines). This began in 2016 with the commencement of the formal Aboriginal community consultation process by JBHS (2016). Additional survey was conducted in 2018 and following an indication from DPIE (in a meeting with John Gilding and Andrew Fisher 4th May 2018) a ground penetrating radar survey was commissioned in 2018 (RPS Australia, 2017). Test excavation occurred in 2020.
- *Integration of assessment results into planning and design*: Avoid, minimise and mitigate harm as appropriate: Following the final fieldwork, preliminary results were distributed to the proponent. In the absence of a clear imperative to avoid or minimise harm based on archaeological significance, it was resolved to apply for an Aboriginal Heritage Impact Permit (AHIP).
- *Preparation of requisite documentation and any required permit applications*: This is represented by the current document.

7.4 CUMULATIVE IMPACTS

The principles of Ecologically Sustainable Development (ESD) require consideration of potential impact as part of cumulative effects. That is, if the proposed work involves one minor impact in a process that is part of a past or future ongoing process that amounts to a large impact in total. The current proposal is viewed as positive in this regard.

Sand extraction activities in the Riverina have a very chequered history with regard to impact to significant Aboriginal cultural heritage sites and remain an ongoing threat when poorly assessed and managed. The current proposal has been subject to a lengthy assessment process involving two separate full archaeological assessments in collaboration with Aboriginal community representatives and a complementary GPR investigation.

While sand extraction will be ongoing, there is a finite market for sand in the region. If managed well, sand extraction can be designed to avoid ongoing impacts to Aboriginal heritage.

7.5 STATUTORY CONTEXT

The legal context requiring that an AHIP be in place prior to the proposed works is centred on Section 86 of the *National Parks and Wildlife Act* 1974. Under S86:

1) A person must not harm or desecrate an object that the person knows is an Aboriginal object; and
2) A person must not harm an Aboriginal object.

The first is the 'knowing offence' with penalties of up to $1,100,000 and the second is known as a 'strict liability offence' which may happen in a way that was unanticipated with penalties of up to $550,000.

In the NPW Act, the relevant legal definitions within the harm provisions are:

- "Aboriginal object" means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.
- "harm" an object or place includes any act or omission that: (a) destroys, defaces or damages the object or place, or (b) in relation to an object-moves the object from the land on which it had been situated, or (c) is specified by the regulations, or (d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c), but does not include any act or omission that: (e) desecrates the object or place, or (f) is trivial or negligible, or (g) is excluded from this definition by the regulations.

There have been no previous AHIPs applied for, issued or refused within the activity area.

7.6 RECOMMENDATIONS

The current recommendations follow from and are consistent with those made by Bell and Edwards (2016, pp. 46-7), reproduced below in Table 12.

It is recommended that:

- An Aboriginal Heritage Impact Permit (AHIP) should be applied for;
- The AHIP should cover the areas mapped in Figure 27 and Figure 28.
- No ground disturbance should occur in any area until covered by an AHIP (or subject to appropriate due diligence advice)
- No further mitigation work in the form of salvage excavation should be required.
- Ground should not be disturbed outside the AHIP area, noting that there are locations on the property with high Aboriginal cultural heritage values or potential.

Table 12: Recommendations previously made by Bell & Edwards

MSQ1	MSQ2	MSQ3	PAD
1. Extraction activities will not impact on this Aboriginal site. The site will not be harmed by the activity. 2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site, then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm. 3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site and there is potential for harm, then no works must commence in the area until further assessment and an Aboriginal Heritage Impact Permit (AHIP) is obtained from OEH.	1. Extraction activities will not impact on this Aboriginal site. The site will not be harmed by the activity. 2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site, then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm. 3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site and there is potential for harm, then no works must commence in the area until further assessment and an AHIP is obtained from OEH.	1. Proposed extraction activities will no longer impact on this Aboriginal site. The site will not be harmed by the proposed activity. 2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site (including the spoil from initial scalping of the area), then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm. 3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site (including the spoil from initial scalping of the area), an AHIP must be obtained from OEH before any works can commence.	1. The entire sand sheet within the property has been identified as an area of cultural heritage sensitivity (potential archaeological deposit). However, the proponent has reduced the extent of potential harm by limiting the extraction footprint to approximately 1ha both in the southern and in the northern areas (see Figure 12). As harm cannot be totally avoided in the identified PAD, further assessment is required to investigate the actual potential for Aboriginal cultural heritage to be located within the proposed activity footprint. This work must be undertaken prior to commencement of works. 2. Further investigation must include a program of sub-surface testing but may also include the use of ground penetrating radar (GPR) as suggested by John Kerr (Moama LALC) on-site and discussed during the recommendations meeting held on 18 March 2016. The further investigation options and proposed sampling methodology must be discussed with representatives from the RAPs, OEH and the proponent".

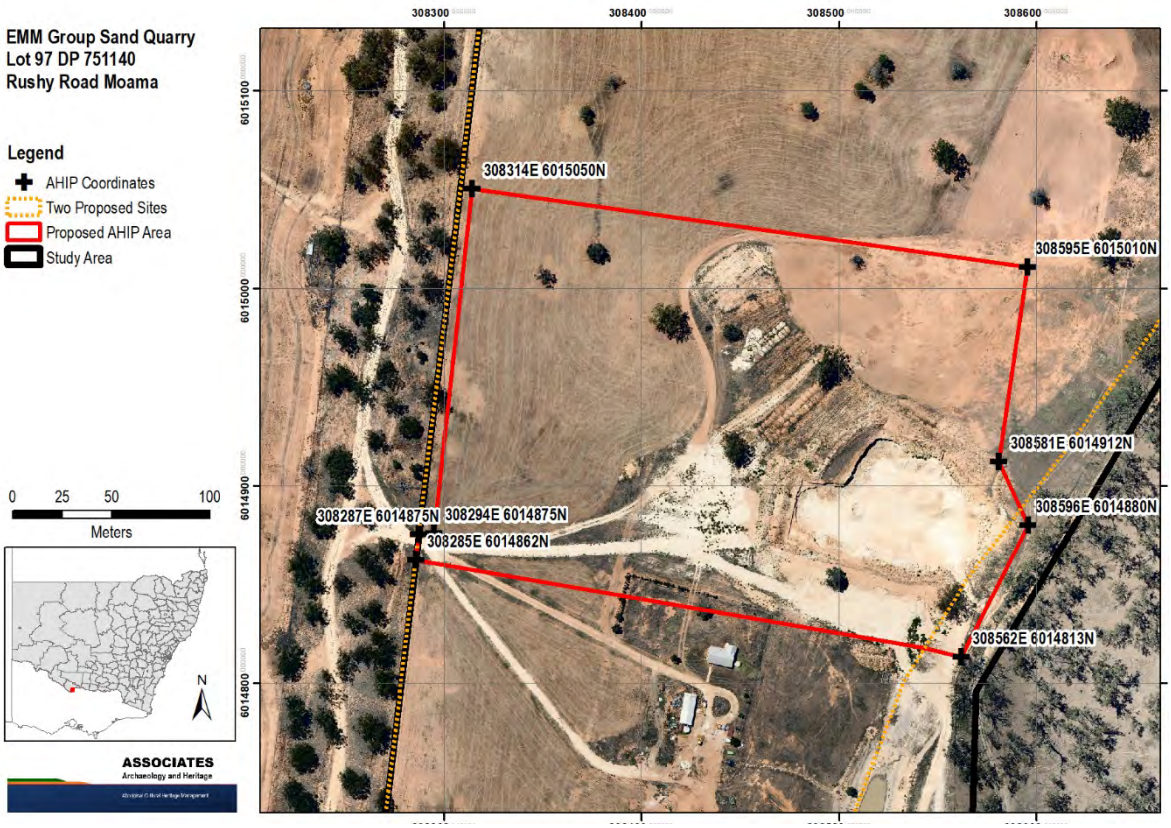


Figure 27: Rushy Road 1 AHIP Area

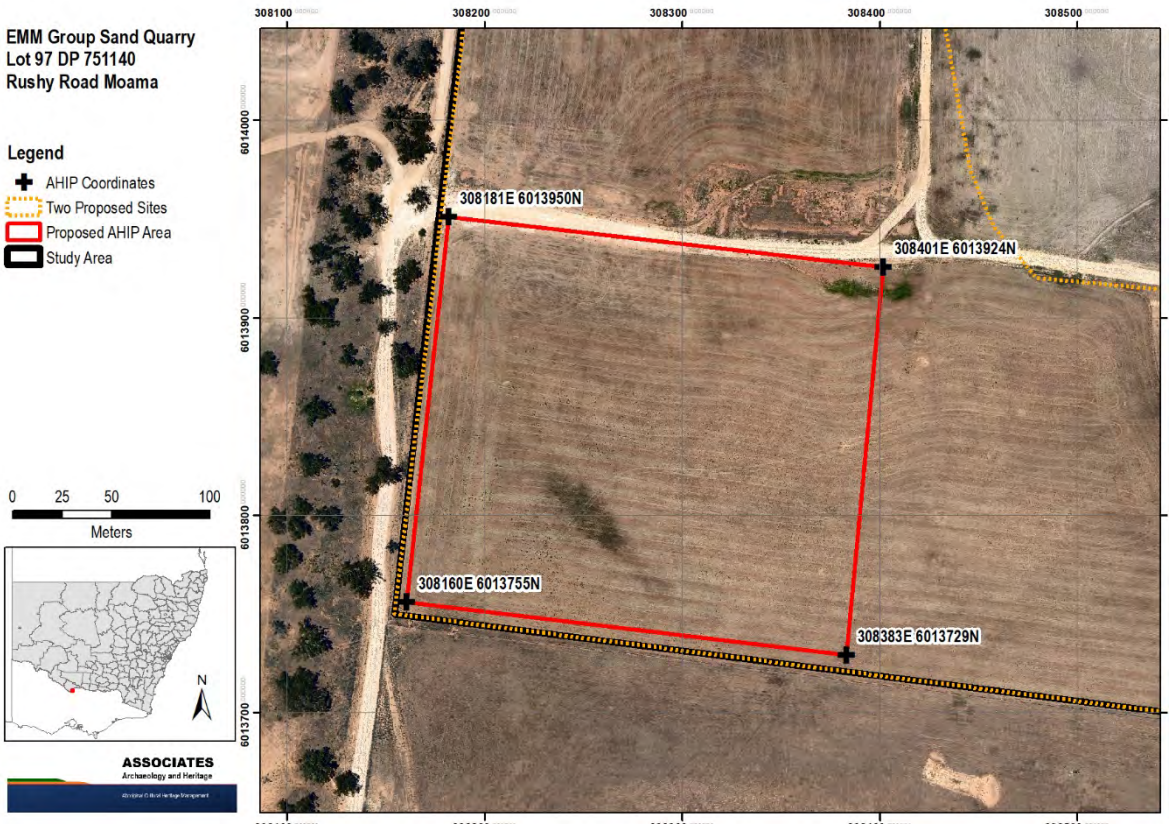


Figure 28: Rushy Road 2 AHIP Area

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GLOSSARY AND ABBREVIATIONS

AHIP Aboriginal Heritage Impact Permit

The statutory instrument that OEH issues under section 90 of the NPW Act to manage harm or potential harm to Aboriginal objects and places.

BP Before Present

This term is generally used specifically in relation to radiometric dating and is taken to be before 1950, being an approximate point at which nuclear weapons testing artificially altered the world's carbon isotope ratios.

ACC Albury City Council

ADLALC Albury and District Local Aboriginal Land Council

AHIMS Aboriginal Heritage Information Management System

AHIMS is a part of OEH and maintain the NSW records database of Aboriginal objects / sites, declared Aboriginal Places and archaeological reports submitted either voluntarily or as part of compliance-related submissions.

CMA Catchment Management Authority

DECCW NSW Department of Environment, Climate Change and Water.

Now OEH and formerly the DECC (somewhat prophetically nick-named the 'department of constant change').

EIS Environmental Impact Statement

EP&A Act Environmental Planning and Assessment Act 1979

EP&A Reg Environmental Planning and Assessment Regulation 2000

EPBC Act Environmental Protection and Biodiversity Conservation Act 1999

FGS Fine Grained Siliceous

We use the term FGS for most flaked artefact raw materials of finer crystal structure than silcrete. Many raw materials used to manufacture flaked stone artefacts remain petrologically poorly defined and given different names by different archaeologists, such that many classifications attempting to be more precise than 'fine grained siliceous' are often a hindrance rather than a help for comparative analysis. FGS are typically sedimentary rocks that have been partially metamorphosed through dissolution and recrystallisation of silica and include chert, silicified tuff, silicified mudstone and chalcedony; although it can also include petrified wood.

LALC Local Aboriginal Land Council

LEP	Local Environmental Plan
LGA	Local Government Area
NNTT	National Native Title Tribunal
NPW Act	National Parks and Wildlife Act 1974
NP&W Reg	National Parks and Wildlife Regulation 2009 This introduced a number of significant changes to the NPW Act including the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*.
NTSCorp	Native Title Services Corporation
OEH	Office of Environment and Heritage OEH was formed in 2011 (having been formerly known as DEC, DECC and DECCW within the preceding decade). It is currently an agency within the Department of Environment and Planning, having moved from the Department of Premier and Cabinet in 2014 and (a now defunct) Department of Environment in 2011. The roles of OEH include the administration of those parts of the NPW Act relating to 'Aboriginal country, culture and heritage'.
ORALRA	Office of the Registrar, Aboriginal Land Rights Act
REF	Review of Environmental Factors; An environmental assessment under Part 5 of the EP&A Act often undertaken by local government authorities as a self-assessment process.
SEPP	State Environmental Planning Policy
SHR	State Heritage Register

APPENDIX 1: CONSULTATION LOG

Table 13: Registered Aboriginal Parties (RAPs)

Registered Aboriginal Party	Contact	Email	Registration date
Cummeragunja LALC (CLALC)	Rowan Atkinson	ceo@cummeralalc.com.au	30/07/2019
Moama LALC (MLALC)	John Kerr	ceo@moamalalc.com.au	2/08/2019
Bangerang Aboriginal Corporation (BAC)	Vicki Atkinson	vicki@bacch.org.au	5/08/2019
Yorta Yorta Nation Aboriginal Corporation (YYNAC)	Wade Morgan	wade.m@yynac.com.au	

Table 114: 2018 - 2019 Communication

Date	In/Out	Type	Group	Contact	Notes	Contact
03/07/2018	Out	Letter	Various	Various	Pre-notification letter sent to Office of Environment and Heritage, NTSCorp, Murray LLS, Moama LALC, Yorta Yorta Nation Aboriginal Corporation, Bangerang Aboriginal Corporation.	Damian Wall
03/07/2018	Out	Letter	NNTT		Sent search request	Damian Wall
03/07/2018	Out	Letter	ORALRA		Sent request for search of Land Claim Register	Damian Wall
04/07/2018	In	Email	NNTT		Response showing no overlap results	Damian Wall
11/07/2018	In	Email	ORALRA		Response showing no claims	Damian Wall
13/07/2018	In	Letter	OEH	Miranda Kerr	Response with list of potential RAPs	Damian Wall
22/07/2019	Out	Letter	Various	Various	Pre-notification letter sent to Office of Environment and Heritage, Cummeragunja Local Aboriginal Land Council, Local Land Services (incorporating former Catchment Management Authority), Murray River Council, Native Title Services (NTSCorp).	Oliver Brown
22/07/2019	Out	Letter	ORALRA	Tabitha Dantoine	Sent request for search of Land Claim Register	Oliver Brown
22/07/2019	Out	Letter	NNTT		Sent search request	Oliver Brown
23/07/2019	In	Email	NNTT	GeospatialSearch@NNTT.gov.au	Email noting that "Lot 97 on DP751140 appears to be freehold, and freehold tenure extinguishes native title. The National Native Title Tribunal does not hold data sets for freehold tenure; consequently, we cannot conduct searches over freehold."	Oliver Brown
23/07/2019	In	Phone	Moama LALC	John Kerr	Rang to register interest and explain situation of the area being in Cummera area but in their back yard as well. Followed up with email:Hi Oliver Thank you for taking my call this morning in regards to the proposed workers at the sand hill in the Barmah area As per our conversation the Moama Local Aboriginal Land council is 100% committed to the process in its entirety. We look forward to the meeting you guys in the engagement process. If you have any questions please don't hesitate to call me.	Oliver Brown

Date	In/Out	Type	Group	Contact	Notes	Contact
30/07/2019	In	Phone	Cummeragunja LALC	Rowan Atkinson	Rang to register interest. Also noted that they willingly work cooperatively with MLALC, Yorta Yorta Nation AC and Bangerang.	Oliver Brown
31/07/2019	In	Email	DPIE	Andrew Fisher	Provided list of potential RAPs	
1/08/2019	Out	Email, post	Bangerang Aboriginal Corporation, Cummeragunja LALC, Gary Pappin, John Jackson, Moama LALC, Pappin Family Aboriginal Corporation, Wakool Indigenous Corporation, Yarkuwa Indigenous Knowledge Centre, Yorta Yorta Nation Aboriginal Corporation	Various	Sent invitation to register, Project Information and Draft Assessment Methodology to all potential RAPs	Oliver Brown
2/08/2019	In	Email	Moama LALC	John Kerr	Further email confirming previous registration	Oliver Brown
5/08/2019	In	Email	Bangerang Aboriginal Corporation	Vicki Atkinson	Email with registration	Oliver Brown
10/08/2019	Out	Ad	Riverine Herald, Denuliquin Pastoral Times	~	Newspaper advertisement	
10/10/2019	Out	Phone	Yorta Yorta Nation Aboriginal Corporation	Wade Morgan	Follow up phone call to ensure registration hadn't 'fallen through the cracks' noting Rowant Atkinson's (CLALC) regarding their cooperative work with MLALC, BAC and YYNAC. Left messages at office and with Wade, noting that we send through methodology in the draft ACHA in case.	Oliver Brown
11/10/2019	Out	Email	All RAPs: Bangerang Aboriginal Corporation, Cummeragunja LALC, Moama LALC	Vicki Atkinson, Rowan Atkinson, John Kerr	Provided draft ACHA as further project information and proposed methodology	Oliver Brown
18/10/2019	Out	Phone	Cummeragunja LALC	Rowan Atkinson	Called for response to draft ACHA and proposed methodology. Left message for RA to return call	Oliver Brown
18/10/2019	In	Phone	Cummeragunja LALC	Rowan Atkinson	Called in response to proposed methodology – in support and hoping for fieldwork before Christmas	Oliver Brown
18/10/2019	Out	Phone	Yorta Yorta Nation Aboriginal Corporation	Wade Morgan	Called for response to draft ACHA and proposed methodology. WM unable to respond until following Monday 21st	Oliver Brown
18/10/2019	Out	Phone	Moama LALC	John Kerr	Called for response to draft ACHA and proposed methodology. JK asked for report to be sent again due to IT issues there, intending to review and respond that day. Response provided by email.	Oliver Brown
18/10/2019	In	Email	Moama LALC	John Kerr	Response to draft ACHA seeking testing permit: "Thanks you for that, we have no problem with the proposed methodology"	Oliver Brown
18/10/2019	Out	Phone	Bangerang Aboriginal Corporation	Kevin Atkinson	Called for response to draft ACHA and proposed methodology.	Oliver Brown
18/10/2019	In	Phone	Bangerang Aboriginal Corporation	Kevin Atkinson	Called back supporting the proposed methodology over the phone rather than in writing	Oliver Brown

Table 125: Consultation undertaken by Jo Bell Heritage Services

Date	In/Out	Type	External Involvement	Consultant Involvement	Notes
22/10/2015	Out	Email	Moama LALC, Murray Shire Council, Murray CMA, OEH, ORALRA, NNTT, NTSCorp	Jo Bell	Prenotification letters and register searches as required by Consultation Requirements.
27/10/2015	In	Phone	Joe Day, Moama Local Aboriginal Land Council (MLALC)	Jo Bell	Rang to register interest, left message.
29/10/2015	Out	Phone call	Joe Day, Moama LALC	Jo Bell	Returned call. Joe indicated that MLALC would like to be involved and suggested that YYNAC should also be notified. He would also contact them and let them know
4/11/2015	In	Letter	ORALRA	Jo Bell	Response to initial letter. No Registered Aboriginal owners. Suggested contacting the Moama LALC
6/11/2015	In	Email / Letter	Peter Ewin (OEH)	Jo Bell	Response to request for information about relevant parties. OEH provided a list of Aboriginal parties who may have an interest in the area, including Moama LALC; Deniliquin LALC; Bangerang Aboriginal Corporation; Yorta Yorta Nation Aboriginal Corporation; Yarkuwa indigenous Knowledge Centre; Cummeragunga LALC; and Wakool Aboriginal Corporation
10/11/2015	In	Letter	Simon Arkinstall, Director Environmental Services, Murray Shire	Jo Bell	Response to request for information about relevant parties. Suggested contacting Cummeragunja Land Council
10/11/2015	In		Sylvia Jagtman, Senior Case Management Assistant, NNTT	Jo Bell	Response to request for information about relevant parties. No Native Title claims or Land Use Agreements for the activity area.
11/11/2015	Out	Post	Moama Local Aboriginal Land Council, Bangerang Aboriginal Corporation, Cummeragunga Local Aboriginal Land Council, Deniliquin Local Aboriginal Land Council, Wakool Aboriginal Corporation, Yarkuwa Indigenous Knowledge Centre, Yorta Yorta Nation Aboriginal Corporation	Jo Bell	Invitation to register interest. Closing date given of 27/11/2015
11/11/2015	Out	Ad	Notice posted in Riverine Herald	Jo Bell	Closing date given of 27/11/2015
19/11/2015	In	Phone	Vicki Atkinson, Bangerang Aboriginal Corporation (BAC)	Jo Bell	Vicki enquired into the EOI as she had not seen it. Asked for a copy to be emailed to her. Copy sent and registration taken over the phone (followed by email on 24/11/15
27/11/2015	In	Email	Wade Morgan, Yorta Yorta Nation Aboriginal Corporation (YYNAC)	Jo Bell	Registering interest
30/11/2015	Out	Email	OEH, MLALC	Jo Bell	List of RAPs sent to MLALC and OEH
7/12/2015	Out	Email	All Registered Aboriginal Parties	Jo Bell	Invitation to first meeting to discuss the project, survey methodology and arrange a date for the field assessment
7/12/2015	In	Email	Wade Morgan (YYNAC)	Jo Bell	Confirmed attendance at inception meeting
9/12/2015	Out	Phone and Email	Joe Day (MLALC)	Bridget Grinter	Chasing up confirmation of attendance. Confirmed attendance on phone
9/12/2015	Out	Phone and Email	Vicki Atkinson (BAC)	Bridget Grinter	Chasing up confirmation of attendance. Confirmed attendance on phone
16/12/2015	~	In person	Steve Hamilton (Project Manager), Kane Henson (EMM Group), Brett Hamilton (BAC), John Kerr (MLALC), Wade Morgan and Tyrone Miller (YYNAC), and Bridget Grinter (JBHS).		The presentation of the information presented during the meeting included: - A description of the activity (including the nature, scope, methodology, and environmental and other impacts); - A description of the activity area; - A summary of the geology, geomorphology, climate and flora and fauna of the activity area;

Date	In/Out	Type	External Involvement	Consultant Involvement	Notes
					- A summary of the Aboriginal sites in the area; - A summary of the land use history of the activity; - A brief site prediction model based on the desktop assessment; - An outline of the impact assessment process including the input points into the investigation and assessment activities; - The proposed survey methodology for the field survey; and - Specification of timelines and milestones for the completion of the assessment activities and delivery of reports.
4/01/2016	Out	Email	All Registered Aboriginal Parties	Bridget Grinter	Confirmed date and time for field assessment
6/01/2016	~	In person	John Kerr (MLALC), Michael Bourke (YYNAC), Brett Hamilton (BAC)	Jo Bell, Bridget Grinter	Carried out surface field assessment of the activity area. On-site discussion. Requested a statement of significance from each group. Will email through some information to assist with the preparation of this
7/01/2016	~	In person	John Kerr (MLALC), Michael Bourke (YYNAC), Brett Hamilton (BAC)	Jo Bell, Bridget Grinter	Second survey day
19/01/2016	Out	Email	All RAPs (MLALC, BAC, YYNAC)	Jo Bell	"a map showing the location of the recorded Aboriginal cultural heritage and information about cultural significance was emailed to all RAPs with a request for information in relation to cultural significance of the heritage values and the landscape. No information was received as a result".
26/02/2016	Out	Email	All Registered Aboriginal Parties	Bridget Grinter	Invitation to second meeting (11 March) to discuss the results, cultural significance, management recommendations and further investigations
29/02/2016	~	In person	OEH, Murray Shire Council, EMM Group	Jo Bell, Bridget Grinter, Steve Hamilton	On-site meeting to discuss the proposed activity
3/03/2016		Email	All Registered Aboriginal Parties	Bridget Grinter	Requested a change of date to 18 March 2016
3/03/2016		Email	Wade Morgan (YYNAC)	Bridget Grinter	Confirmation of attendance at meeting
3/03/2016		Phone	Vicki Atkinson (BAC)	Bridget Grinter	Called a number of times to confirm. No response
17/03/2016		Email	Joe Day (MLALC)	Bridget Grinter	Confirmation of attendance at meeting
18/03/2016	~	In person	All RAPs (MLALC, BAC, YYNAC)	Jo Bell	a meeting with RAP representatives was held to discuss the results of the assessment, the cultural significance of the Aboriginal cultural heritage identified and to develop cultural heritage management options.
18/03/2016	~	In person	Wade Morgan (YYNAC), Brett Hamilton (BAC), John Kerr (MLALC)	Bridget Grinter, Jo Bell, Steve Hamilton, Kane Henson	Delivered powerpoint on results of the assessment. Discussed cultural significance, impact assessment, avoiding harm, management recommendations and further investigations
9/05/2016	Out	Email	All RAPs (MLALC, BAC, YYNAC)	Jo Bell	Distribution of draft ACHA for comment. None received
9/05/2016	Out	Email	Wade Morgan (YYNAC), Vicki Atkinson (BAC), Joe Day (MLALC)	Jo Bell	Copy of the draft Assessment report for comment with the request that comments be received by 6 June. No responses received.

APPENDIX 2: CONSULTATION DOCUMENTATION

Your details	Name: Damian Wall
	Position: Cultural Heritage Advisor
	Company/organisation: Red-Gum Environmental Consulting Pty Ltd
	Postal address: 94 Kirby Flat Road, Yackandandah VIC 3749
	Your reference: Moama Sand Quarry
	Email address: damian.wall@red-gum.com.au
	Telephone No.: 0402 344 574
	Fax No.: n/a
	Date of request: 03/07/18
Reason for search request	☐ **I am a party to a native title proceeding** – please specify Federal Court/Tribunal file number/application name: ☒ **I need to identify existing native title interests to comply with the NTA or other State/Territory legislation** – please provide details: I am undertaking an Aboriginal Cultural Heritage Assessment, and need to identify native title interests as part of the community consultation component, as required by the Office of Environment and Heritage guidelines.
Details of the area to be searched Please complete the relevant description fields (fields marked with an asterisk must be completed) **or** provide a clear map of the area including landmarks	**Mining Tenure:** *State/Territory: *Mining/ exploration details: Tenement number(s) (i.e. EL No or MCN No) or block/sub block description:
	Other Land Tenure: *State/Territory: NSW Land parcels: *Lot number(s)*: Lot 97 DP751140 *Tenure type (*e.g. agricultural lease*): Private Property name: Pastoral Lease number or name: *Local Government Area(s): Murray Shire Council County: Caddell Parish: Bama Town: Moama, NSW Section: Hundred: Northern Territory Portion:
	Other details: (additional information may be attached): Map attached

Note: Search requests cannot be processed if insufficient detail is supplied. **Note:** Map coordinates that form part of the attachments to a search result will not be sent with results unless specifically requested. Maps and any other formal attachments will be sent.

Damian Wall
94 Kirby Flat Road,
Yackandandah, VIC 3749

Office of Environment & Heritage
Level 2 Government Offices,
512 Dean Street,
Albury, NSW 2640

CC: Murray Shire Council, NTSCORP, Office Registrar ALA, Murray Local Land Services, Moama Local Aboriginal Land Council, Yorta Yorta Nation Aboriginal Corporation, Bangerang Aboriginal Corporation, National Native Title Tribunal.

Re: Request for Information on Aboriginal Stakeholders for an Aboriginal Cultural Heritage Assessment at Proposed Extension of an Existing Sand Mine, Rushy Road, Moama NSW 2731.

Dear Sir or Madam,

In accordance with the NSW Office of Environment and Heritage's (OEH) Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010, I am writing to notify you that we have been engaged to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of a proposed sand quarry extension (Site 1 & Site 2) at Moama, NSW 2731 (**Map 1**).

The land in question is within the Murray Shire, at Lot 97 DP751140, Parish of Bama (**Map 2**). It is bounded by the Murray Valley National Park in the east, Rushy Road in the west and agricultural land to the north and south. The proponent is EMM Group Pty. Ltd., 26-42 Old Aerodrome Road, Echuca, Victoria 3564 or contact Mr Kane Henson, General Manager, (M: 0417 582 313 or E: andrew@emmgroup.com.au).

I am writing to you to seek information on relevant Aboriginal individuals and/or communities that you are aware of, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places. It would be appreciated if you could provide this information to me as soon as possible, at the address above or by email to damian.wall@red-gum.com.au.

Please don't hesitate to contact me on 0402 344 574 if you have any queries or concerns.

Regards

Mr Damian Wall
BAppSc, MEnvMgt, MAACAI
Managing Director

3rd July 2018

94 Kirbys Flat Road, Yackandandah, VIC 3749
E-mail: damian.wall@red-gum.com.au
Mob: 0402 344 574
Web: www.red-gum.com.au

Figure 1: **Existing Quarry at Lot 97 DP751140 showing Site 1 & 2.**

94 Kirbys Flat Road, Yackandandah, VIC 3749
E-mail: damian.wall@red-gum.com.au
Mob: 0402 344 574
Web: www.red-gum.com.au

Map 2: Site 1 & Site 2 at Lot 97 DP751140

94 Kirbys Flat Road, Yackandandah, VIC 3749
E-mail: damian.wall@red-gum.com.au
Mob: 0402 344 574
Web: www.red-gum.com.au

REQUEST FOR SEARCH OF LAND CLAIM REGISTER

OFFICE OF THE REGISTRAR
ABORIGINAL LAND RIGHTS ACT 1983 (NSW)

11-13 Mansfield Street
Glebe NSW 2037
PO Box 112, Glebe NSW 2037
P 02 9562 6327 F 02 9562 6350

Please print all details clearly using block letters

Full name of person requesting search: *(name for correspondence)*

Damian Wall

Name of company: Red-Gum Environmental

Postal address: 94 Kirby Flat Road, Yackandandah, VIC 3749

Telephone number: 0402344574 Fax number: N/a

Land identifiers:
(lot, dp, reserve number –
not crown plan number or vol id) Lot 97 DP751140

Parish name: Bama

County name: Moama

To assist the office in assigning priorities, please answer the following:

1) Purpose for which information is required:

Request undertaken as part of the Aboriginal consultation process required by Office of Environment and Heritage in the development of an Aboriginal Cultural Heritage Assessment

2) If urgent consideration is required, reason for urgency:

Signature, position and date: Cultural Heritage Advisor
03/07/2018

Please note:

1. Searches are completed within 5 working days and returned by ordinary mail.
2. The register covers only crown land.
3. All information is required including a name for correspondence before the search will be completed.
4. The person to whom correspondence is addressed must sign the form.

March 2009

National Native Title Tribunal

Overlap Analysis Report

Disclaimer - This information product has been created to assist in understanding the spatial characteristics and relationships of this native title matter and is intended as a guide only. Spatial data used has

Selected feature

Name	Murray River
Full name	Murray River Council
As at	1/08/2017
Calculated area SqKm	11,859.0124

Overlap details

Schedule of Native Title Determination Applications

Overlap Tribunal ID	Name	FC No	Date Lodged	RT Status	Area sq km(calculated)
NC2014/002	Muthi Muthi People	NSD1248/2014	28/11/2014	Not accepted for registration	30,100.8134

Register of Native Title Claims

No overlap found

Native Title Determinations

Overlap Tribunal ID	Name	FC No	Determination Status	Related NTDA	Area sq km(calculated)
VCD1998/001	Yorta Yorta	VID6001/1995	In effect - Finalised	VC1994/001	1,833.8796

Native Title Determination Outcomes

Overlap Tribunal ID	Name	Federal Court number	Determined outcome	Determination Type	Determination area Albers sq km(calc	feature area sq km(cal	lap Areasq km (calculat
VCD1998/001	Yorta Yorta	VID6001/1995	Native title does not exist	In effect - Finalised	1,833.8796	11859.0124	570.1279
VCD1998/001	Yorta Yorta	VID6001/1995	Native title does not exist	In effect - Finalised	1,833.8796	11859.0124	2.1723

** Note: Outcomes identified as "Native title extinguished" are generally outside the determination area. Refer to the determination document for more information.*

Indigenous Land Use Agreements

No overlap found

Produced by NNTT Geospatial Database on

Page 1

OFFICE OF THE REGISTRAR
ABORIGINAL LAND RIGHTS ACT 1983 (NSW)

11 July 2018

Damian Wall
Cultural Heritage Advisor
Red-Gum Environmental
94 Kirby Flat Road
Yackandandah VIC 3749

Via email: damian.wall@red-gum.com.au

Dear Damian,

Request – Search for Aboriginal Land Claim

I refer to your request dated 3 July 2018 to search the Register of Aboriginal Land Claims database (**the Register**), in relation to lands described by you as:

Lot	Section	DP	Parish	County
97		751140	Bama	Moama

I have searched the Register and the property above does not appear to be affected by an Aboriginal Land Claim pursuant to sections 36 or 37 of the *Aboriginal Land Rights Act 1983.*

Please contact our office on (02) 8633 1266 if you require further assistance.

Yours sincerely,

Tysan Towney
Administration Officer
Office of the Registrar, ALRA

***Please Note**:*
1. Search requests should not be made over privately owned land. Crown Land is the only land in NSW that is likely to be affected by an ALC under the Aboriginal Land Rights Act. If an ALC has been made over privately owned land it would be refused as soon as this is known.

2. Land across NSW with older land descriptors such as "portion, REF & TSR" have been allotted new descriptors over the last 10 years & many of these now have "Lot & DP" numbers. The ORALRA database lists the land descriptor at lodgement & may not include an updated land descriptor. If this may affect the land that you've described, we advise that you contact the Aboriginal Land Claims Investigation Unit on (02) 6883 3396.

Address: Level 3, 2 – 10 Wentworth Street, PARRAMATTA NSW 2150
Post: P.O Box 5068, PARRAMATTA NSW 2124
Phone: 02 8633 1266

Office of Environment & Heritage

Your reference:
Our reference: DOC18/463775
Contact: Miranda Kerr
(02) 6022 0607
Date 13 July 2018

Damian Wall
Managing Director
Red-Gum Environmental Consulting
94 Kirbys Flat Road
YACKANDANDAH VIC 3749

Via email: damian.wall@red-gum.com.au

Dear Sir/Madam

WRITTEN NOTIFICATION OF PROPOSAL AS REQUIRED UNDER DECCW ABORIGINAL CULTURAL HERITAGE CONSULTATION REQUIREMENTS FOR PROPONENTS 2010
RE: Proposed extension of existing sand mine at Rushy Road, Moama – Murray River LGA

I refer to your emailed letter received by the Office of Environment and Heritage (OEH) 6 July 2018 regarding the above matter.

Attached is a list of known Aboriginal parties for the Murray River local government area that OEH feels is likely to have an interest in the development. Please note this list is not necessarily an exhaustive list of all interested Aboriginal parties. Receipt of this list does not remove the requirement of a proponent/ consultant to advertise in local print media and contact other bodies seeking interested Aboriginal parties, in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (April 2010).

Under Section 4.1.6. of the *Consultation Requirements* you must also provide a copy of the names of each Aboriginal person who registered an interest to the relevant OEH regional office and Local Aboriginal Land Council (LALC) within 28 days from the closing date for registering an interest.

Please note that the contact details in the list provided by OEH may be out of date as it relies on Aboriginal parties advising OEH when their details need changing. If individuals/companies undertaking consultation are aware that any groups contact details are out of date, or letters are returned unopened, please contact either the relevant stakeholder group (if you know their more current details) and/or OEH. AHIP applicants should make a note of any group they are unable to contact as part of their consultation record.

Please contact me if you want to discuss this matter further.

Yours sincerely

MIRANDA KERR
A/ Senior Team Leader Planning
Regional Operations, South West
Office of Environment and Heritage

ATTACHMENT A – Registered Interests, Murray River Local Government Area

PO Box 1040 Albury NSW 2640
Second Floor, Government Offices
512 Dean St, Albury NSW
Tel: (02) 6022 0624 Fax: (02) 6021 0610
ABN 30 841 387 271
www.environment.nsw.gov.au

ATTACHMENT A Registered Interests

Murray River Local Government Area

Organisation/ Individual Name	Address	Contact Details
Deniliquin Local Aboriginal Land Council	426 Wood Street PO Box 846 DENILIQUIN NSW 2710	Phone: 03 5881 4891 Fax: 03 5881 2852 Email: lalcd@bigpond.com
Wamba Wamba Local Aboriginal Land Council	3 Moulamein Rd MURRAY DOWNS VIC 3585 PO Box 2011 SWAN HILL VIC 3585	Phone: 03 5032 2378 (may not be connected) Fax: 03 5032 2934 Email: ceo@wambawamba.org.au
Cummeragunja Local Aboriginal Land Council	Tongala Road Cummeragunja Village PO Box 99 MOAMA NSW 2731	Phone: 03 5869 3372 Fax: 03 5869 3348 Email: cummera@mcmedia.com.au
Balranald Local Aboriginal Land Council	200 Church St PO Box 187 BALRANALD NSW 2715	Phone: 03 5020 1932 Fax: 03 5020 1940 Email: blalc@bigpond.com
Moama Local Aboriginal Land Council	52 Chanter St PO Box 354 MOAMA NSW 2731	Phone: 03 5482 6071 Fax: 03 5482 6085 Email: JoeDay@njernda.com.au
Hay Local Aboriginal Land Council	412 Belmore St PO Box 75 HAY 2711	Phone: 02 6993 2243 Fax: 02 6993 2290 Email: haylalc@tpg.com.au
Yorta Yorta Nation Aboriginal Corporation	Neville Atkinson (Chairperson) Shier St BARMAH VIC 3639	Phone: 03 5869 3353 Email: reception@yynac.com.au
Yarkuwa Indigenous Knowledge Centre	Jeanette Crew (Chairperson) 125 End St PO Box 276 DENILIQUIN NSW 2710	Phone: 03 5881 3312 Fax: 03 5881 5494 Email: admin@yarkuwa.com
Bangerang Aboriginal Corporation	John Atkinson PO Box 989 SHEPPARTON VIC 3630	Mobile: 0438 751 944 Email: info@bacch.org.au
Pappin Family Aboriginal Corporation	2 Alfred Close MILDURA VIC 3500	Mobile: 0400 634 994
Gary Pappin	PO Box 243 BALRANALD NSW 2715	Mobile: 0424 625 636
Wakool Indigenous Corporation	Cynthja Pappin PO Box 243 BALRANALD NSW 2715	Mobile: 0400 634 994 Email: info@wakool.com.au
John Jackson	PO Box 132 BALRANALD NSW 2715	Phone: 0427 927 675 Email: John.Jackson@health.nsw.gov.au

Oliver Brown
29 Hannan Street, Maroubra NSW 2035
0427 414 226
oliver@archassociates.com.au
22nd July 2019

South West Regional Operations, Office of Environment and Heritage
Via email: Rog.southwest@environment.nsw.gov.au
Cc: Andrew.Fisher@environment.nsw.gov.au
John.Gilding@environment.nsw.gov.au

CC: Local Aboriginal Land Council, Local Council, Catchment Management Authority, NTSCORP, Office of the Registrar Aboriginal Land Rights Act 1983, National Native Title Tribunal.

Re: Request for Information on Aboriginal Stakeholders for an Aboriginal Cultural Heritage Assessment at Lot 97 DP751140, Moama, NSW

Dear Sir or Madam,

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to notify you that we have been engaged to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of proposed sand extraction at Lot 97 DP751140, Moama.

The land in question is within the Murray River Local Government Area, located at Lot 97 DP751140, Moama, NSW; County of Cadell, Parish of Bama. It is within the Cummeragunja Local Aboriginal Land Council Area. The proponent is EMM Group, represented by Andrew Halloran (26-42 Old Aerodrome Rd Echuca, Victoria; (03) 5480 6665; andrew@emmgroup.com.au).

I am writing to you to seek information on relevant Aboriginal individuals and/or communities that you are aware of, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places. It would be appreciated if you could provide this information to me as soon as possible, at the Sydney address above or by email to oliver@archassociates.com.au

Please don't hesitate to contact me on 0427 414 226 if you have any queries or concerns.

Yours sincerely,

Kind regards,

Oliver Brown
0427 414 226
oliver@archassociates.com.au

ASSOCIATES
Archaeology and Heritage
Aboriginal Cultural Heritage Management

Your details	Name: Oliver Brown
	Position: Archaeologist
	Company/organisation: Associates Archaeology & Heritage
	Postal address: 29 Hannan Street, Maroubra, NSW 2035
	Your reference: Moama
	Email address: oliver@archassociates.com.au
	Telephone No.: 0427 414 226
	Fax No.: n/a
	Date of request: 22/07/19
Reason for search request	☐ **I am a party to a native title proceeding** – please specify Federal Court/Tribunal file number/application name: ☒ **I need to identify existing native title interests to comply with the NTA or other State/Territory legislation** – please provide details: I am undertaking an Aboriginal Cultural Heritage Assessment, and need to identify native title interests as part of the community consultation component, as required by the Office of Environment and Heritage guidelines.
Details of the area to be searched Please complete the relevant description fields (fields marked with an asterisk must be completed) **or** provide a clear map of the area including landmarks	**Mining Tenure:** *State/Territory: *Mining/ exploration details: Tenement number(s) (i.e. EL No or MCN No) or block/sub block description:
	Other Land Tenure: *State/Territory: NSW Land parcels: *Lot number(s)*: Lot 97 DP751140 *Tenure type (*e.g. agricultural lease*): Freehold Property name: Pastoral Lease number or name: *Local Government Area(s): Murray River County: Cadell Parish: Bama Town: Section: Hundred: Northern Territory Portion:
	Other details: (additional information may be attached):

Note: Search requests cannot be processed if insufficient detail is supplied.

Note: Map coordinates that form part of the attachments to a search result will not be sent with results unless specifically requested. Maps and any other formal attachments will be sent.

REQUEST FOR SEARCH OF LAND CLAIM REGISTER

OFFICE OF THE REGISTRAR
ABORIGINAL LAND RIGHTS ACT 1983 (NSW)

11-13 Mansfield Street
Glebe NSW 2037
PO Box 112, Glebe NSW 2037
P 02 9562 6327 F 02 9562 6350

Please print all details clearly using block letters

Full name of person requesting search: *(name for correspondence)*

Oliver Brown

Name of company: Associates A&H

Postal address: 29 Hannan Street
Maroubra NSW 2035

Telephone number: 0427 414 226 Fax number: N/a

Land identifiers:
(lot, dp, reserve number –
not crown plan number or vol id) Lot 97 DP751140

Parish name: Cadell

County name: Bama

To assist the office in assigning priorities, please answer the following:

1) Purpose for which information is required:

Request undertaken as part of the Aboriginal consultation process required by Office of Environment and Heritage in the development of an Aboriginal Cultural Heritage Assessment

2) If urgent consideration is required, reason for urgency:

Signature, position and date: Archaeologist
22/07/2019

Please note:

1. Searches are completed within 5 working days and returned by ordinary mail.
2. The register covers only crown land.
3. All information is required including a name for correspondence before the search will be completed.
4. The person to whom correspondence is addressed must sign the form.

March 2009

Our ref: DOC19/629939
Senders ref:

Oliver Brown
Associates Archaeology & Heritage
29 Hannan Street
MAROUBRA NSW 2035

Via email: oliver@archassociates.com.au

31 July 2019

Dear Mr Brown

Subject: **ACHA - Proposed Sand Extraction at Lot 97 DP751140 Moama, Murray River LGA**

WRITTEN NOTIFICATION OF PROPOSAL AS REQUIRED UNDER DECCW ABORIGINAL CULTURAL HERITAGE CONSULTATION REQUIREMENTS FOR PROPONENTS 2010

Thank you for your correspondence dated 22 July 2019 about the above matter seeking comments from the Biodiversity and Conservation Division of the Department of Planning, Industry and Environment (The Department).

The Biodiversity and Conservation Division was formerly part of the Office of Environment and Heritage (OEH). It forms part of the new Environment, Energy and Science Group in the Department (see https://intranet.dpie.nsw.gov.au/). The Environment, Energy and Science Group works to protect and strengthen NSW's natural environment by managing the conservation of our environment and energy resources. We support the community, as well as business and government, in developing their ability to achieve these outcomes.

The Biodiversity and Conservation Division has statutory responsibilities relating to biodiversity (including threatened species, populations, ecological communities, or their habitats), Aboriginal cultural heritage and flooding. For matters relating to national parks estate matters please refer these to the National Parks and Wildlife Service.

Attached is a list of known Aboriginal parties for the Murray River local government area that the Department considers likely to have an interest in the development. Please note this list is not necessarily an exhaustive list of all interested Aboriginal parties. Receipt of this list does not remove the requirement of a proponent/ consultant to advertise in local print media and contact other bodies seeking interested Aboriginal parties, in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (April 2010).

Under Section 4.1.6. of the Consultation Requirements, you must also provide a copy of the names of each Aboriginal person who registered an interest to the relevant Department regional office and Local Aboriginal Land Council (LALC) within 28 days from the closing date for registering an interest.

Please note that the contact details in the list provided by the Department may be out of date as it relies on Aboriginal parties advising the Department when their details need changing. If individuals/companies undertaking consultation are aware that any groups contact details are out of date, or letters are returned unopened, please contact either the relevant stakeholder group (if you know their more current details) and/or the Department. AHIP applicants should make a note of any group they are unable to contact as part of their consultation record.

If you have any questions about this advice, please contact me via rog.southwest@environment.nsw.gov.au or 02 6022 0623.

Yours sincerely

Andrew Fisher

Senior Team Leader Planning

South West Branch

Biodiversity and Conservation Division

Department of Planning, Industry and Environment

ATTACHMENT A Registered Aboriginal Interests – Murray River Local Government Area

ATTACHMENT A Registered Interests

Murray Local Government Area

Organisation/ Individual Name	Address	Contact Details
Deniliquin Local Aboriginal Land Council	426 Wood Street PO Box 846 DENILIQUIN NSW 2710	Phone: 03 5881 4891 Fax: 03 5881 2852 Email: lalcd@bigpond.com
Wamba Wamba Local Aboriginal Land Council	3 Moulamein Rd MURRAY DOWNS VIC 3585 PO Box 2011 SWAN HILL VIC 3585	Phone: 03 5032 2378 (may not be connected) Fax: 03 5032 2934 Email: ceo@wambawamba.org.au
Cummeragunja Local Aboriginal Land Council	PO Box 99 Barmah Post Office MOAMA NSW 2731	Phone: 03 5869 3372 Mobile: 0417 314 170 Email: ceo@cummeraLALC.com.au
Balranald Local Aboriginal Land Council	200 Church St PO Box 187 BALRANALD NSW 2715	Phone: 03 5020 1932 Fax: 03 5020 1940 Email: blalc@bigpond.com
Moama Local Aboriginal Land Council	52 Chanter St PO Box 354 MOAMA NSW 2731	Phone: 03 5482 6071 Mobile: 0497 129 490 Email: ceo@moamalalc.com.au
Hay Local Aboriginal Land Council	412 Belmore St PO Box 75 HAY 2711	Phone: 02 6993 2243 Fax: 02 6993 2290 Email: haylalc@tpg.com.au
Yorta Yorta Nation Aboriginal Corporation	Neville Atkinson (Chairperson) Shier St BARMAH VIC 3639	Phone: 03 5869 3353 Email: reception@yynac.com.au
Yarkuwa Indigenous Knowledge Centre	Jeanette Crew (Chairperson) 125 End St PO Box 276 DENILIQUIN NSW 2710	Phone: 03 5881 3312 Fax: 03 5881 5494 Email: admin@yarkuwa.com
Bangerang Aboriginal Corporation	PO Box 989 SHEPPARTON VIC 3630	Mobile: 0408 579 392 Email: admin@bacch.org.au
Pappin Family Aboriginal Corporation	2 Alfred Close MILDURA VIC 3500	Mobile: 0400 634 994
Gary Pappin	PO Box 243 BALRANALD NSW 2715	Mobile: 0424 625 636
Wakool Indigenous Corporation	Cynthja Pappin PO Box 243 BALRANALD NSW 2715	Mobile: 0400 634 994 Email: info@wakool.com.au

Project Information, Invitation for Registering Aboriginal Parties

Aboriginal Cultural Heritage Assessment at Moama NSW

Rushy Road, Moama (Lot 97 DP 751140)

August 2019

Prepared for:

Potential Aboriginal Community Representatives

AA&H Quality Control	
Document#	18041_ProjectInfo & RAP Invitation
Revision/Version No.	1st August 2019
Prepared by:	Oliver Brown
Prepared for:	Potential Aboriginal Community Representatives

1 Invitation to Register as an Interested Party

This document is provided to potentially interested Aboriginal Parties in accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010c). Associates Archaeology & Heritage have been engaged to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of proposed extension of sand extraction operations on Rushy Road, Moama (Lot 97 DP 751140) (**Figure 1**) (County of Cadell, Parish of Bama, Cummeragunja Local Aboriginal Land Council Area (with interests also held by Moama LALC).

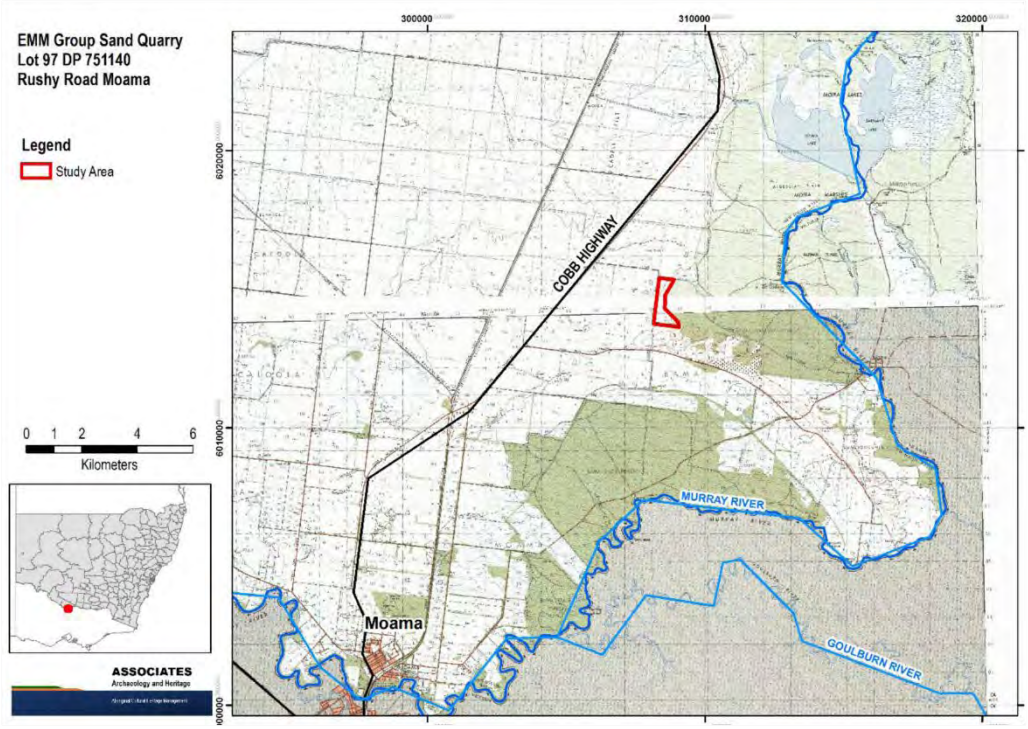

Figure 1: Location

Registration of interest should only be made by Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) in the study area. Registration should not be expected to lead to any paid fieldwork opportunities. Please review the project information below and if you would like to register an interest, the information listed below must be provided (by email or phone):

Name of Registering Aboriginal Party:	
Contact Person:	
Phone:	
Email: **(Note: Documents for review will only be supplied in electronic format delivered by email)**	

The closing date for registration of interest is Thursday 15th August. Please be aware that your details will be forwarded to OEH and Cummeragunja Aboriginal Land Council unless you specify otherwise.

2 Project Information

Table 1: Proponent and consultant contact details

	Heritage Consultant	Proponent
Company	Associates Archaeology & Heritage	EMM Group Pty Ltd
Contact person	Oliver Brown	Kane Henson (General Manager)
Email	oliver@archassociates.com.au	kane@emmgroup.com.au
Address	29 Hannan Street, Maroubra NSW 2035	26-42 Old Aerodrome Road, Echuca, Victoria 3564
Phone	0427 414 226	03 5480 6665

Current plans are for an extension to sand extraction areas shown in **Figure 2**. It is possible that an Aboriginal Heritage Impact Permit (AHIP) will be required for some work to proceed. The proposed assessment process is being undertaken to assist the proponent in the preparation of an application for an AHIP and to assist OEH in their consideration and determination of the application.

The study area has previously been subject to Aboriginal cultural heritage assessment by Jo Bell Heritage Services (Jo Bell, 2016). Several artefact locations were located on the property and the entire area was considered to have archaeological potential. Archaeological test excavation was proposed to fully determine the nature and extent of archaeological deposits in the areas proposed for sand extraction. Since then, ground penetrating radar survey has also been conducted, particularly addressing concerns about potential burials, although without any clear indication of their presence.

Due to the depth of the deposit that will require assessment, test excavation will not be possible under the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b). It cannot be done by hand due to worker safety regulations and will need to use controlled mechanical excavation to safely obtain material from the required depths. As a result, it will be necessary to obtain an initial AHIP just for test excavation. This approach has been discussed with OEH.

In order to obtain the AHIP for testing, an Aboriginal Cultural Heritage Assessment Report (ACHAR) needs to prepared. This will not involve any further fieldwork. The report will be distributed to RAPs for consultation and include a detailed methodology for the proposed testing. Once that initial AHIP has been issued, further fieldwork will occur. From there, we will have a better idea of the Aboriginal cultural heritage resource, how it should be managed and what activities the proponent may be able to proceed with.

If you have any queries about the project, please do not hesitate to contact Oliver Brown by phone or email:

oliver@archassociates.com.au

0427 414 226

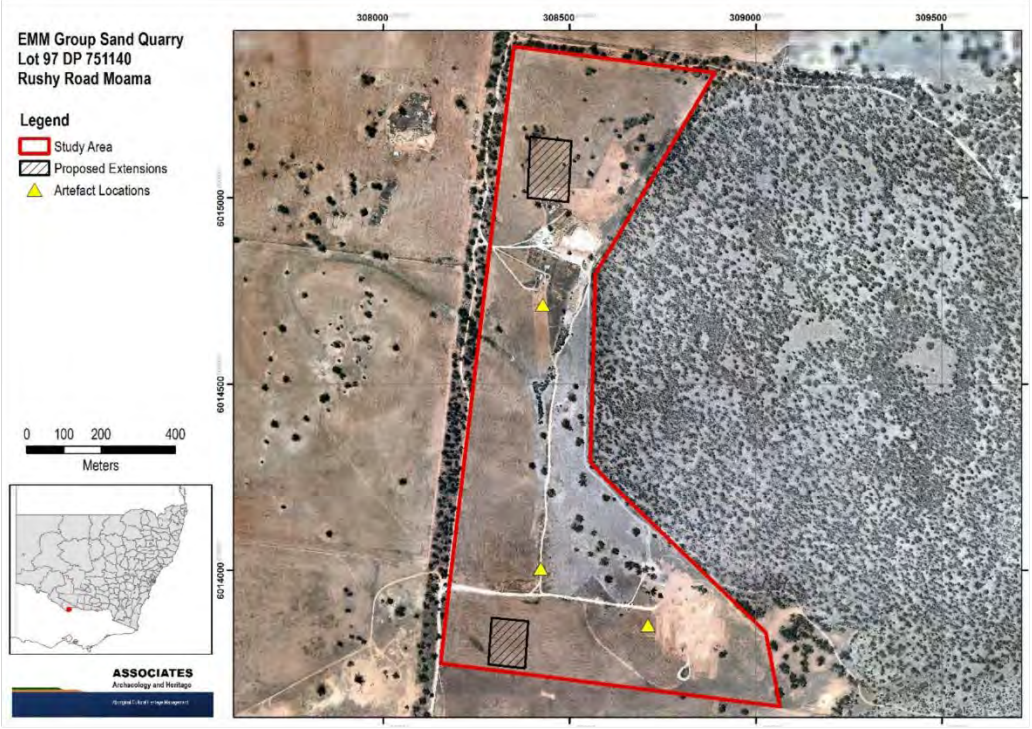

Figure 2: Proposal

BANGERANG ABORIGINAL CORPORATION | ICN : 8030
(m) 0437 657 526 | www.bacch.org.au | admin@bacch.org.au | 169 Hayes St, Shepparton VIC 3630

5 August 2019

Associates Archaeology and Heritage
Attention: Oliver Brown
29 Hannan Street
Maroubra
NSW 2035

Via Email; oliver@archassociates.com.au

Dear Oliver,

Your Ref: **EMM Group – extension to sand extraction operations**
Lot 97 | DP751140 Rushby Rd, Moama

Thank-you for alerting us to the requirements for your client, EMM Group to make contact with interested Aboriginal parties who hold cultural knowledge of the assessment areas to register their interest in the consultation process.

The Bangerang people who are represented by Bangerang Aboriginal Corporation (BAC) have a traditional association with Cummeragunja, the Murray (including tracts of the Murray Valley National Park) and much of the Riverina country throughout NSW and Victoria surrounding these places.

Bangerang people would like to be kept informed and to assist in the determination of cultural significance of any Aboriginal objects or places located within the proposed extension to sand extraction operations.

The Victorian Aboriginal Heritage Council has recognised Bangerang as Traditional Owners.

BAC has nominated Mr Kevin Atkinson as our representative on this matter and he can be contacted on (m) 0429 311 023 and (e) kevin.atkinson@ahvic.org.au.

Documents for review can also be forwarded to admin@bacch.org.au.

Bangerang look forward to an active and enduring connection with Associates Archaeology and Heritage on this and other matters.

Yours sincerely

Vicki Atkinson
Secretary
vicki@bacch.org.au

cc: kevin.atkinson@ahvic.org.au

Notification of Aboriginal Cultural Heritage Assessment and Invitation for Registrations of Interest – Moama (Murray Shire Council).

An Aboriginal Cultural Heritage Assessment is being undertaken for a proposed extension of an existing sand mine at Rushy Road, Moama NSW 2731. The proponents are EMM Group Pty. Ltd., 26-42 Old Aerodrome Road, Echuca, Victoria 3564 or contact Mr Kane Henson, General Manager, (M: 0417 582 313 or E: andrew@emmgroup.com.au).

Registrations are invited from Aboriginal individuals and/or organisations, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places and who wish to be involved in the community consultation process.

The purpose of the Aboriginal community consultation is to assist the proponent in preparing the ACHA for the project area, and to assist OEH in considering an AHIP application.

Registrations of interest should be provided no later than 7th September 2018 to Damian Wall: 94 Kirby Flat Road; 0402 344 574 damian.wall@red-gum.com.au

APPENDIX 3: BELL AND EDWARDS 2016 ARTEFACT DATA

AHIMS No.	Depth (mm)	Raw Material	Primary Form	Cortex	Retouch (%)	Platform	Termination	Core scars	Longest Scar (mm)	Formal Tool / Core Type	Length (mm)	Width (mm)	Thick (mm)	Max. Dimension (mm)
MSQ1	0	Quartz	Complete Flake	0	0	Plain	Hinge				16.8	8.2	3.6.	17.7
MSQ1	0	Quartz	Core	0	0			3	23.3	Multidirectional	23.3	17.3	9.4	23.3
MSQ2	0	Mudstone	Cobble	0	100 (dressing)					Axe blank	94.4	73.2	24	103.4
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				10.1	7.6	3.9	13.3
MSQ3	0	Quartz	Proximal Flake	0	0	Plain					12.9	13.7	5.1	19.2
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Crushed	Feather				23.2	15.6	5.6	23.5
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				19.5	11.5	4.4	19.5
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				16.8	6.6	5.6	16.8
MSQ3	0	Quartz	Core	0	0			3	2		22.1	13.8	12	22.1
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				17.2	14.5	6.1	18.5
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Hinge				24.4	12.7	8.9	25.6
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Plain	Hinge				15.5	7.2	2.8	15.5
MSQ3	0	Quartz	Angular Fragment	0	0						14.5	6.9	5.5	14.5
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Hinge				19.6	12.3	5	19.7
MSQ3	0	Quartz	Angular Fragment	0	0						14.5	10.3	5.2	14.5
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Plain	Axial				17.7	16.1	9.5	20.4
MSQ3	0	Quartzite	Complete Flake	0	0	Crushed	Feather				27	10	3.9	27

AHIMS No.	Depth (mm)	Raw Material	Primary Form	Cortex	Retouch (%)	Platform	Termination	Core scars	Longest Scar (mm)	Formal Tool / Core Type	Length (mm)	Width (mm)	Thick (mm)	Max. Dimension (mm)
MSQ3	0	Quartz	Angular Fragment	0	0						13.3	8.2	5.3	13.3
MSQ3	0	Quartz	Angular Fragment	0	0						8.4	9.5	3.2	9.5
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				18.9	11.1	4.8	18.9
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				20	7.3	4.8	20
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Feather				20.1	11.7	3.9	20.9
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				16.3	8.8	6.7	21.1
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				14.6	14.6	4.3	19.5
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Feather				12.9	15.5	6.4	22.3
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Crushed	Feather				21.6	8.8	6.8	21.6
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Crushed	Feather				15	5.7	3.1	15
MSQ3	0	Quartz	Angular Fragment	0	0						10	4.7	2.7	10
MSQ3	0	Quartz	Angular Fragment	0	0						17.2	8.2	6.5	17.2
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				17	10	2.7	17.8
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				11.6	7.9	1.7	11.6
MSQ3	0	Quartz	Broken Flake	0	0	Crushed					14.1	15.4	4.5	20.1
MSQ3	0	Smoky Quartz	Angular Fragment	0	0						13.5	10.5	5.1	13.5
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Axial				20.4	7.3	3.3	20.4
MSQ3	0	Quartz	Angular Fragment	0	0						14	8.4	5.4	14

AHIMS No.	Depth (mm)	Raw Material	Primary Form	Cortex	Retouch (%)	Platform	Termination	Core scars	Longest Scar (mm)	Formal Tool / Core Type	Length (mm)	Width (mm)	Thick (mm)	Max. Dimension (mm)
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				17.3	8.8	6.5	17.3
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				19.2	11.3	3	19.2
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				22.7	8.7	7.3	22.7
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Axial				20	7	5.2	20
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				12.1	9.5	2.2	12.8
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Hinge				14.6	8.6	3.8	14.6
MSQ3	0	Rose Quartz	Complete Flake	0	0	Plain	Axial				38.7	17.3	7.9	38.7
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				30.4	16.8	7.2	30.4
MSQ3	0	Silcrete	Complete Flake	0	0	Plain	Axial			Core rejuvenation flake	36.9	7.5	6.8	36.9
MSQ3	0	Silcrete	Complete Flake	20	0	Plain	Feather				24.7	16	4.7	27.4
MSQ3	0	Crystal Quartz	Angular Fragment	0	0						19.6	12.2	9.9	19.6
MSQ3	0	Quartz	Proximal Flake	0	0		Feather				24	7	2.4	24
MSQ3	0	Silcrete	Complete Flake	0	0	Plain	Feather				16.6	13.7	3.3	16.6
MSQ3	0	Silcrete	Complete Flake	0	0	Plain	Hinge				27.7	7.6	5.9	27.7
MSQ3	0	Silcrete	Complete Flake	0	0	Plain	Axial				32.4	22.6	8.6	32.5

APPENDIX 4: BELL AND EDWARDS 2016 ABORIGINAL CULTURAL HERITAGE ASSESSMENT

Proposed Extension to an Existing Sand Quarry, Moama Aboriginal Cultural Heritage Assessment

Name of Proponent: EMM Group Pty. Ltd.

Name of Cultural Heritage Advisor: Joanne Bell

Name of Authors: Joanne Bell & Ashley Edwards

Date of Completion: 21 June 2016

Local Government Area: Murray Shire Council

Jo Bell Heritage Services Pty. Ltd.
PO Box 248 Euroa VIC 3666
T: +61 3 5798 1341 M: 0427 505 335
ACN: 135 659 915 ABN: 18 135 659 915

Proposed Extension to an Existing Sand Quarry, Moama Aboriginal Cultural Heritage Assessment

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ACN: 135 659 915 ABN: 18 135 659 915

EXECUTIVE SUMMARY

This report documents the assessment of the Aboriginal cultural heritage values of a proposed sand quarry extension at Moama, New South Wales (see Map 1).

An Environmental Impact Statement (EIS) is being prepared for the activity area in accordance with the provisions of Part 4 of the *Environmental Planning & Assessment Act* 1979. An assessment of the Aboriginal cultural heritage values of the activity area must be undertaken as a part of the EIS.

The cultural heritage advisor commissioned to carry out the assessment is Jo Bell, Director, Jo Bell Heritage Services Pty. Ltd. The archaeological fieldwork was carried out by Joanne Bell and Bridget Grinter.

The activity area comprises a proposed development area of approximately 49ha with a buffer of 25.8ha within Lot 97 DP751140, Parish of Bama (see Map 2). It is bounded by the Murray Valley National Park in the east, Rushy Road in the west and agricultural land to the north and south. The local government area is Murray Shire.

The proponent is EMM Group Pty. Ltd., 26-42 Old Aerodrome Road, Echuca, Victoria 3564. Kane Henson (General Manager) is the Project Manager for EMM Group. The EIS is being prepared by Steve Hamilton Environmental Consulting. Steve Hamilton is project managing the EIS.

The activity area is owned by the proponent.

The activity includes the extraction, processing and transportation of quarry products.

Moama Local Aboriginal Land Council (MLALC), Bangerang Aboriginal Corporation (BAC) and Yorta Yorta Nation Aboriginal Corporation (YYNAC) identified as Registered Aboriginal Parties (RAPs) for the project.

A desktop assessment and a field survey were carried out during the assessment.

Desktop Assessment

The results of the desktop assessment indicate that the activity area comprises undulating dune formations associated with the Barmah Sand Hills, a formation resulting directly from the uplift of the Cadell Fault and the down-throwing of the Echuca Depression (Palaeo Lake Kanyapella) some 30,000 years ago. Previous archaeological investigations in the vicinity of the activity area indicate that stone artefact scatters, mounds, scarred trees and burials are likely to be found in association with such landforms. The area has been generally used for agricultural purposes with quarrying activities commencing at two locations within the property from 2006.

Survey

The field survey was carried out over two days on 6-7 December 2015 by Jo Bell and Bridget Grinter (Archaeologists, Jo Bell Heritage Services Pty Ltd) with Brett Hamilton (Bangerang), Mick Bourke (Yorta Yorta), John B. Kerr and John Kerr (Moama LALC) also in attendance.

The activity area for survey was divided into survey units 1 to 4. These areas were defined by internal farm tracks, laid out across the undulating sand dune (see Map 3). The activity

area was surveyed on foot by the field team, focusing on exposed areas with good visibility (see Map 4). The buffer zones were not assessed.

Three scatters of stone artefacts were identified during the survey (*Moama Sand Quarry Artefacts 1-3*).

The activity area comprises a sector of sand dunes associated with the Cadell Fault to the west, overlooking a wetland area to the east. Similar dune landforms in the area, both to the west and east, have been shown to contain ancestral remains, shell midden, mound and hearth material, artefact scatters and scarred trees. Dating of shell and charcoal indicate an age of approximately 1100 BP. The activity area, comprising sand sheet and sand dune landforms, was identified as a potential archaeological deposit (PAD).

Whilst the existing extraction pits exhibit obvious disturbance, these lie outside the proposed future development areas. The activity area appears to have sustained impacts only from agriculture and only in the upper 250mm of deposit (K.Henson pers.comm: 2016). Further investigation will be necessary to determine the potential for Aboriginal cultural heritage to be located in a buried context.

Recommendations

Recommendation 1 - Moama Sand Quarry Artefacts 1 (AHIMS No 59-2-0017)

1. Extraction activities will not impact on this Aboriginal site. The site will not be harmed by the activity.
2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site, then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm.
3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site and there is potential for harm, then no works must commence in the area until further assessment and an Aboriginal Heritage Impact Permit (AHIP) is obtained from OEH.

Recommendation 2 - Moama Sand Quarry Artefacts 2 (AHIMS No 59-2-0018)

1. Extraction activities will not impact on this Aboriginal site. The site will not be harmed by the activity.
2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site, then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm.
3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site and there is potential for harm, then no works must commence in the area until further assessment and an AHIP is obtained from OEH.

Recommendation 3 - Extraction Activities Cannot Commence near Moama Sand Quarry Artefacts 3 (AHIMS No 59-2-0019)

1. Proposed extraction activities will no longer impact on this Aboriginal site. The site will not be harmed by the proposed activity.
2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site (including the

spoil from initial scalping of the area), then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm.

3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site (including the spoil from initial scalping of the area), an AHIP must be obtained from OEH before any works can commence.

Recommendation 4 - Further Assessment is Required in PAD areas

1. The entire sand sheet within the property has been identified as an area of cultural heritage sensitivity (potential archaeological deposit). However, the proponent has reduced the extent of potential harm by limiting the extraction footprint to approximately 1ha in both the southern and the northern areas (see Figure 12). As harm cannot be totally avoided in the identified PAD, ***further assessment is required*** to investigate the actual potential for Aboriginal cultural heritage to be located within the proposed activity footprint. This work must be undertaken prior to commencement of works.

Further investigation must include a program of sub-surface testing but may also include the use of ground penetrating radar (GPR) as suggested by John Kerr (Moama LALC) on-site and discussed during the recommendations meeting held on 18 March 2016. The further investigation options and proposed sampling methodology must be discussed with representatives from the RAPs, OEH and the proponent

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Acknowledgments

Jo Bell Heritage Services would like to thank the following people who provided invaluable support through participation, consultation and discussion during the preparation of the project:

Kane Henson	EMM Group Pty. Ltd.
Andrew	EMM Group Pty. Ltd.
Steve Hamilton	Hamilton Environmental Services
Joe Day	Moama Local Aboriginal Land Council
John Kerr	Moama Local Aboriginal Land Council
John B. Kerr	Moama Local Aboriginal Land Council
Wade Morgan	Yorta Yorta Nation Aboriginal Corporation
Tyrone Miller	Yorta Yorta Nation Aboriginal Corporation
Michael Bourke	Yorta Yorta Nation Aboriginal Corporation
Vicki Atkinson	Bangerang Aboriginal Corporation
Brett Hamilton	Bangerang Aboriginal Corporation
Peter Ewin	OEH, Albury
Jo Bell	Jo Bell Heritage Services, Meetings, GIS mapping, Fieldwork, Reporting
Ashley Edwards	Jo Bell Heritage Services, Background research, GIS mapping, Reporting
Bridget Grinter	Jo Bell Heritage Services, Meetings, Fieldwork, Editing

1.0 INTRODUCTION

This report documents the assessment of Aboriginal cultural heritage values for the proposed extension of an existing sand quarry at 79 Rushy Road, north of Moama, New South Wales (Map 1). The works are being undertaken as part of an Environmental Impact Statement (EIS).

Objectives

The objective (and brief) for the assessment was to identify the Aboriginal cultural heritage values in the activity area for the purposes of assessing the impact of the development on those values and to develop recommendations for the management and/or mitigation of harm to those values.

1.1 Statutory Context

Aboriginal cultural heritage in New South Wales is protected by several acts:

National Parks and Wildlife Act 1974 (NPW Act)

The NPW Act is administered by the Office of Environment and Heritage (OEH) (NSW Department of Premier and Cabinet). It is the primary legislation for the protection of Aboriginal cultural heritage in NSW. One of the objectives of the NPW Act is:

> "…the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including but not limited to: (i) places, objects and features of significance to Aboriginal people…"

Section 2A(1)(b)) Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm them.

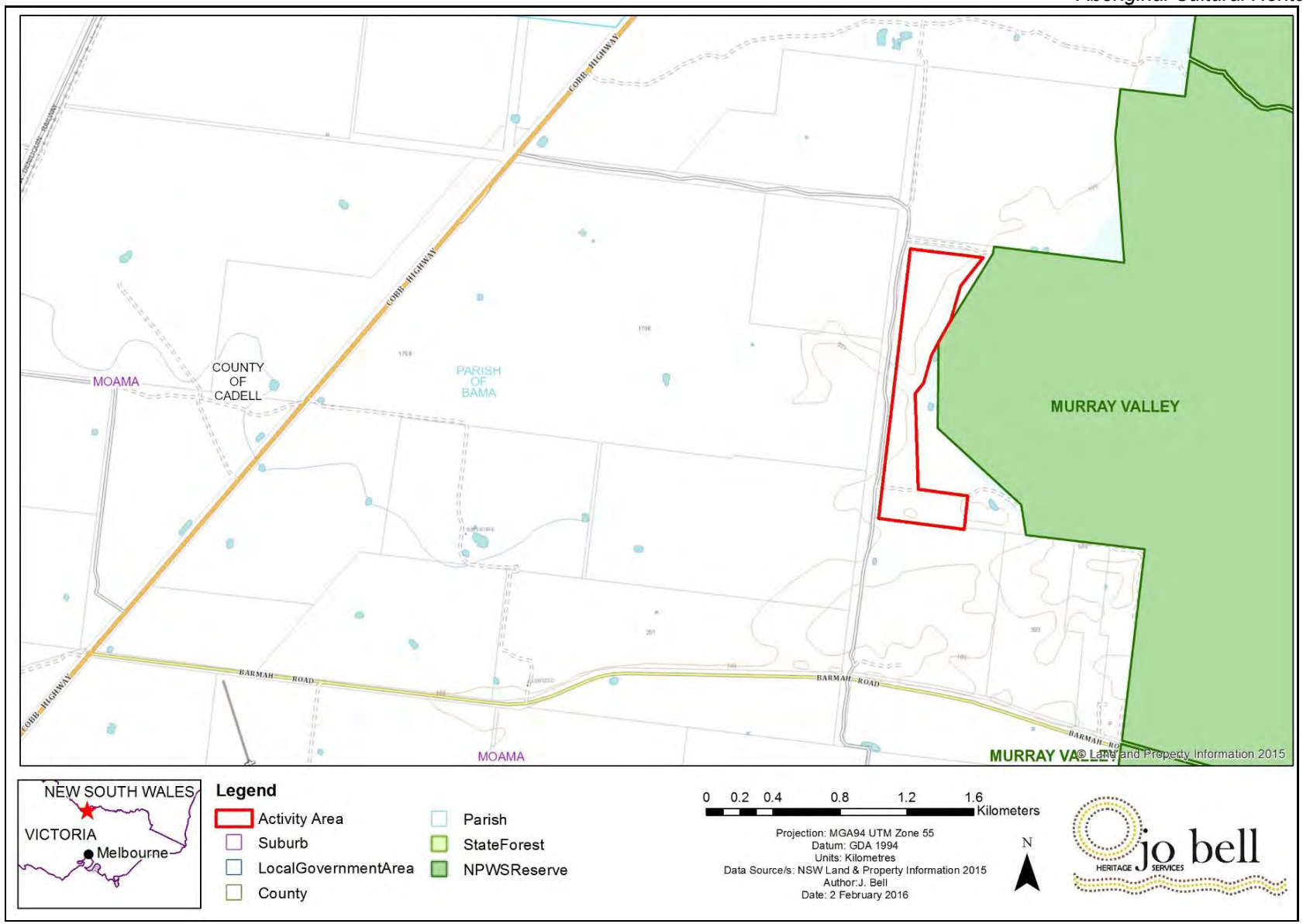
Consent from the Director-General of the OEH is required under Section 87 for the investigation of Aboriginal sites, or under Section 90 for the destruction of an Aboriginal object or Aboriginal place (Aboriginal Heritage Impact Permit (AHIP)).

Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act is administered by the NSW Department of Planning and Infrastructure (DPI). It provides planning controls and requirements for environmental assessment in the development approval process. The EP&A Act establishes the framework for Aboriginal cultural heritage values to be formally assessed in the land-use planning and development consent processes.

Heritage Act 1977

The Heritage Act is also administered by the NSW Office of Environment and Heritage. This act protects the state's natural and cultural heritage. While Aboriginal heritage is primarily protected under the NPW Act, it may be subject to the provisions of the Heritage Act if the item is listed on the State Heritage Register or subject to an interim heritage order (IHO). The Heritage Act established the NSW Heritage Council, which provides advice and recommendations to the Minister for Heritage. The Minister approves the listing of items and places on the State Heritage Register and can also prevent the destruction, demolition or alteration of items.



Map 1: General Location of the Activity Area

Aboriginal Land Rights Act 1983 (ALR Act)

The NSW Aboriginal Land Rights Act (ALR Act) is administered by NSW Department of Education and Communities. It establishes the NSW Aboriginal Land Council (NSWALC) and Local Aboriginal Land Councils (LALCs). The Act requires these bodies to:

- Take action to protect the culture and heritage of Aboriginal persons in the council's area, subject to any other law; and
- Promote awareness in the community of the culture and heritage of Aboriginal persons in the council's area.

These requirements recognise and acknowledge the statutory role and responsibilities of NSWALC and LALCs.

The ALR Act also establishes the registrar whose functions include, but are not limited to, maintaining the Register of Aboriginal Land Claims and the Register of Aboriginal Owners. Under the NSW *Aboriginal Lands Right Act* 1983, the registrar is to give priority to the entry in the register of the names of Aboriginal persons who have a cultural association with:

- Lands listed in Schedule 14 to the NPW Act; and
- Lands to which section 36A of the ALR Act applies.

Native Title Act 1993 (Cth) (NTA)

The Commonwealth NTA provides the legislative framework to:

- Recognise and protect native title;
- Establish ways in which future dealings affecting native title may proceed and to set standards for those dealings, including providing certain procedural rights for registered native title claimants and native title holders in relation to acts which affect native title;
- Establish a mechanism for determining claims to native title; and
- Provide for, or permit, the validation of past acts invalidated because of the existence of native title.

Native Title Act 1994 (NSW)

The NSW *Native Title Act* 1994 was introduced to make sure the laws of NSW are consistent with the Commonwealth's NTA on future dealings. It validates past and intermediate acts that may have been invalidated because of the existence of native title.

The National Native Title Tribunal has a number of functions under the NTA, including maintaining the Register of Native Title Claims, the National Native Title Register and the Register of Indigenous Land Use Agreements, and mediating native title claims.

Other Acts

The Australian Government *Aboriginal and Torres Strait Islander Heritage Protection Act* 1984 (Cth) may be relevant if any item of Aboriginal heritage significance to an Aboriginal community is under threat of injury or desecration and state-based processes are unable to protect it. The *Environment Protection and Biodiversity Conservation Act* 1999 (Cth) may also be relevant to some proposals, particularly where there are heritage values of national significance present.

1.2 Proponent

The proponent is EMM Group Pty. Ltd., 26-42 Old Aerodrome Road, Echuca, Victoria 3564. Kane Henson (General Manager) is the Project Manager for EMM Group.

The EIS is being prepared by Steve Hamilton Environmental Consulting. Steve Hamilton is project managing the EIS.

1.3 Cultural Heritage Advisor

The cultural heritage advisor commissioned to carry out the assessment is Joanne (Jo) Bell, Director, Jo Bell Heritage Services Pty. Ltd. The authors of the assessment report are Jo Bell and Ashley Edwards. The field survey was carried out by Jo Bell and Bridget Grinter. Jo has a BA (Hons) in Archaeology and over fifteen years' professional experience in the cultural heritage industry, including the preparation of cultural heritage management plans and assessment reports. Ashley has a BArch (Hons), an MA in Archaeology and over nine years of experience in the cultural heritage industry (see Appendix 1). Bridget has a BA (Hons) in Archaeology and more than six years of experience in the industry.

1.4 Activity Area

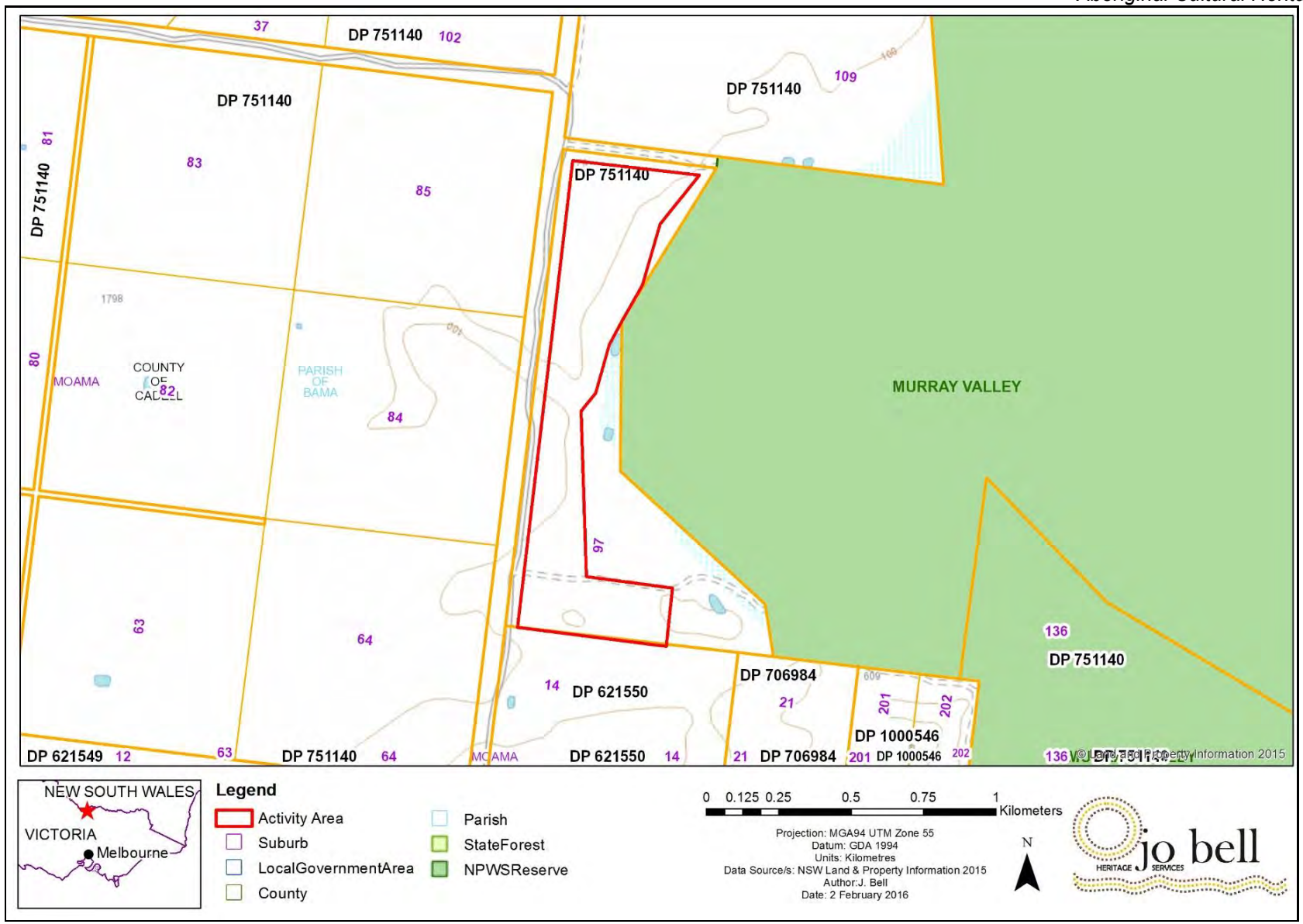
1.4.1 Activity Area Description

The activity area (or subject area) is located approximately 16km northeast of Moama and 8km west of Barmah (both as the crow flies) (see Map 1). It comprises a proposed development area of approximately 49ha within Lot 97 DP751140 (Map 2). The quarry buffer varies in dimensions but covers approximately 25.8ha in area. The existing quarry pits make up approximately 8ha in total.

The property is situated on Rushy Road (also known as 11 Mile Road), Moama. It is bounded by the Murray Valley National Park in the east, Rushy Road in the west and agricultural land to the north and south.

The property comprises undulating dune formations associated with the Barmah Sand Hills (Figure 1), a formation resulting directly from the uplift of the Cadell Fault and the down-throwing of the Echuca Depression (Palaeo Lake Kanyapella) some 30,000 years ago (Cochrane *et al* 1995:77; McPherson *et al* 2012).

The activity area is owned by the proponent.



Map 2: Parcel Plan showing the Activity Area

1.4.2 Existing Conditions

The proposed development areas are currently undeveloped and used for agricultural purposes, including cropping and cattle grazing. Recent NSW LPI aerial imagery shows a number of dams in the central part of the activity area. An existing sand quarry is shown in the south west corner of the activity area.

The development plan for the project, which uses a more recent aerial, shows a second existing sand quarry north east of the house in the activity area.

Isolated trees exist within the activity area, although these are mostly confined to the buffer zones.

Figure 1 is an aerial photograph that shows recent conditions in the activity area.

1.5 Nature of the Proposed Activity

The proponent is proposing to extend the existing sand extraction pits into the as yet undeveloped land (excluding the buffer zones) (Figure 2).

The proposed activity will include the following:

* Excavation of sand from the proposed development areas down to a depth of approximately 3m in the south and approximately 6m in the north ;
* On-site screening of excavated material;
* On-site storage and stockpiling of excavated material ready for supply;
* Formalisation of internal farm access tracks;
* Protection of buffer areas; and
* Rehabilitation of extraction areas following extraction completion.

A variety of different sand types is available from the site, from very fine sand through to coarse sand, with different extraction areas targeting particular grades of sand.

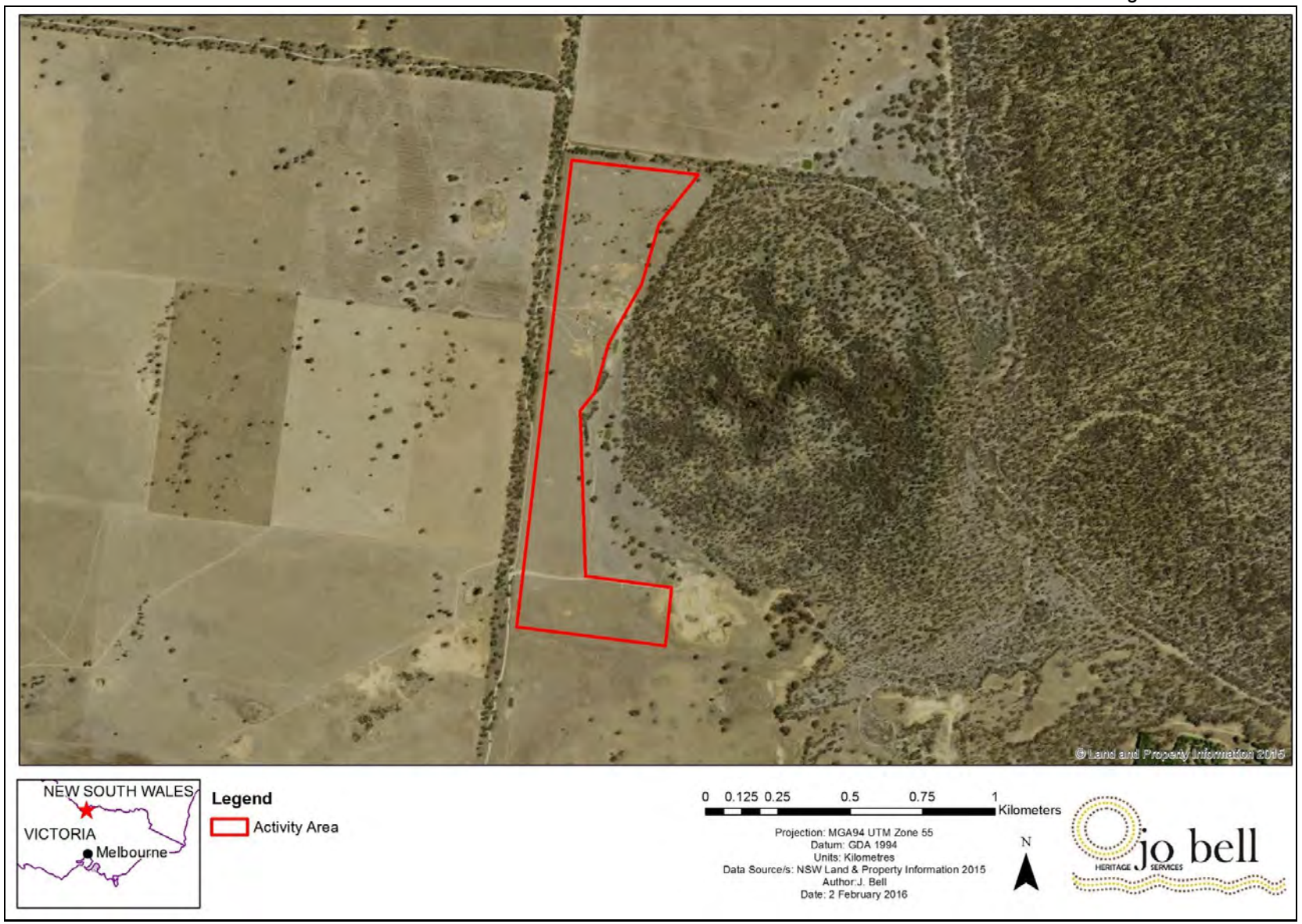


Figure 1: Existing conditions in the Activity Area (2015 Imagery)

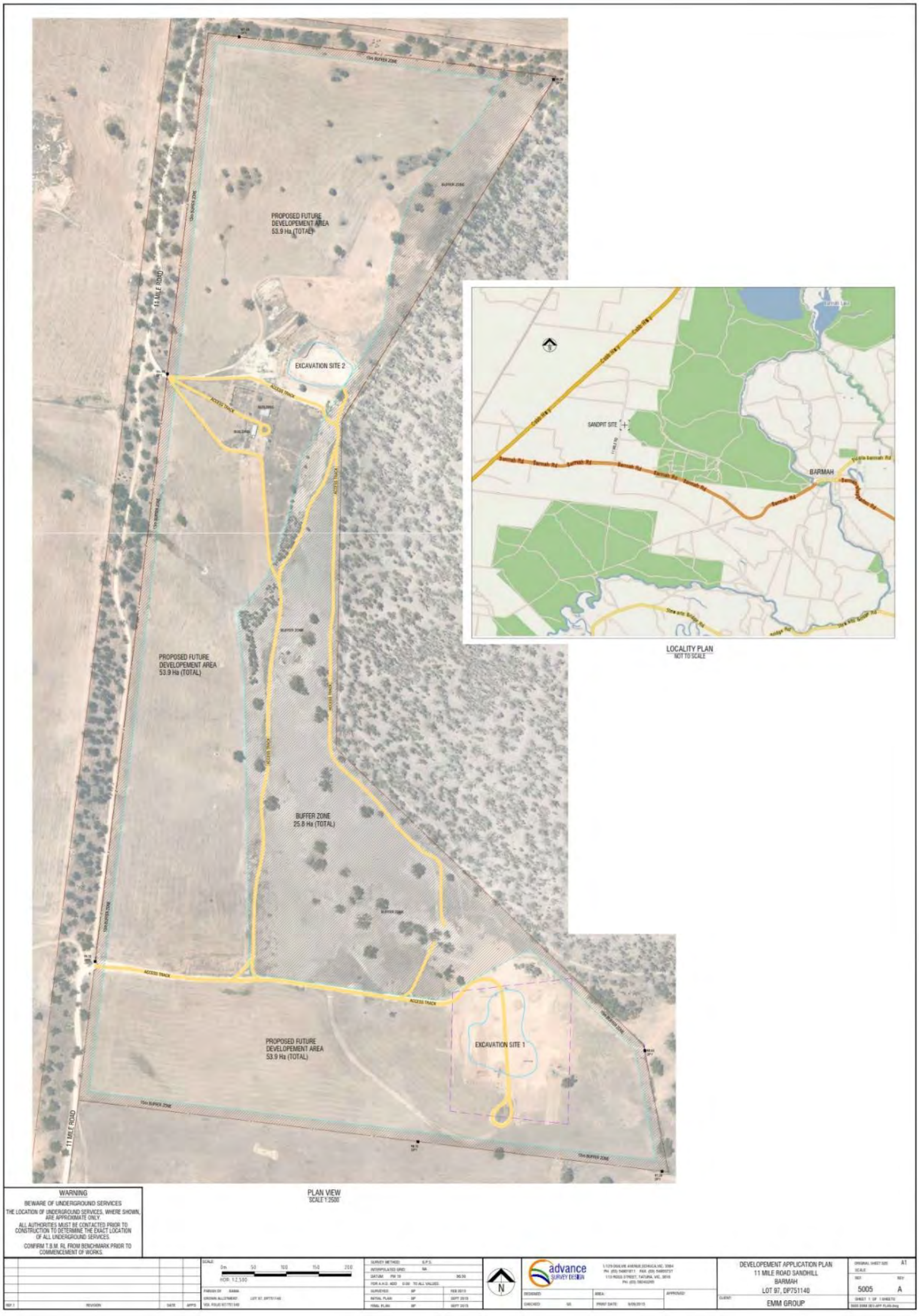


Figure 2: Concept Plan (source: Advance Survey Design 2015)

2.0 CONSULTATION

Consultation with Aboriginal people is necessary to understand their views and concerns about the proposed activity but also to understand the cultural values present in the area that may be harmed.

Aboriginal community consultation for the assessment followed the requirements as specified in clause 80c *National Parks and Wildlife Regulations* 2009 as set out in the Department of Environment, Climate Change and Water's *(*DECCW) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (2010a). This consultation was carried out in a number of stages.

2.1 Stage 1 - Notification of Project Proposal and Registration of Interest

Stage 1 of the consultation process involves ascertaining, from reasonable sources of information, the names of Aboriginal people who may have an interest and/or hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places in the activity area. Letters requesting the contact details of people who may have an interest and/or hold cultural knowledge relevant to the activity area, were sent on 22 October 2015 to the following agencies and groups (see Appendix 2 for a sample letter):

- Moama Local Aboriginal Land Council;
- Murray Shire Council;
- Murray CMA;
- OEH EPRG;
- The Registrar, Aboriginal Land Rights Act 1983 for a list of Aboriginal owners;
- The National Native Title Tribunal for a list of registered native title claimants, native title holders and registered Indigenous Land Use Agreements; and
- Native Title Services Corporation Limited (NTSCORP Limited).

The letters sent to the above agencies and groups notified recipients that an Aboriginal Heritage Assessment was being prepared for the activity. These letters outlined the name and contact details of the proponent and provided a brief overview of the proposed activity that is the subject of the assessment (and an AHIP where necessary), including the location of the proposed activity.

As a result of the letters, a number of groups were identified who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places that may exist within the activity area (see Table 1).

The groups identified in Table 1 were sent a letter providing them with a brief overview of the proposed activity, the location of the activity area and an invitation to register as an Aboriginal stakeholder or Registered Aboriginal Party.

A notice was also placed in the local newspaper (The Riverine Herald) on 11 November 2015 inviting expressions of interest (EOI) by relevant Aboriginal persons or organisations that may hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) in the area of the proposed activity (a copy of the EOI is provided in Appendix 2). The notice also outlined the name and contact details of the proponent and a provided brief overview of the proposed activity that will be the subject of the assessment, including the location of the proposed activity.

Aboriginal Person/Organisation	Date Sent	Method
Moama Local Aboriginal Land Council	11 November 2015	Post
Bangerang Aboriginal Corporation	11 November 2015	Post
Cummeragunga Local Aboriginal Land Council	11 November 2015	Post
Deniliquin Local Aboriginal Land Council	11 November 2015	Post
Wakool Aboriginal Corporation	11 November 2015	Post
Yarkuwa Indigenous Knowledge Centre	11 November 2015	Post
Yorta Yorta Nation Aboriginal Corporation	11 November 2015	Post

Table 1: List of Aboriginal people or organisations identified as potential stakeholders and invited to register as an Aboriginal stakeholder or Registered Aboriginal Party

Both the EOI notices required Aboriginal persons or organisations to register an interest in the process of community consultation with the proponent regarding the proposed activity no later than COB 27 November 2015.

Joe Day from Moama Local Aboriginal Land Council (MLALC) responded via phone on 27 October 2015, registering their interest as an Aboriginal party.

Vicki Atkinson from Bangerang Aboriginal Corporation (BAC) responded via phone on 19 November 2015 and later by email (24 November 2015), registering their interest as an Aboriginal Party.

Wade Morgan from Yorta Yorta Nation Aboriginal Corporation (YYNAC) responded via email on 27 November 2015, registering YYNAC's interest as an Aboriginal party.

No other EOI were received. A list of the Aboriginal people/organisations who responded to the letter of invitation or the public newspaper notice and registered for involvement in the consultation process is presented in Table 2. These Aboriginal people/organisations will be referred to as Registered Aboriginal Parties (RAPs).

Aboriginal Person/Organisation	Contact	Date Registration Received	Method
Joe Day Moama Local Aboriginal Land Council	03 5482 6071	27/10/2015	Phone
Vicki Atkinson Bangerang Aboriginal Corporation	0417 789 393	24/11/2015	Email
Wade Morgan Yorta Yorta Nation Aboriginal Corporation	03 5832 0222	27/11/2015	Email

Table 2: List of Aboriginal people or organisations identified as potential stakeholders and invited to register as an Aboriginal stakeholder or Registered Aboriginal Party

A list of the RAPs for the project was sent to the Moama LALC and OEH via email on 30 November 2015.

Appendix 2 also contains copies of any submissions from the RAP throughout the consultation process.

2.2 Stage 2 - Presentation of Information About the Proposed Activity

Stage 2 of the consultation process aims to provide registered Aboriginal parties with information about the scope of the proposed project and the proposed cultural heritage assessment process.

An inception meeting was arranged for 16 December 2015 at EMM Group offices in Echuca to present the proposed project information. In attendance were Steve Hamilton (Project Manager), Kane Henson (EMM Group), Brett Hamilton (BAC), John Kerr (MLALC), Wade Morgan and Tyrone Miller (YYNAC), and Bridget Grinter (JBHS).

The presentation of the information presented during the meeting included:

- A description of the activity (including the nature, scope, methodology, and environmental and other impacts);
- A description of the activity area;
- A summary of the geology, geomorphology, climate and flora and fauna of the activity area;
- A summary of the Aboriginal sites in the area;
- A summary of the land use history of the activity;
- A brief site prediction model based on the desktop assessment;
- An outline of the impact assessment process including the input points into the investigation and assessment activities;
- The proposed survey methodology for the field survey; and
- Specification of timelines and milestones for the completion of the assessment activities and delivery of reports.

The proposed methodology for the field survey was discussed as a group and it was agreed that the activity area should be systematically assessed as a group, walking transects across the entire activity area, where possible (see Section 4.1). This survey methodology was to include the inspection of all mature Eucalypts and landforms known to be sensitive for Aboriginal cultural heritage, such as dunes, terraces and high ground overlooking watercourses. In addition to systematic survey, opportunistic areas of exposure would be targeted for detailed examination.

It was proposed to record any Aboriginal cultural heritage places directly onto AHIMS site recording forms. Areas of potential Aboriginal cultural heritage sensitivity identified during the surface assessment were to be noted for further investigation (as necessary).

The RAPs did not identify any cultural concerns during the field assessment other than stating that burials were likely to be found given the landforms existing in the activity area.

2.3 Stage 3 - Gathering Information about Cultural Significance

On 19 January 2016, a map showing the location of the recorded Aboriginal cultural heritage and information about cultural significance was emailed to all RAPs with a request for information in relation to cultural significance of the heritage values and the landscape. No information was received as a result.

Additionally, a meeting with RAP representatives was held on 18 March 2016 to discuss the results of the assessment, the cultural significance of the Aboriginal cultural heritage identified and to develop cultural heritage management options.

As a result of the group discussion, the significance assessment is provided in Section 5 of this report; the impact assessment is detailed in Section 6 of this report; and the management recommendations are set out in Section 7 of this report. It should be stated that each Aboriginal site and PAD was discussed separately and all RAP representatives had input into the development of the management recommendations.

2.4 Stage 4 - Review of Draft Cultural Heritage Assessment Report

The cultural heritage advisor provided each RAP with a copy of the draft cultural heritage assessment report via email on 9 May 2016 for their review and comment.

The RAPs were given a minimum of 28 days to make a submission. No response was had from any of the RAPs.

A copy of the final Aboriginal cultural heritage assessment report will be sent to each RAP and the LALC for their records.

2.5 Consultation Outcomes

The consultation process has been undertaken in accordance with the guidelines published by DECCW, *Aboriginal cultural heritage consultation requirements for proponents 2010*, under Part 6 of the *National Parks and Wildlife Act 1974*.

Moama Local Aboriginal Land Council, Bangerang Aboriginal Corporation and Yorta Yorta Nation Aboriginal Corporation all submitted an EOI in relation to the project. Each RAP has

been consulted throughout the project and representatives from each RAP have been instrumental in developing the recommendations of this report.

3.0 DESKTOP ASSESSMENT

As outlined in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011:5), a background assessment should 'compile, analyse and synthesise previous information and relevant contextual information to gain an initial understanding of the cultural landscape'.

This section of the report sets out the methodology and results of the desktop assessment.

3.1 Methodology

The desktop assessment was carried out according to the previously mentioned guide and *The Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b).

The aim of a desktop assessment is to produce an archaeological site prediction model. Site prediction models are then used to assist:

- The design of fieldwork strategies;
- The interpretation of fieldwork results;
- The assessment of Aboriginal cultural heritage significance; and
- The design of management recommendations.

In order to produce an archaeological site prediction model, the cultural heritage advisor must review relevant background information.

As part of the desktop assessment, the following tasks were undertaken:

- Search of AHIMS register to identify any previously recorded Aboriginal objects/places recorded within or near the activity area;
- Review of archaeological reports previously undertaken in the geographic region of the activity area including existing site prediction models;
- Review of local histories of the region, including any documentation of written or oral history regarding Aboriginal people in the region;
- Review of relevant reference texts on the local geology and geomorphology, and flora and fauna studies to identify the resources that would have been available to Aboriginal people in the past;
- Field ethnographic sources to identify the likely traditional owners;
- Historic archival plans;
- Aerial photography; and
- The land-use history of the area, particularly evidence for the extent and nature of past land disturbance.

The background research was undertaken by Ashley Edwards.

3.2 Landscape Context & Regional Character

3.2.1 Geology and Geomorphology

The activity area is situated on Shepparton Formation (Nws) geology, which is characterised by 'unconsolidated to poorly consolidated, mottled, variegated clay, silty clay with lenses of coarse to fine sand and gravel, including interlayered red-brown palaeosols' (Deniliquin 1:250 000 Geological Map, NSW DPI 2000; Figure 3).

The area to the east of the activity area is comprised of Coonambidgal Formation geology and other alluvial deposits characterised by 'unconsolidated, grey, brown, micaceous silty clay, silt, sand and gravel'.

The area to the south of the activity area is comprised of poorly consolidated brown, red, yellow and grey siliceous sand, silty clay, clay pellet aggregates, gypseous clay pellets, pale grey gypseous clay pellets, pale grey gypsite and older components increasingly modified by soil formation and development processes.

The activity area is located in the Riverina bioregion of New South Wales.

> 'This bioregion is dominated by river channels, floodplains, backplains, swamps, lakes and lunettes that are all of Quaternary age. The region comprises three overlapping alluvial fans centred on the eastern half of the Murray Basin. Features of each fan differ slightly because of differences in the discharge of the streams. The Lachlan fan is mainly clay as this smaller stream does not have the competence to carry sand. The other two fans are similar except that the Murray is more confined and has more active anabranch channels where it is forced to flow around the obstacle of the Cadell fault near Echuca. At times of extreme flood flow, water from the different streams can cross the fan surfaces and enter channels of another system'. (NSW NPWS 2003:92)

More specifically however, the uplift of the Cadell Fault resulted in river diversion of both the Murray and the Goulburn Rivers to the north and south respectively, creating the swamps and wetlands of the Moira, Barmah and Kanyapella lakes system (Pels 1966; Bonhomme 1990). The Barmah Sand Hills, of which the activity area forms a part, comprise a large continuous ridge rising 18m above the plain (Bonhomme 1990). According to Bowler (1978), 'this lunette formed during lake full conditions and the absence of characteristic clay layers in the lunette profile indicates that the lake was an open system where fine sediments were flushed out of the system' (Bonhomme 1990, after Bowler 1978).

The activity area is located at the transition from Murray Channels and Floodplains landforms to Murray Scaled Plains Landforms (NSW NPWS 2003).

Geotechnical testing has also been carried out on the property (Bell Cochrane & Associates 2015). This testing defined the amount of overburden (silts, clays and silty-clayey sands) overlying the sand resource (ranging from very fine sands through medium and coarse sands to gravels).

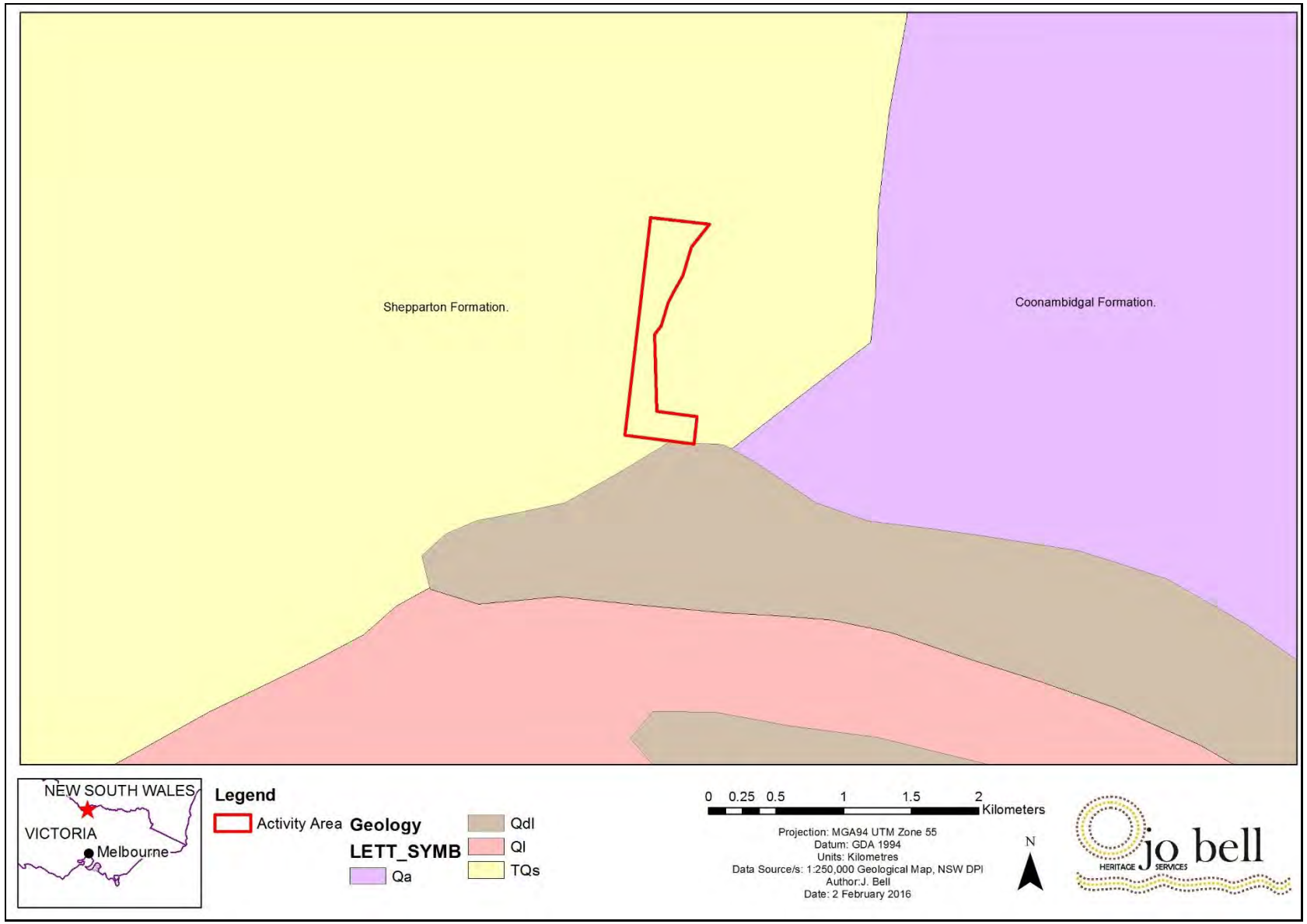


Figure 3: Geology of the Activity Area

The results of the geotechnical testing found that that the northern area (Area 3) contained an average overburden of 3m overlying the sand resource layer of 7m. The Middle Area (Area 2) showed an average overburden of 2m overlying the sand resource layer of 10m. The Southern Area (Area 1) contained an average overburden of 1.7m overlying the sand resource layer of 10.3m. The Dune Sand Area was also located in the south of the property and was differentiated from other sand deposits based on particle size amongst other things. This area showed an average overburden of 0.2m overlying the sand resource layer of 2.6m (Bell Cochrane & Associates 2015).

3.2.2 Climate and Hydrology

The activity area is situated on the sand dunes surrounding a low-lying wetland or swamp that is a part of the Murray River floodplain.

The Riverina Bioregion 'is dominated by a persistently dry semi-arid climate and characterised by hot summers and cool winters' (Stern *et al* 2000, cited in NSW NPWS 2003:91). Mean Annual rainfall ranges from 238 – 617mm with summer rainfall tending to occur mainly from localised thunderstorms with more consistent rainfall occurring in the winter months (NSW NPWS 2003:91)

3.2.3 Flora and Fauna

Mapping of the pre 1750 vegetation in the area indicates that the area was dominated by Eucalypt Woodlands (MVG 5). This vegetation

> 'includes a series of communities which have come to typify inland Australia (e.g. the box and ironbark woodlands of eastern Australia). Understoreys may vary from grasses to shrubs and in some cases have attained a parkland appearance due to frequent fire and grazing. The parkland appearance is reflected in early landscape paintings providing a strong sense of place for many Australians' (DEWR 2007:18).

The activity area is further mapped as '*Eucalyptus woodlands with a tussock grass understorey'*.

- Estimated Pre 1750 Major Vegetation Group - Eucalypt Woodlands
- Estimated Pre 1750 Major Vegetation Sub Group - Eucalyptus woodlands with a tussock grass understorey
- Present Major Vegetation Group - Eucalypt Woodlands
- Present Major Vegetation Sub Group - Eucalyptus woodlands with a tussock grass understorey.

Current mapping shows the vegetation unchanged in the activity area.

A recent assessment of the current flora and fauna in the activity area has been conducted by Steve Hamilton Environmental Consulting (*in prep*). The assessment describes the current vegetation as follows:

> *Notwithstanding the direct impact of the extraction areas, the vegetation of the remainder of the property does reflect the inferred historic land use:*
> - *Substantial tree clearing, with only scattered mature trees across the northern and central areas of the property in particular;*
> - *No tree recruit for several decades;*
> - *No shrub layer or shrub recruitment;*
> - *A ground layer that is predominantly opportunistic annual introduced species-based due to the recurrent cultivation and cropping disturbance over much of the property, with indigenous ground layer vegetation only evident around the base of clumps of trees or along some of the boundary areas along the perimeter fences;*
> - *No fallen timber.*
>
> Hamilton (*in prep*:3).

3.2.4 Land Use History

Pastoral History

> 'John Oxley first explored the Riverina in 1817, following the Lachlan River downstream southwest of Booligal in the centre of the bioregion (Eardley 1999). Oxley was followed almost 20 years later by Thomas Mitchell, who arrived at the junction of the Lachlan and the Murrumbidgee Rivers in 1836, and by Charles Sturt, who explored the Murrumbidgee and lower Murray in the years between 1828 and 1831 (Eardley 1999)' (NSW NPWS 2003).
>
> 'Graziers followed soon after, establishing pastoral runs near Yanco and on the Murrumbidgee and Murray Rivers as far west as Hay between 1835 and 1839 (Eardley 1999). In the 1840s, cattle were the primary industry but by the 1860s sheep were the predominant stock (Eardley 1999)' (NSW NPWS 2003).

Aerial Photography

1961

The activity area appears to be mostly cleared farmland (grazing) with a number of remnant mature trees in the northern part of the activity area and around the edge of the swamp which appears to be dry (Figure 4).

1996

The activity area appears relatively unchanged apart from the addition of a house and sheds. The swamp appears to be wet and green when the photograph was taken (Figure 5).

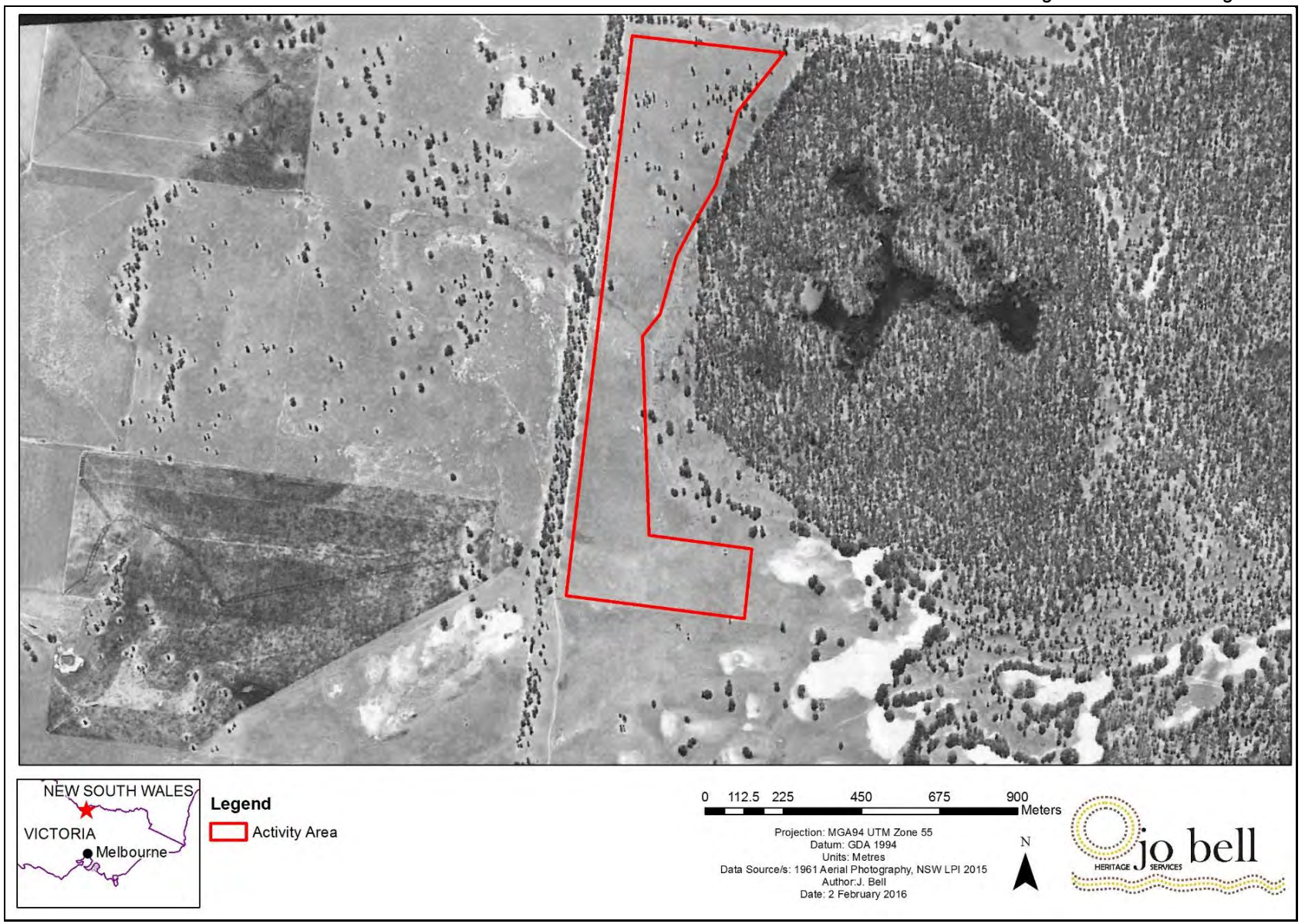


Figure 4: Historic Aerial Photography, 1961 (source: NSW Land and Property Information)

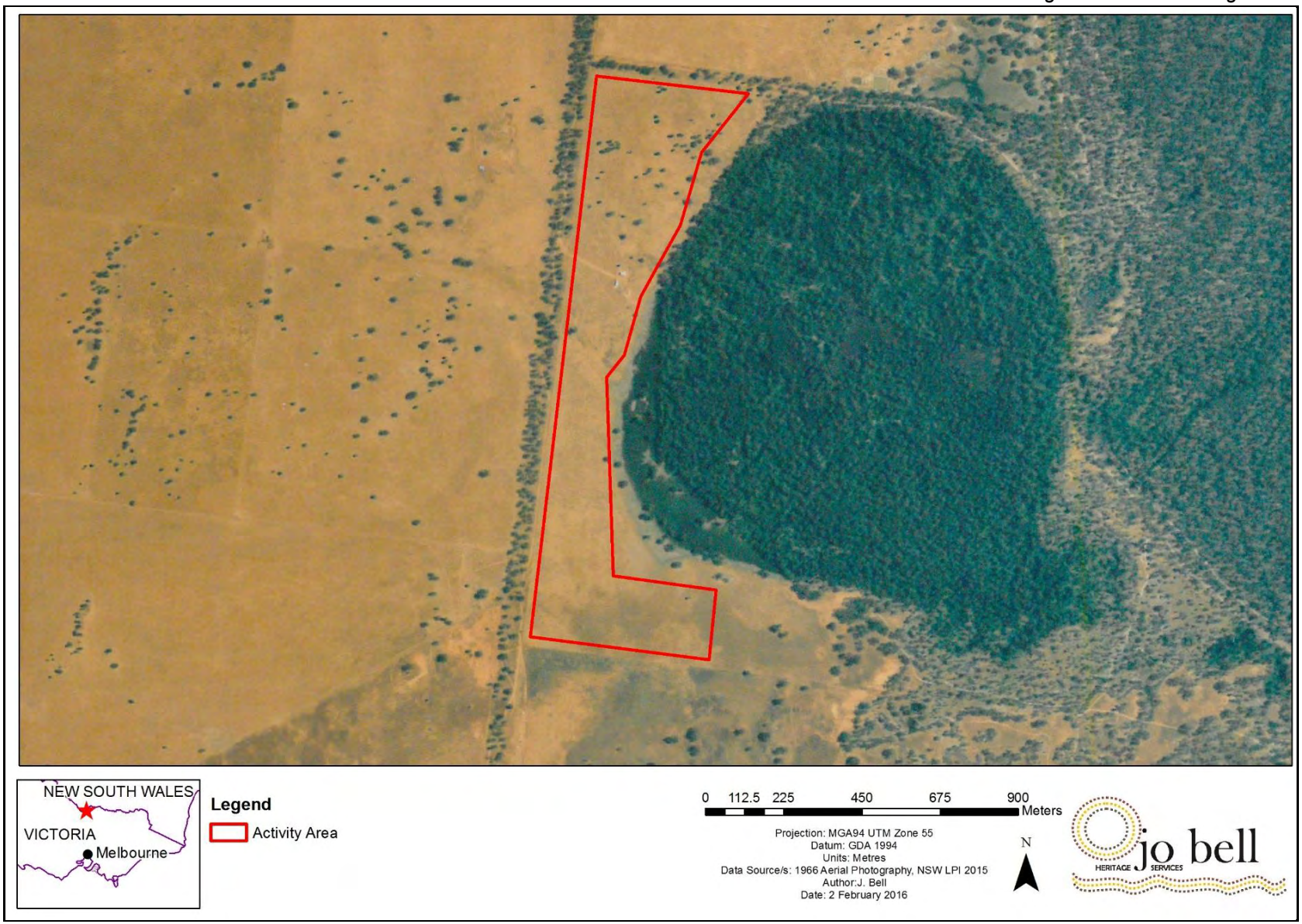


Figure 5: Aerial Photography, 1996 (source: NSW Land and Property Information)

Historic Plans

Parish of Bama

1914

The activity area is marked as leased to Thomas Light Hamling on August 18th (197 acres). The plan states that the property was gazetted on 11 July 1900. The activity area is shown as situated on the western edge of a swamp (Figure 6).

No Date

The activity area is still marked as leased to Thomas L. Hamling from August 18th (197 acres). The activity area is still shown as situated on the western edge of a swamp.

1928

The activity area is marked as leased to T. A. Hamling on November 4th (197 acres) which has been crossed out and replaced with A. J. Eddy. The swamp is not shown in this plan (Figure 7).

3.3 Previous Archaeological Work

3.3.1 Previous Archaeological Assessments

A review was made of the Aboriginal Heritage Information Management System (AHIMS) Register as part of the desktop assessment. A number of archaeological investigations have been carried out in the wider region in which the activity area is located (Table 3). Of most relevance to the activity area itself, is a site survey undertaken by Cummeragunga LALC on 29 May 2006.

According to a letter from Cummeragunja LALC Sites Officer Neville Atkinson (provided by the proponent), Mr Atkinson conducted a site survey of the 'Rushi Farm' property in 2006. In conclusion, Mr Atkinson states

> 'The proposed quarry sites [are] in the general area where land has been cultivated over a long period of time for cereal cropping…There were no visible signs of any Aboriginal heritage listings suggesting the possibility of finding any on the surface in the near future is very remote taking into consideration all the previous land disturbance that has taken place in the past'.

Presumably, the survey took place only for the two quarry sites that are currently in existence and not the rest of the property that is currently being investigated. It should be noted that whilst the statement considers surface material, it does not make any consideration of the potential for *buried* Aboriginal cultural heritage to be identified during works.

Figure 6: Historic plan of Parish of Bama, County of Cadell, 1914 (source: NSW Land and Property Information)

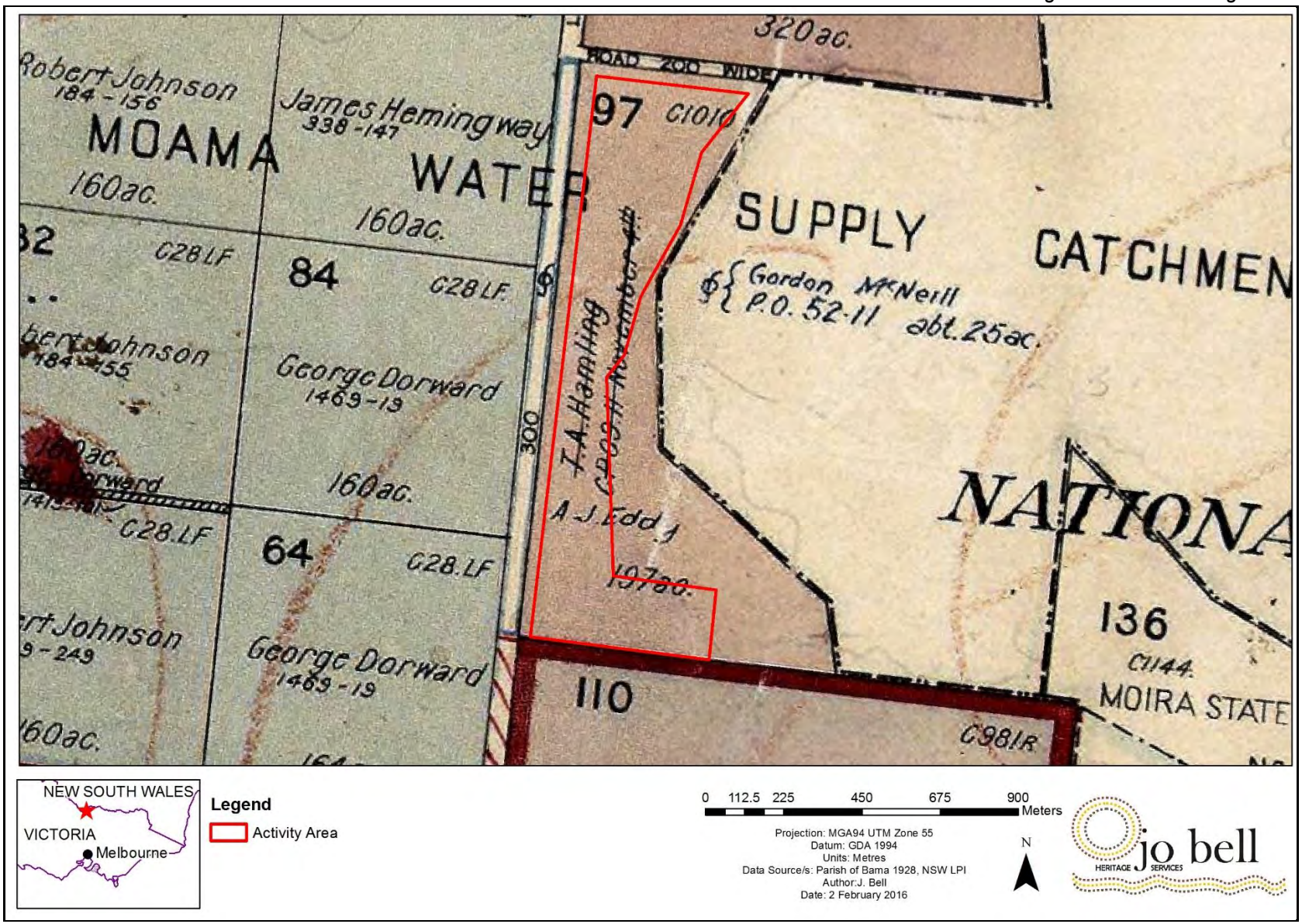


Figure 7: Historic plan of Parish of Bama, County of Cadell, 1928 (source: NSW Land and Property Information)

In terms of archaeological investigations undertaken of similar landforms as exist within the current activity area, the most relevant are summarised below.

Lance, A. & Webb, S. G. 1985
An Archaeological Investigation of a Sand Dune on the Murray River at Moama, NSW. Report to the NPWS, NSW. ANU Archaeological Consultancies: Canberra.

This study reports on an investigation of a sand quarry 2km east of Moama, which was prompted by reports of human remains at the property (up to 15 individuals). An inspection of the site resulted in the identification of the skeletal remains of a child at the site. A number of 1x1m pits and auger holes were excavated on the property. No human remains were identified during the excavation however the remains of a further two individuals were identified in some spoil dumps. The report assesses the site as of relatively low scientific significance and claims that the reports of 15 individuals being removed from the site as 'exaggerated'. The report considered it unlikely that additional remains would be found at the property.

Lance, A. 1985
An Archaeological Investigation of the Algeboia Shell Midden in the Moira State Forest, Murray Valley, NSW. Report to the Forestry Commission of NSW. ACT Archaeological Consultancies: Higgins.

This report details the results of an investigation into a shell midden situated on a low sandy rise bordering the Murray River floodplain that was disturbed by quarrying. The site is located only 3km northeast of the activity area. The site contained freshwater mussel shell, fish and mammal bones, one stone flake, one hammerstone and scarred trees. An excavation of the site was carried out revealing a deposit of shell, bone, charcoal, stone artefacts and clay. The site was dated to 1,100 BP.

Edmonds, V. 1990
An Archaeological Survey of the Proposed Echuca-Moama RSL and Citizen's Club Site, Moama, New South Wales. Report prepared for Echuca-Moama RSL and Citizen's Club Ltd.

Edmonds conducted a survey of the 4ha site, located 1km northwest of Moama. No Aboriginal sites were identified during the survey.

Lloyd, A. 1993
Archaeological Survey of Proposed Moama Sewerage Treatment Works, Moama, New South Wales. Report to Moama Shire Council.

Lloyd surveyed an area of 431ha north of Moama (11.5km southwest of the activity area). A total of 18 scarred trees and one mound were recorded during the survey. Lloyd suggests that scarred trees and mounds are likely to occur across all landform types 'rather than being landform specific'.

Craib, J. L. 1991
Archaeological Survey of the Moira-Millewa State Forests. Report for National Parks and Wildlife Service.

Craib surveyed an area of the Moira-Millewa forest, 20km north of Moama. A total of 146 sites including burials, mounds, middens, scarred trees and artefact scatters were identified during the survey across a variety of landforms. Based on the results of the survey, together with Bonhomme's 1990 survey results from the Barmah Forest, Craib developed a prediction model for the Moira-Millewa forest area. The current activity area contains sand dunes which,

according to Craib's prediction, could contain open artefact scatters and burials in low densities and mounds in higher densities.

Stone, T. 1999

An Archaeological Survey of the Corridor of a Proposed Levee Bank near Moama, NSW. A report to Sinclair Knight Merz.

Stone surveyed a 5km corridor north of Moama. No Aboriginal sites were identified during the survey.

Navin Officer Heritage Consultants 2009

Deniliquin to Moama 132kV Transmission Line Route: Aboriginal and Historical Archaeological Assessment. A report to Sinclair Knight Merz.

Navin Officer Heritage Consultants conducted a survey of a 69km alignment between Moama and Deniliquin. Nine scarred trees were identified during the survey of the alignment, none of these were close to the activity area.

Table 3: Summary of Previous Archaeological Investigations in the Region

Investigation	Location / Survey Type	Landform	Results
Lance, A. & Webb, S. G. 1985 *An Archaeological Investigation of a Sand Dune on the Murray River at Moama, NSW*. Report to the NPWS, NSW. ANU Archaeological Consultancies: Canberra.	Sand quarry 2km east of Moama Foot survey and test excavations	Sand dune, 300m from Murray River main channel	Ancestral remains of 3 individuals identified in spoil. No remains identified during test excavations. Excavations and augering to a depth of 2.7m. Unit A - humic-rich soil horizon overlying Unit B - red sand horizon (some charcoal associated with carbonized tree roots), overlying Unit C - mottled red sand (leached from Unit B), overlying Unit D – yellow sand (horizontal bedding planes), overlying Unit E – riverine clays
Lance, A. 1985 *An Archaeological Investigation of the Algeboia Shell Midden in the Moira State Forest, Murray Valley, NSW*. Report to the Forestry Commission of NSW. ACT Archaeological Consultancies: Higgins.	Moira State Forest Foot survey and excavation	Low sandy rise bordering Murray River floodplain	Shell midden disturbed through quarrying. Site contained freshwater mussel shell, fish and mammal bones, charcoal, stone flake, a hammerstone and scarred trees. Dated to 1,100 years BP
Edmonds, V. 1990 *An Archaeological Survey of the Proposed Echuca-Moama RSL and Citizen's Club Site, Moama, New South Wales*. Report prepared for Echuca-Moama RSL and Citizen's Club Ltd.	4ha area for the Echuca –Moama RSL site, 1km northwest of Moama Foot survey	Floodplain – 500m from northern bank of Murray River	No cultural heritage identified

Investigation	Location / Survey Type	Landform	Results
Bonhomme, T. 1990 *An Archaeological Survey of the Barmah Forest*. Report prepared for Victoria Archaeological Survey and Department of Conservation and Environment.	Barmah Forest, Victoria 9km north of Barmah township Foot Survey of linear transects for sampling	Varied – River and creek margins, floodplain, sand dunes and plains	182 Aboriginal sites recorded, including scarred trees, mounds, burials and stone artefact scatters
Craib, J. L. 1991 *Archaeological Survey of the Moira-Millewa State Forests*. Report for National Parks and Wildlife Service.	Moira-Millewa State Forests, 20km north of Moama Area foot survey	Varied – River and creek margins, floodplain, sand dunes and plains	146 Aboriginal sites recorded, including burials, mounds, middens, scarred trees and artefact scatters
Lloyd, A. 1993 *Archaeological Survey of Proposed Moama Sewerage Treatment Works, Moama, New South Wales*. Report to Moama Shire Council.	431ha north of Moama Foot survey	Plain	18 Scarred trees and one mound identified
Stone, T. 1999 *An Archaeological Survey of the Corridor of a Proposed Levee Bank near Moama, NSW*. A report to Sinclair Knight Merz.	5km linear alignment, north of Moama Foot survey	Plain, terrace edge of Murray River	No cultural heritage identified
Navin Officer Heritage Consultants 2009 *Deniliquin to Moama 132kV Transmission Line Route: Aboriginal and Historical Archaeological Assessment*. A report to Sinclair Knight Merz.	69km linear alignment between Moama and Deniliquin Field Inspection	Varied	9 scarred trees were identified

3.3.2 Aboriginal Heritage Information Management System (AHIMS) Register Search

A Basic Search of the AHIMS was conducted on 22 October 2015 (Client Service ID: 196232). The results indicated that one Aboriginal site had been recorded in the vicinity of the activity area.

An extensive search of AHIMS has indicated that there are 59 sites within a 10km radius of the activity area. These sites include an Aboriginal place, burials, an ochre quarry, fish traps, ovens, mounds, scarred trees, mythological sites, and mixed sites located primarily on river bank and flood plain landforms.

There is one Aboriginal site located east of the activity area, in the swamp. The site is *Many Waters Scar Tree 4* (Site ID 54-5-0248). The environmental context of the scarred tree is given as 'Lagoon', 'Stream bank' and 'Open forest' (Figure 8).

The tree is a healthy standing Red Gum with a single scar. The condition of the tree is given as 'Good'. The scar measures 0.85m in length and 0.14m in width. It is 1.2m above the ground surface level. The orientation of the scar is south east. The presence of axe marks is 'indeterminate'. There are no recommendations for protecting the tree as it was not seen as being under any threat at the time of recording.

3.3.3 Aboriginal History and Ethnography

There is evidence that Aboriginal people have been present in the Murray-Darling Basin for at least 40,000 years (NSW NPWS 2003:95). However there appears to be little agreement about the location of the boundaries of the Aboriginal groups to the north of the Murray River in the vicinity of the study area for this investigation.

The Riverina bioregion of NSW was occupied by various traditional Aboriginal groups that lived on the Hay Plain and around the rivers. These included the Wiradjuri, Nari-Nari, Mudi-Mudi, Gurendji, Yida-Yida, Bangerang, Yorta-Yorta, Baraba-Baraba, Wamba-Wamba, Wadi-Wadi and Dadi-Dadi communities (*Ibid.*). The rivers of the region were integral to the traditional Aboriginal economy, especially as a source of food (*Ibid*.). According to Pardoe (1988) access to the resources of major river systems in the region was a privilege inherited by generation upon generation of the local indigenous groups.

According to the NSW NPWS (2003:95) the Bangerang people were located around the Moama region. The Bangerang used the Murray River extensively, travelling the river in bark canoes (*Ibid*.). Evidence of Aboriginal presence commonly found along the river systems include human burial sites, camping sites, scarred trees and middens (*Ibid*.).

The Murray supplied the Bangerang with Murray cod and shellfish, while nuts, fruit and tubers were found in the river's surrounds (NSW NPWS 2003:95). The Bangerang may have joined the Wiradjuri and Monaro groups to participate in the summer feasts of Bogong moths in the alpine country (*Ibid.*).

Howitt, on the other hand believed that the Baraba-baraba language group was located within the country extending "from Mathoura between Deniliquin and Moama on the south to Jerilderie or Narandera on the east, to Moulemein on the south east and Dry Lake on the north east" (1996:52-3).

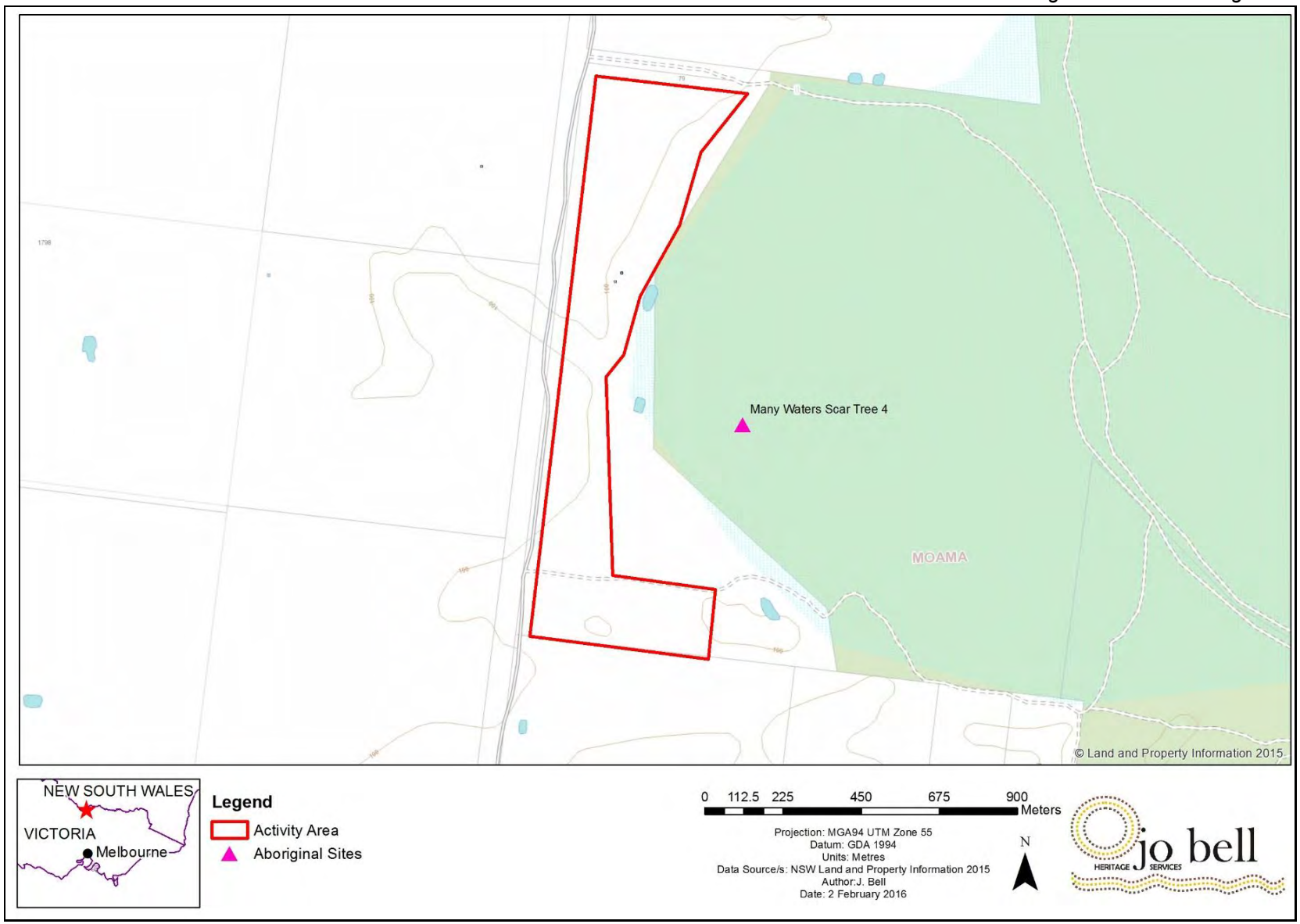


Figure 8: Location of registered Aboriginal sites within 1km of the Activity Area

Tindale's reconstruction of language groups in the area names Jotijota as occurring on the Murray 'from east of Cohuna to Echuca and a point 30km by river west of Tocumwal, along Tullah Creek to Yielima, at Tuppal, Conargo and Deniliquin in NSW' (1974:194). The group was reported in 1842 as visiting the Murrumbidgee River (*Ibid*.). Tindale believes that Curr mistakenly included two of Jotijota's hordes in his Pangerang horde list (Ngarrimowro and Woolithiga) (*Ibid*.).

Contact

By the 1830s, the effects of European settlement could be seen when diseases such as influenza, smallpox and syphilis ravaged the Bangerang community (NSW NPWS 2003:95). A census of Aboriginal people in 1845 estimated there were about 2,000 living in the Murrumbidgee Pastoral District, including 100 at Thomas Mitchell's station near what is now Albury, 300 near Deniliquin, and 200 at Urana on the eastern boundary of the Riverina Bioregion (*Ibid*.). Middens, which are often thought to have reflected the high population of the eighteenth century, became deserted, with midden material used in place of gravel by the Europeans (*Ibid*.). Some aspects of traditional Aboriginal life continued through the 1840s and 1850s but by the 1870s important ceremonies such as corroborees began to attract the interest of settlers who encouraged them as a form of entertainment by paying surviving group members to perform them (*Ibid*.).

The 1870s also saw Aboriginal people forced off their traditional lands with the men coerced into employment on local stations or encouraged to live in towns (NSW NPWS 2003:96). The women were forced to work as domestic servants and often bore settlers' children (*Ibid*.).

While the authors have attempted to provide an account of the available historical literature, this may not necessarily be accepted by descendants of traditional custodians or RAPs.

3.3.4 Summary of Previous Site Prediction Models

Previous site prediction models for sand sheet and dune landforms in particular have suggested that open artefact scatters and burials will occur in low densities, whilst mounds would be identified in higher densities. Scarred trees and mounds are likely to occur across all landform types. Shell middens are most likely to be found associated with low sandy rises overlooking the Murray River. The one cultural deposit that has been dated indicates a date of 1,100 years BP.

3.4 Summary

The results of the desktop assessment indicates that the activity area comprises undulating sand dune and sand sheet landforms, associated with the Cadell Fault and the Echuca Depression. Previous archaeological investigations in the vicinity of the activity area indicate that stone artefact scatters, mounds, scarred trees and burials are likely to be found in association with these landforms.

3.5 Site Prediction Model

Based on the results of the desktop assessment, it is predicted that scatters of stone artefacts and mounds or hearth material are the most likely site types to be found in the activity area, and usually occur relatively close to the surface. These site types are likely to represent campsites and stone working areas as the undulating sand hills of the activity area overlook a low-lying wetland that would have provided both food and water resources. The sand hills themselves would have provided dry ground for habitation and high ground for a long-range view of the surrounding area.

It is also possible that ancestral remains could be identified at some depth within the sand deposits on the property. The likelihood of the survival of skeletal remains would depend on the amount of erosion and re-deposition of sediment, which is linked to land-use practices including clearing of vegetation and subsequent dune instability.

4.0 SURVEY

The results of the desktop assessment indicated that a survey was required to further investigate the Aboriginal cultural heritage values (if any) located within the activity area.

4.1 Survey Methodology

The field team was to consist of two archaeologists and a representative from each of the RAPs. The proposed field methodology included a systemic survey of the entire activity area as a group, walking transects where possible across the survey units, Areas 1 to 4 (after Burke & Smith 2004). This survey methodology was to include the inspection of all mature Eucalypts and exposed ground as the entire area is a landform known to be sensitive for Aboriginal cultural heritage (sand dune).

It was proposed to record any Aboriginal cultural heritage places directly onto AHIMS site recording forms. Areas of potential Aboriginal cultural heritage sensitivity identified during the surface assessment were to be noted for further investigation during subsurface testing (as necessary).

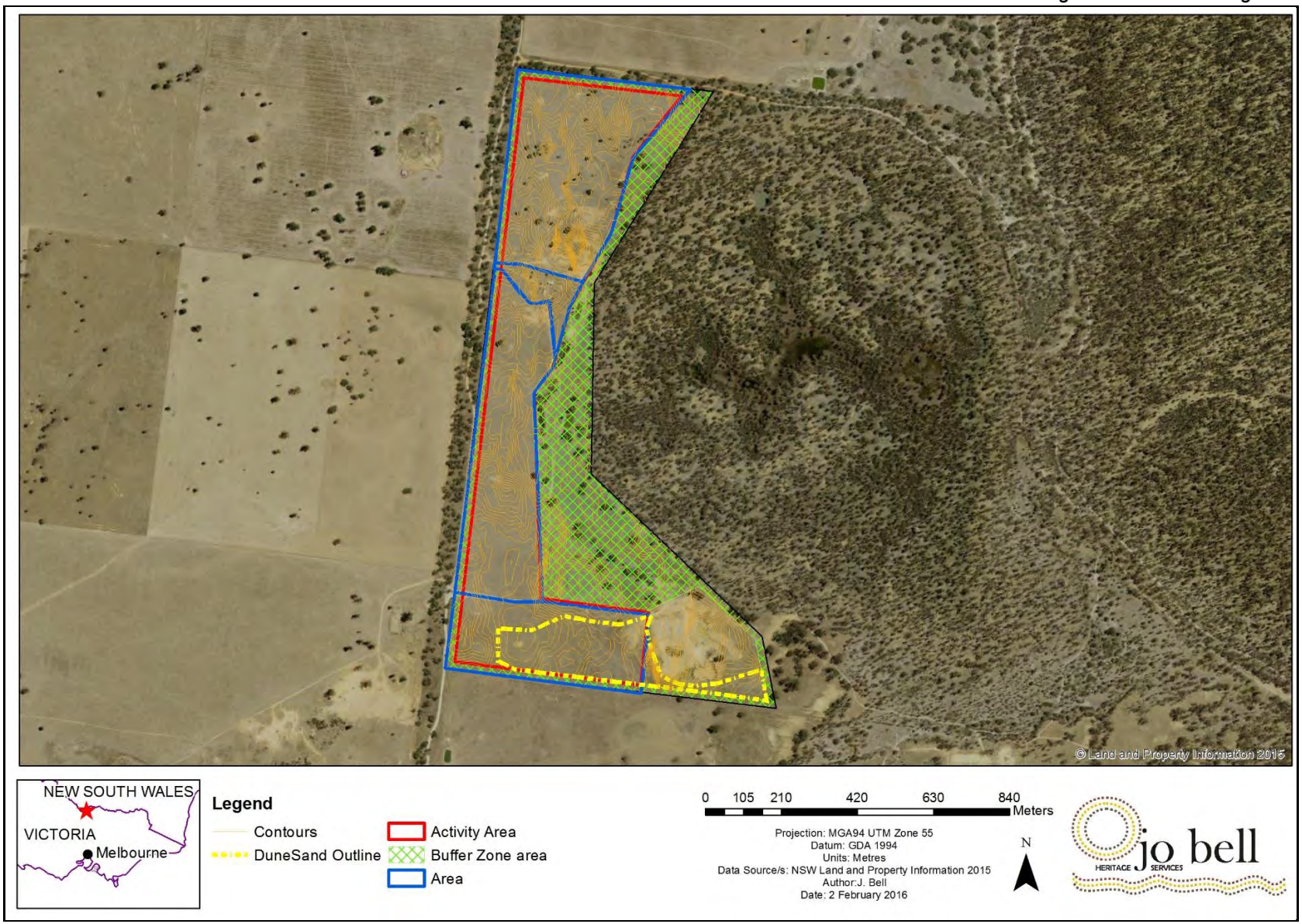
4.2 Results

The field survey was carried out over two days on 6-7 December 2015 Jo Bell and Bridget Grinter (Archaeologists, Jo Bell Heritage Services Pty. Ltd.) with Brett Hamilton (Bangerang), Mick Bourke (Yorta Yorta), John B. Kerr and John Kerr (Moama LALC) also in attendance.

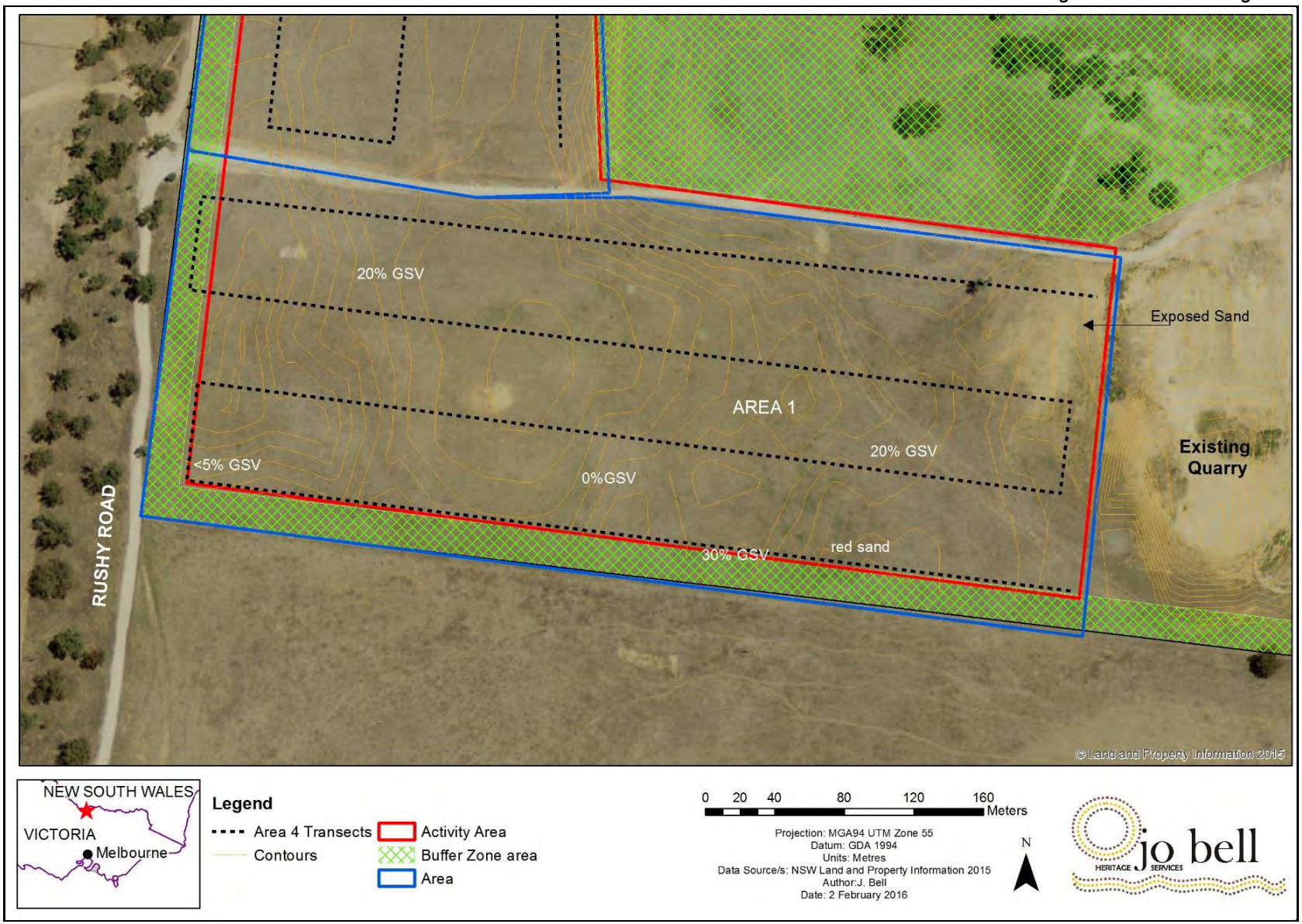
The activity area for survey was divided into survey units 1 to 4. These areas were defined by internal farm tracks, laid out across the undulating sand dune (Map 3). The activity area was surveyed on foot by the field team, focusing on exposed areas with good visibility (Map 4 series; Plates 1-2). The buffer zones, which will not be subject to ground disturbance, were not assessed.

Visibility and exposure in the activity area was quite variable, ranging between 0% where weed and grass growth was high to 100% where crop stubble had not yet given way to new growth, or the A-horizon had been completed eroded (Tables 4-5; Plates 3-4).

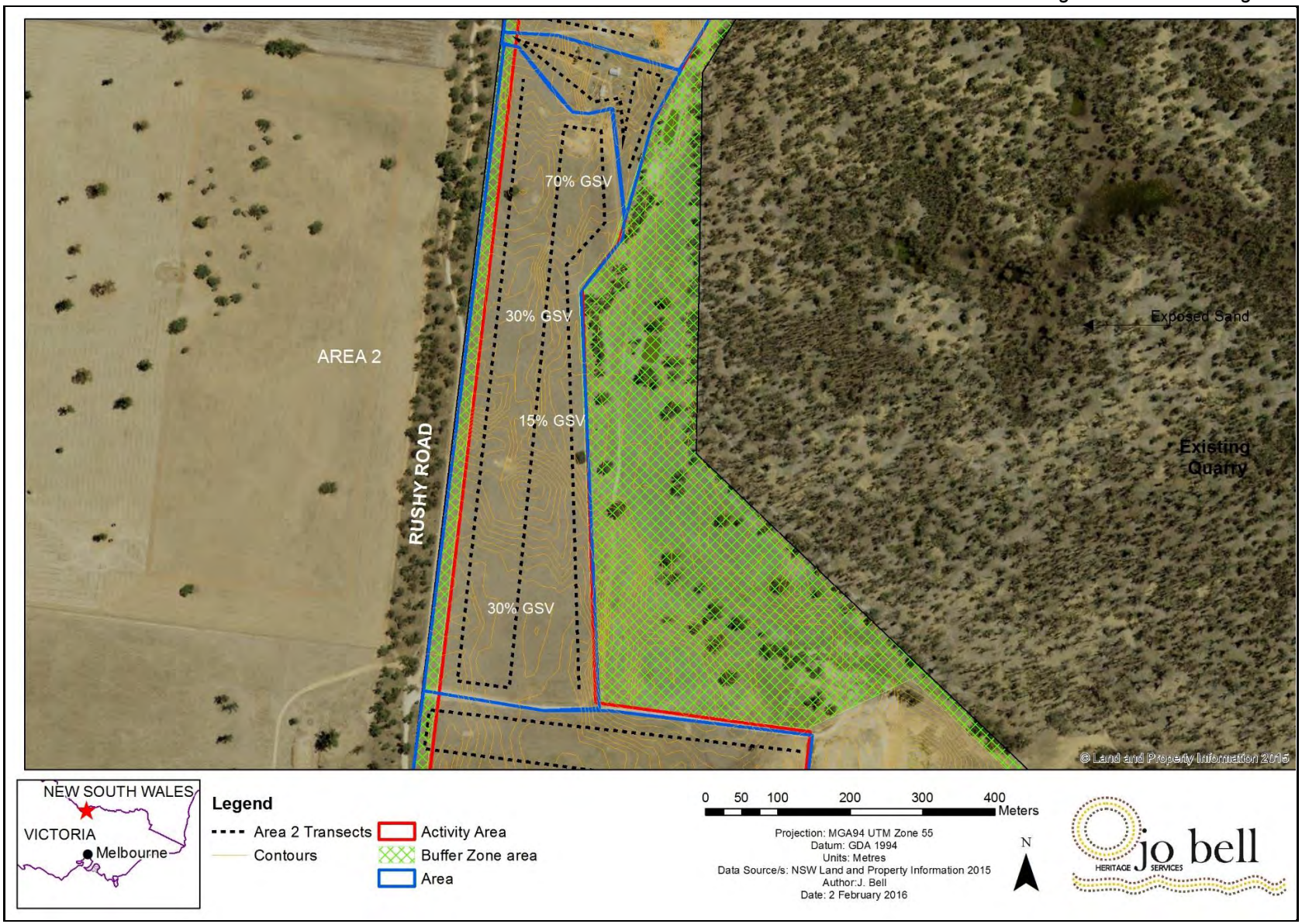
The activity area as a whole, contained very few trees. Isolated mature Eucalypts were mostly confined to Area 3 (see Plate 4). These were all examined in detail, however none showed evidence of cultural scarring. A small stand of young regrowth Eucalypts were identified in Area 2 within the buffer zone. A shallow saddle between two rises in Area 2 was also noted, acting as an ephemeral drainage line (see Plate 2). A house site, sheds, garden and slope down to a nearby dam comprised Area 4. Areas 1-3 had been planted (and harvested) to either oats or vetch. Geotechnical test pit and bore locations were also observed throughout the activity area (see Plate 1).



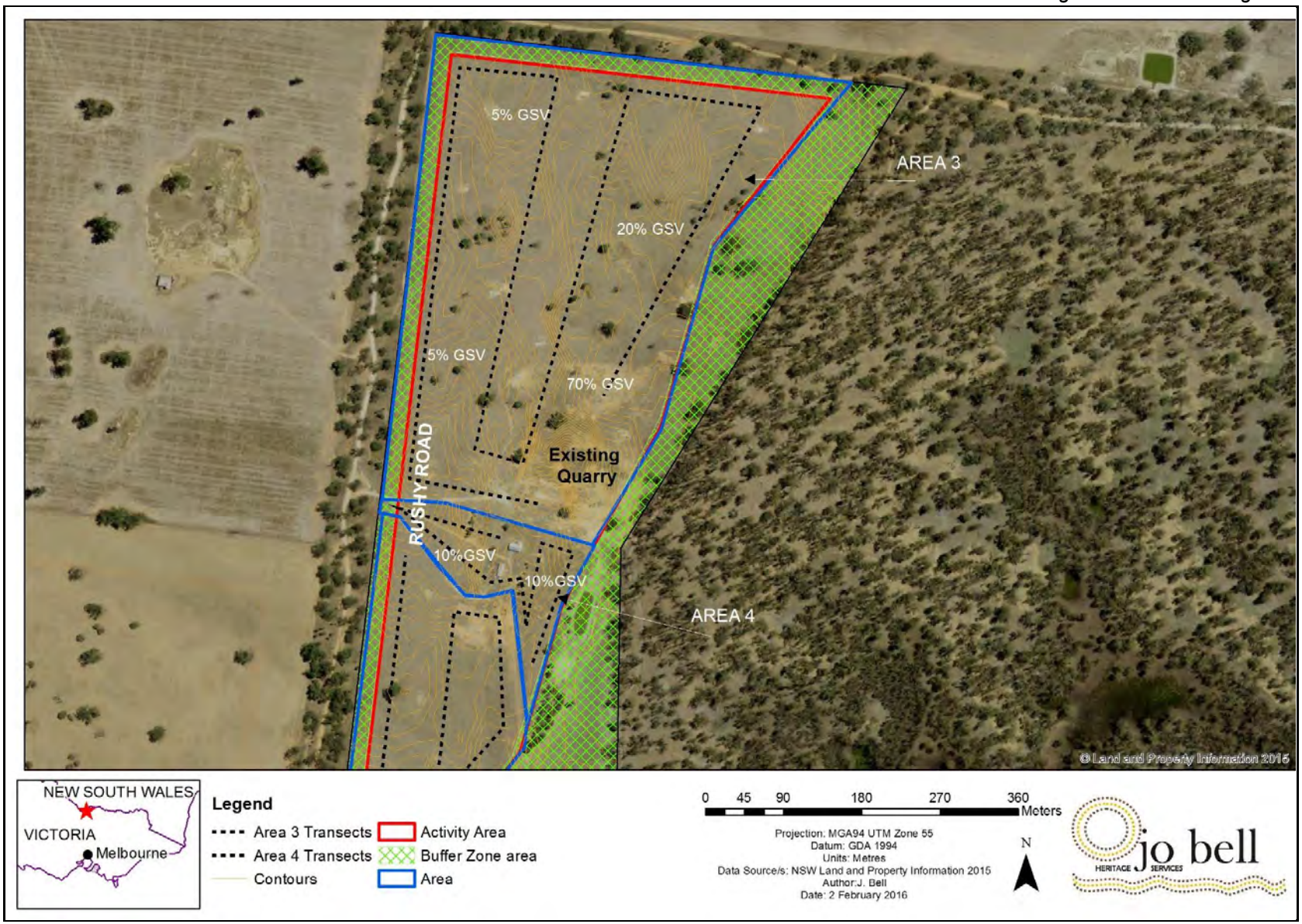
Map 3: Survey Units and Landforms in the activity area



Map 4a: Survey Results – Area 1



Map 4b: Survey Results – Area 2



Map 4c: Survey Results – Areas 3 &4

Table 4: Estimated Survey Coverage

Survey Unit	*Landform*	*Survey Unit Area (square metres)*	*Visibility (%)*	*Exposure (%)*	*Effective Coverage Area (square metres)*	*Effective Coverage (%)*
Area 1	Sand dune / sheet	117,000	20	60	14,040	0.12
Area 2	Sand dune / sheet	164,000	40	50	32,800	0.2
Area 3	Sand dune / sheet	190,000	50	40	38,000	0.2
Area 4	Sand dune / sheet	21,000	10	10	210	0.01

Table 5: Estimated Landform Coverage

Landform	*Landform Area (square metres)*	*Area of Landform Effectively Surveyed (square metres)*	*% of Landform Effectively Surveyed*	*Number of Sites*	*Number of Artefacts or Features*
Sand sheet / dune	492,000	85,050	0.172	3	60+

Plate 1: Area of excellent ground surface visibility in Area 1. Note backfilled geotechnical testing trench, facing 80º (Photo: J.Bell 6/1/2016)

Plate 2: Looking down at Area 2 from top of hill and good ground surface visibility, facing 190º (Photo: J.Bell 6/1/2016)

Plate 3: Area 1 showing limited ground surface visibility, looking towards existing quarry, facing 90º (Photo: J.Bell 6/1/2016)

Plate 4: Area 3 showing plough furrows and isolated trees, facing 190º (Photo: J.Bell 6/1/2016)

4.2.1 Aboriginal Cultural Heritage

No Aboriginal cultural heritage was identified in Areas 3 or 4.

Two isolated artefact occurrences were identified in Area 2: one in the northern sector of the survey unit, south of the shed in the cropped paddock (***Moama Sand Quarry Artefacts 1***); and another in the southern sector of the survey unit, close to the access track in the cropped paddock (***Moama Sand Quarry Artefacts 2***). A dense artefact scatter was identified close to the current extent of the southern extraction pit (Excavation Site 1) (***Moama Sand Quarry Artefacts 3***) (Map 5). These are described further below. AHIMS registrations are detailed in Table 6.

Moama Sand Quarry Artefacts 1 (AHIMS 59-2-0017)

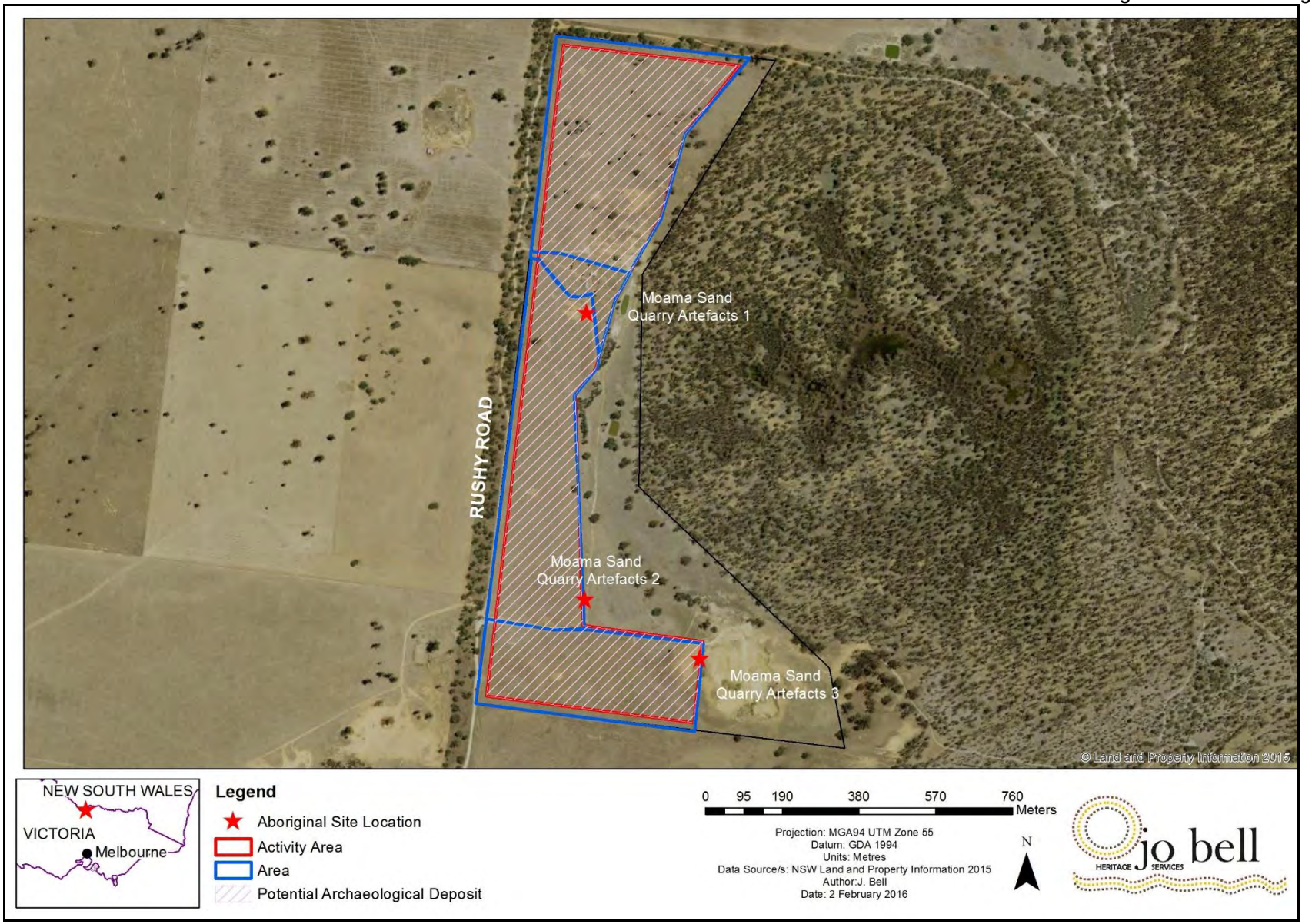
This Aboriginal place is represented by two flaked quartz artefacts; a flake and a core, situated approximately 18m apart in a ploughed paddock. The artefacts were found towards the top of a dune at an elevation of 106.826m (AHD). The place does not represent an *in situ* deposit (Figure 9; Plate 5). Artefact analysis is provided in Appendix 3.

Plate 5: Context of *Moama Sand Quarry Artefacts 1* in Area 2 (Photo: J.Bell 7/1/16)

Moama Sand Quarry Artefacts 2 (AHIMS 59-2-0018)

This Aboriginal place is represented by a single mudstone axe blank, identified exposed in a ploughed paddock near an access track at an elevation of 106.275m (AHD). The artefact does not represent an *in situ* deposit (Figure 10; Plate 6). Artefact analysis is provided in Appendix 3.

Plate 6: *Moama Sand Quarry Artefacts 2* (Photo: J.Bell 7/1/16)



Map 5: Location of sites and PADs in the Activity Area

Table 6: Results – Sites Identified during the Survey

Site Number	***Feature(s)***	***Survey Unit***	***Landform***
Moama Sand Quarry Artefacts 1 (AHIMS 59-2-0017)	Artefact Scatter	Area 2	Sand sheet
Moama Sand Quarry Artefacts 2 (AHIMS 59-2-0018)	Artefact Scatter	Area 2	Sand sheet
Moama Sand Quarry Artefacts 3 (AHIMS 59-2-0019)	Artefact Scatter	Area 1	Sand dune

Figure 9: Context of Moama Sand Quarry Artefacts 1 (AHIMS 59-2-0017)

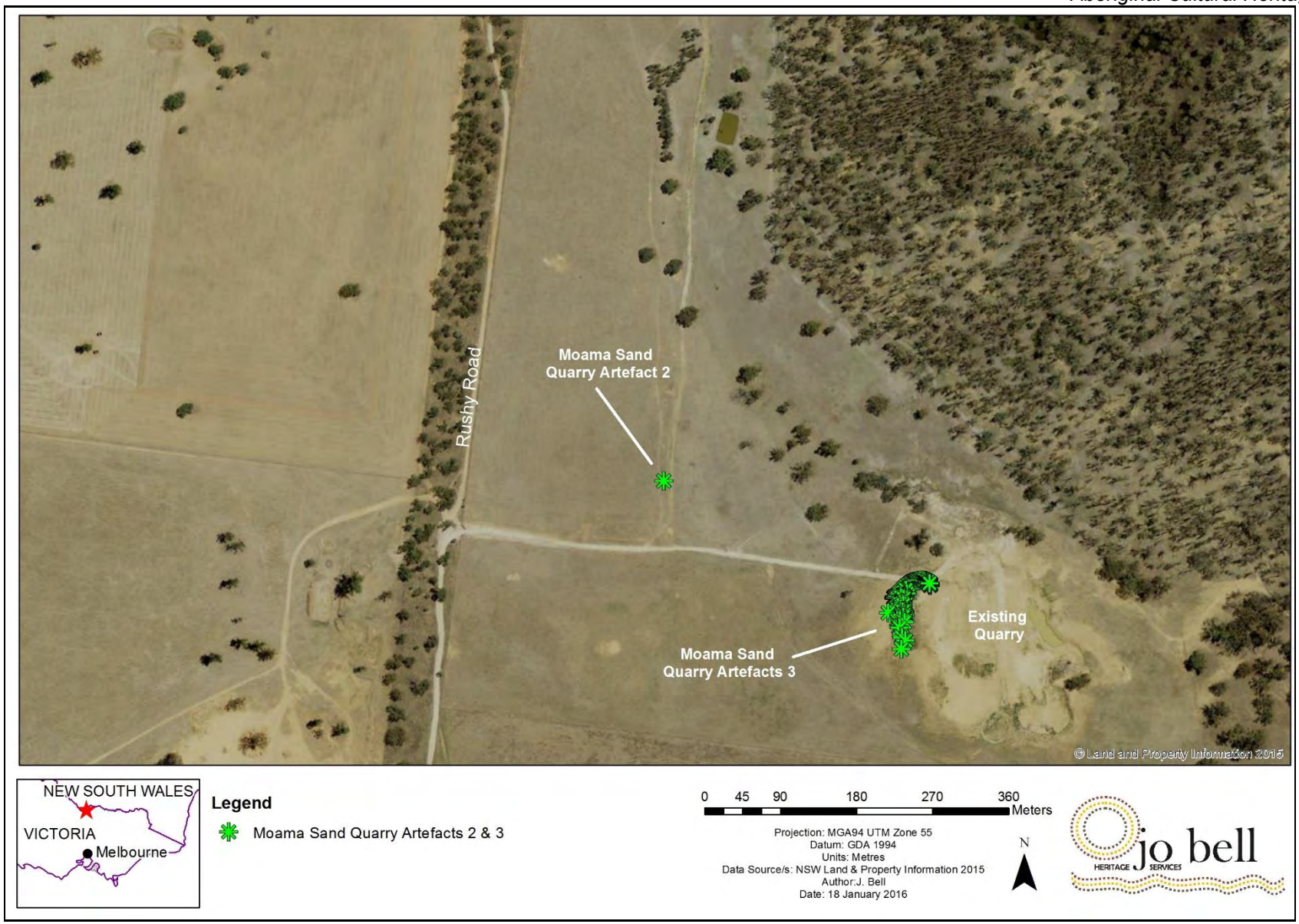


Figure 10: Context of Moama Sand Quarry Artefacts 2 (AHIMS 59-2-0018) and 3 (AHIMS 59-2-0019)

Moama Sand Quarry Artefacts 3 (AHIMS 59-2-0019)

This Aboriginal place is represented by a scatter of stone artefacts exposed in disturbed sand on the edge of the existing extraction pit in the southern sector of the property (see Figure 10; Plates 7-8). The topsoil has been scalped and stockpiled as part of the extraction process. The exposed cultural heritage lies at an elevation of between 99.5m and 100.6m (AHD). Artefacts were identified exposed in the wall of the extraction pit as well as on top of the as yet unexcavated portion. A sample of the artefactual material was analysed (see Appendix 3), and included smoky quartz, crystal quartz, rose quartz, milky quartz, quartzite and silcrete. Artefact types included complete flakes, broken flakes, angular fragments and cores. Charcoal was also identified embedded in the exposed and crusted B-horizon. Its origin or significance could not be determined without excavation.

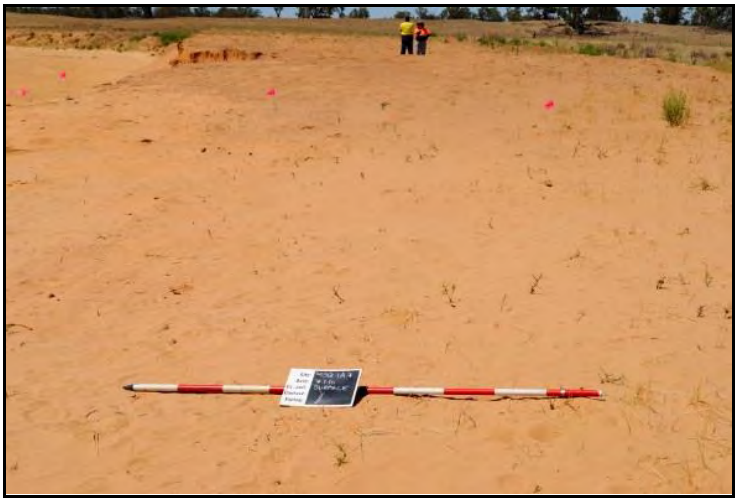


Plate 7: Context of surface exposure associated with *Moama Sand Quarry Artefacts 3* in Area 1, facing 170º (Photo: J.Bell 7/1/16)

Plate 5: Sample of stone artefacts from *Moama Sand Quarry Artefacts 3* (Photo: J.Bell 7/1/16)

Potential Archaeological Deposits (PADs)

The activity area comprises a sector of sand dunes associated with the Cadell Fault to the west, overlooking a wetland area to the east. Similar dune landforms in the area, both to the west and east, have been shown to contain ancestral remains, shell midden, mound and hearth material, artefact scatters and scarred trees. Dating of shell and charcoal indicate an age of approximately 1,100 years BP.

Geotechnical testing has identified 'dune sand' in the south of the activity area (Area 1) and other sand deposits within Areas 1-3. On this basis, the entire activity area must be identified as a PAD as these areas are likely to contain Aboriginal cultural heritage (see Map 5).

4.3 Oral History

No oral history about the activity area was provided during the field assessment or meetings.

4.4 Analysis & Discussion

In accordance with the site prediction model for the region, three stone artefact scatters were identified within the activity area. Additionally, the sand deposits of the activity area were also considered by all team members as representing potential archaeological deposits. Despite ploughing and cropping, the geomorphology of the area suggests that these landforms most likely have not been significantly disturbed.

During the meeting on 18 March 2016, John Kerr stated that he believed it was likely that the artefacts from the two northern-most sites (Moama Sand Quarry Artefacts 1-2) originated from the southern-most site (Moama Sand Quarry Artefacts 3), which is the large *in situ* deposit, located between the sandy rise and the wetland. He also indicated that he felt that the southern area was much more sensitive than the northern area, a point of view which was reiterated by both Brett Hamilton and Wade Morgan.

4.5 Summary

In summary, the entire activity area was walked by the survey team in linear transects. The activity area comprises an extensive sand sheet associated with the Barmah Sand hills. Ground surface visibility was variable across the study area. Three Aboriginal sites were identified during the assessment, all artefact scatters. The activity area as a whole has been identified as a potential archaeological deposit.

5.0 SIGNIFICANCE ASSESSMENT

Cultural significance is a concept which assists in estimating the value of places. Places that are likely to be of significance are those which aid in the understanding of the past or enrich the present, and which will be of value to future generations.

In the Burra Charter (Australia ICOMOS 1999), cultural significance means "aesthetic, historic, scientific or social value for past, present or future generations".

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use.

Historic value encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section.

A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives *in situ*, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.

Social value embraces the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a majority or minority group.

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantial information.

Scientific value assesses research potential and representativeness which has been developed by Bowdler (1984) and complements the assessment of scientific value as described by Australia ICOMOS (1999). Research potential is defined by the *contents* and *condition* of an archaeological site. Representativeness is defined by the frequency with which a particular site type occurs within a particular region or group of related landforms. The methodology developed by Bowdler (1984) assesses whether a site is of common, occasional or rare occurrence within a region.

In 2001, Australia ICOMOS adopted a Statement on Indigenous Cultural Heritage which recognises among other things that

* Indigenous cultural perspectives require an integrated view of heritage which includes social significance and natural features and landscapes, which are given meaning through culture; and that
* The Indigenous cultural heritage significance of places can only be determined by the Indigenous communities themselves.

An assessment of the social, aesthetic, historic and scientific significance of the sites identified in the activity area is presented below. Further investigation (sub surface testing) may identify additional sites, which will also require significance assessment prior to the preparation of an AHIP application (if required).

The significance assessment of each Aboriginal site was discussed in depth at the meeting held on 18 March 2016. The results are as follows.

5.1 Moama Sand Quarry Artefacts 1 (AHIMS 59-2-0017)

This Aboriginal site is represented by two flaked quartz artefacts, identified in a disturbed context (see Section 4.2.1).

In terms of aesthetic, social and historic significance, John Kerr stated that the Aboriginal site was of low cultural significance because the paddock had essentially been cleared and ploughed, only two artefacts were identified and neither were *in situ*. Brett Hamilton and Wade Morgan concurred that the site was of low significance.

In terms of scientific significance, the site is represented by a limited number and range of cultural materials, which are not in their original context. The site type is also known to commonly occur within the landscape units being assessed. It is assessed as having low scientific significance.

5.2 Moama Sand Quarry Artefacts 2 (AHIMS 59-2-0018)

This Aboriginal site is represented by a single mudstone axe blank, identified exposed in a ploughed paddock near an access track and is not *in situ* (see Section 4.2.1).

Similarly, John Kerr, Brett Hamilton and Wade Morgan all indicated that this Aboriginal site was of low cultural significance in terms of aesthetic, social and historic values given its location.

In terms of scientific significance, the site is represented by a limited number and range of cultural materials, which are not in their original context. However, the axe blank does provide evidence of the manufacturing process of ground-edge axes. The site type is known to commonly occur within the landscape units being assessed. It is assessed as having low scientific significance.

5.3 Moama Sand Quarry Artefacts 3 (AHIMS 59-2-0019)

This Aboriginal site is represented by a scatter of stone artefacts exposed in disturbed sand on the edge of the existing extraction pit in the southern sector of the property (see Section 4.2.1).

Following discussion, John Kerr stated that since charcoal and artefacts were found embedded in the deposit, the landscape below the scalped area was in fact relatively intact. It was also a relatively sheltered area and likely to be a campsite due to the artefact density. Brett Hamilton agreed that it was more likely to be *in situ* given its location between the hill and the wetland area. John Kerr added that the campsite was probably directly related to the use of the wetland, a point which was reiterated by Wade Morgan. All RAP representatives agreed that this site was of high cultural significance in relation to aesthetic, social and historic values.

In terms of scientific significance, the site is represented by a large and diverse range of cultural materials and artefacts. It is also largely intact with material still embedded in the deposit although slumping of sand in the excavated wall made an assessment of any potential stratification impossible. Whilst further investigation is needed to investigate and interpret the site fully, intact deposits such as this are not common in the area, having been either destroyed through extraction activities or not yet uncovered. It is assessed as having high scientific significance.

6.0 IMPACT ASSESSMENT

In terms of the proposed activity, sand extraction will require the removal or disturbance (in the case of the stockpiling of overburden material) of all deposit within the identified sand extraction areas on the property. The depth to which the activity will impact the underlying sub-strata will depend on the depth at which the underlying sand resources are found, and the depth to which the sand deposit will be extracted.

The activity therefore is likely to impact on any Aboriginal cultural heritage that may be identified within the activity area. Based on geomorphological studies, it appears that the Cadell Fault uplift, which resulted in the creation of the palaeo Lake Kanyapella, occurred at around 25-30,000 years ago, with the lunette associated with Little Kanyapella on the dry Kanyapella lake floor dating to 18.9+/-1.1Kya (Stone 2006, cited in McPherson 2012:9). Aboriginal occupation of this newly modified landscape that we know today as the Barmah Sand Hills, is likely to contain Aboriginal cultural heritage that may date to beyond the last glacial maximum. However previous investigations suggest that evidence of occupation prior to the last glacial maximum may be sporadic and/or comprise low density distributions.

The impact of the activity on known sites and areas of archaeological potential in the activity area is summarised in Table 7.

The proponent has determined that harm to the artefact scatters (*Moama Sand Quarry Artefacts 1-3*) located within the activity area can be avoided by amending the location of the extraction footprint accordingly. Stage 1 (fine sand extraction) has now been reduced to approximately 1ha, situated in the southwest corner of the property. Stage 2 (coarse sand extraction) has now been reduced to approximately 1ha, situated in the northern area, north of and adjacent to, the existing pit.

The proponent has determined that harm to the entire PAD in the activity area cannot be avoided since the nature of the extraction activity is to remove sand.

Moama Sand Quarry Artefacts 1 is not situated within an area that has been identified for sand extraction and will not be harmed by proposed extraction activities.

Moama Sand Quarry Artefacts 2 is not situated within an area that has been identified for sand extraction and will not be harmed by proposed extraction activities.

Moama Sand Quarry Artefacts 3 is no longer situated within an area that has been identified for sand extraction. Once the Aboriginal site was identified, the proponents fenced it off to prevent any further and undue harm to the site. It will not be harmed by proposed extraction activities.

The site extents of Aboriginal places, Moama Sand Quarry Artefacts 1-3, and the location of the PAD in relation to the preliminary concept plan are shown in Figure 11.

The site extents of the identified Aboriginal sites and the location of the PAD in relation to the updated proposed extraction areas are shown in Figure 12.

Table 7: Impact Assessment

Site Number	*Type of Harm*	*Degree of Harm*	*Consequence of Harm*
Moama Sand Quarry Artefacts 1	None	None	No loss of value
Moama Sand Quarry Artefacts 2	None	None	No loss of value
Moama Sand Quarry Artefacts 3	None	None	No loss of value
PAD	Direct	Partial	Total loss of value within extraction footprint

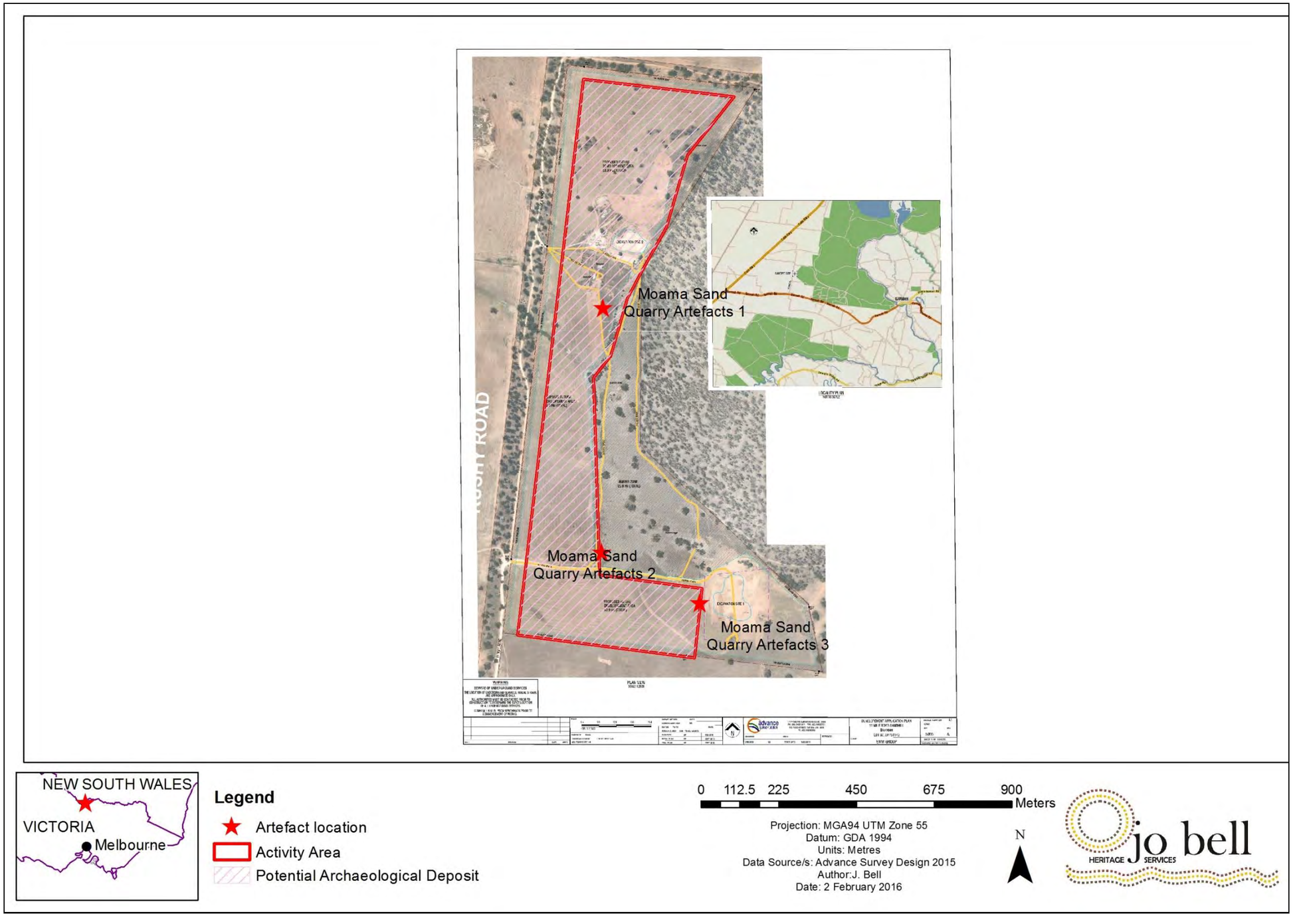


Figure 11: Sites and PADs in the activity area shown on the concept plan

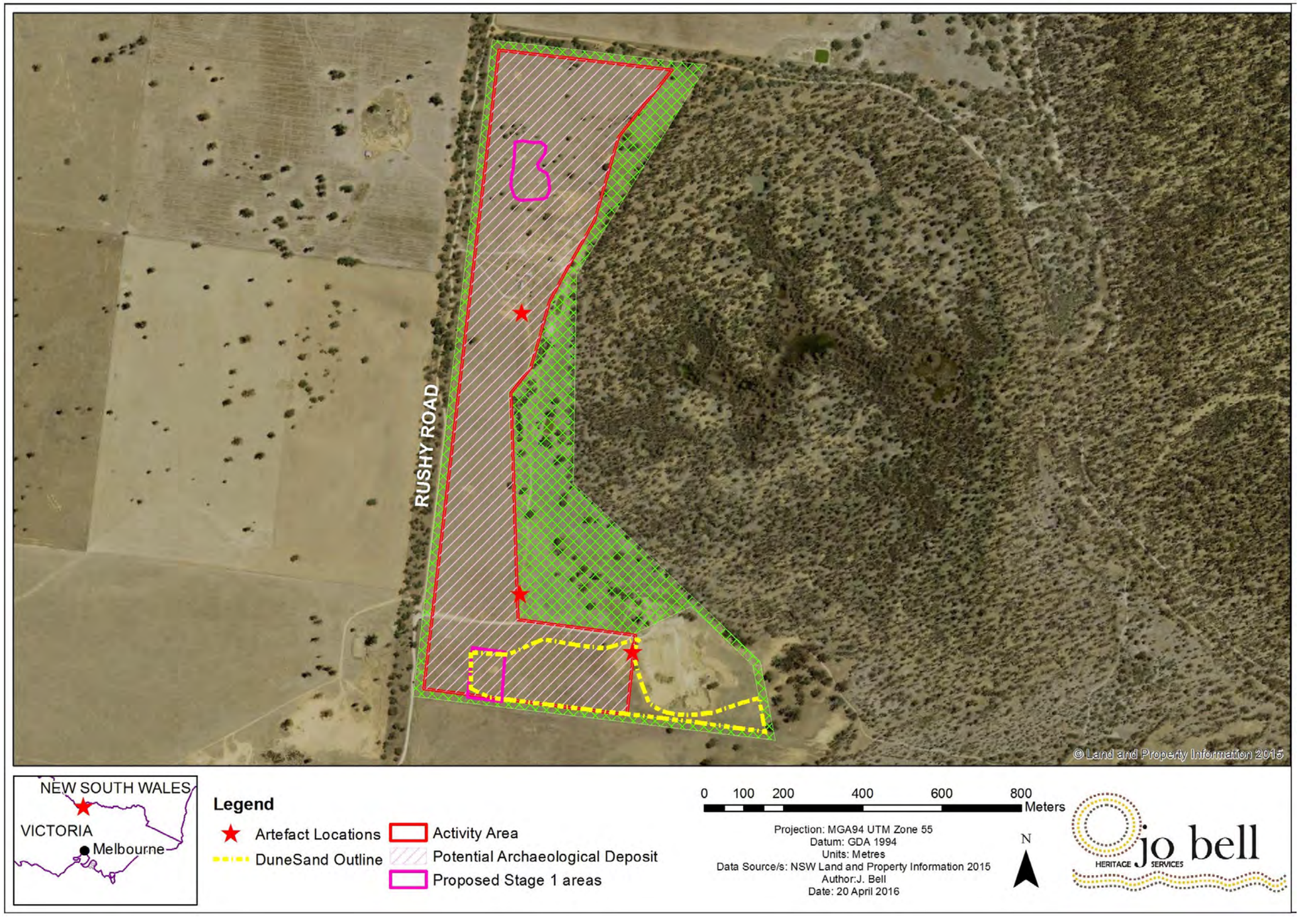


Figure 12: Sites and PADs in the activity area shown in relation to the updated proposed extraction area to avoid harm

7.0 MANAGEMENT & MITIGATION MEASURES

The artefact scatters (*Moama Sand Quarry Artefacts 1-3*) identified during the site inspection are no longer located within the impact zone of the activity. Whilst Moama Sand Quarry Artefacts 1-2 are isolated and not *in situ*, the nature and extent of Moama Sand Quarry Artefacts 3 is as yet unknown. However, the exposed portion has been fenced for protection and the proposed extraction area has been moved to avoid the area entirely.

A portion of the PAD identified during the site inspection is located within the impact zone of the activity, therefore further investigation (sub surface testing) is required so that these areas may be properly managed. Recommendations for these areas are set out in Section 8.

Aboriginal sites in NSW are primarily protected under the *National Parks and Wildlife Act* 1974. To prevent accidental harm to the artefact scatters (*Moama Sand Quarry Artefacts 1-3*) and the PAD in the activity area during the activity, recommendations to prevent harm are set out in Section 8.

In the event that Aboriginal objects are found during the conduct of the activity outside of the site extents and within the PAD areas, contingency measures are set out in Section 9. The contingency measures set out the proponent's requirements in the event that Aboriginal objects are identified during the conduct of the activity.

8.0 RECOMMENDATIONS

Following the desktop and field assessment, the following recommendations are made:

8.1 Moama Sand Quarry Artefacts 1 (AHIMS No 59-2-0017)

1. Extraction activities will not impact on this Aboriginal site. The site will not be harmed by the activity.
2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site, then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm.
3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site and there is potential for harm, then no works must commence in the area until further assessment and an Aboriginal Heritage Impact Permit (AHIP) is obtained from OEH.

8.2 Moama Sand Quarry Artefacts 2 (AHIMS No 59-2-0018)

1. Extraction activities will not impact on this Aboriginal site. The site will not be harmed by the activity.
2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site, then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm.
3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site and there is potential for

harm, then no works must commence in the area until further assessment and an AHIP is obtained from OEH.

8.3 Extraction Activities Cannot Commence near Moama Sand Quarry Artefacts 3 (AHIMS No 59-2-0019)

1. Proposed extraction activities will no longer impact on this Aboriginal site. The site will not be harmed by the proposed activity.
2. However, should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site (including the spoil from initial scalping of the area), then the site must be fenced prior to the commencement of works to protect the Aboriginal cultural heritage from harm.
3. Should any ancillary works or other activities including cropping or grazing be undertaken by the proponent within 50m of this site (including the spoil from initial scalping of the area), an AHIP must be obtained from OEH before any works can commence.

8.4 Further Assessment is Required in PAD areas

1. The entire sand sheet within the property has been identified as an area of cultural heritage sensitivity (potential archaeological deposit). However, the proponent has reduced the extent of potential harm by limiting the extraction footprint to approximately 1ha both in the southern and in the northern areas (see Figure 12). As harm cannot be totally avoided in the identified PAD, ***further assessment is required*** to investigate the actual potential for Aboriginal cultural heritage to be located within the proposed activity footprint. This work must be undertaken prior to commencement of works.

2. Further investigation must include a program of sub-surface testing but may also include the use of ground penetrating radar (GPR) as suggested by John Kerr (Moama LALC) on-site and discussed during the recommendations meeting held on 18 March 2016. The further investigation options and proposed sampling methodology must be discussed with representatives from the RAPs, OEH and the proponent.

9.0 CONTINGENCY PLANS

Aboriginal sites in NSW are primarily protected under the *National Parks and Wildlife Act* 1974. In the event that Aboriginal objects are found during the conduct of the activity, contingency measures are set out below. The contingency measures set out the proponent's requirements in the event that Aboriginal objects are identified during the conduct of the activity.

9.1 Management and Notification of Aboriginal Objects found during the Activity

The NPW Act requires that, if a person finds an Aboriginal object on land and the object is not already recorded on AHIMS, they are legally bound under s.89A of the NPW Act to notify DECCW of the object's location, as soon as possible.

In the event that new Aboriginal objects are found during the conduct of the activity, then the following must occur:

- The person who discovers Aboriginal object/s during the activity will immediately notify the person in charge of the activity;
- The person in charge of the activity must then suspend any relevant works at the location of the discovery and within 5m of the relevant site boundary;
- In order to prevent any further disturbance, the location will be isolated by safety webbing or an equivalent barrier and works may recommence outside the area of exclusion;
- The person in charge of the activity must contact a cultural heritage advisor/ archaeologist within 48hrs;
- The cultural heritage advisor/ archaeologist must contact the OEH Regional Aboriginal Heritage Division (Southern Region);
- Within a reasonable period, a decision/ recommendation will be made by the cultural heritage advisor/ archaeologist in consultation with the relevant Aboriginal stakeholder group(s) and OEH as to the process to be followed to manage the Aboriginal object/s in a culturally appropriate manner, and how to proceed with the works;
- Options for management may include:
    - Recording the site and submitting the relevant forms to the AHIMS Registrar;
    - Developing a strategy to avoid harm to the site; and/ or
    - If avoiding harm is not possible, further investigation, an impact assessment and an AHIP may be required.
- A separate contingency plan has been developed in the event that suspected human remains are discovered during the conduct of the activity.

9.1.1 Protocols for handling sensitive information

Aboriginal cultural heritage encompasses all aspects of Aboriginal culture, including tangible evidence such as stone artefacts, shell middens and ancestral remains, intangible evidence such as oral histories and song lines as well as living culture. While not all aspects of Aboriginal culture is considered sensitive, especially evidence of activities of daily living, there are some aspects that may relate to ceremony, ritual or ancestral remains that are of a particularly sensitive nature. Culturally-sensitive information is inherently bound up with cultural significance. 'If we accept that cultural significance is not an inherent quality of a place, but a social outcome resulting from people's interactions with a place, then the community itself must be the most important source of significance' (Burke & Smith 2004:245).

In the event that further Aboriginal cultural material is identified *during the conduct of the activity*, the cultural heritage advisor must ensure that any investigations undertaken in relation to the Aboriginal objects are carried out in a culturally-sensitive manner, which may include limiting access to the objects during investigations and further advising the proponent/ contractors/ employees of their obligations in relation to the culturally-sensitive nature of the heritage and their obligations in relation to the relevant legislation.

9.2 Notification of the Discovery of Skeletal Remains during the carrying out of the Activity

1. Discovery:
   - If suspected human remains are discovered, all activity in the vicinity must ***stop*** to ensure minimal damage is caused to the remains, and,
   - The remains must be left in place, and protected from unauthorised access and harm or damage.

2. Notification:
   - Once suspected human skeletal remains have been found, New South Wales Police (use the local number) must be notified immediately;
   - If there is reasonable grounds to believe that the remains could be Aboriginal, the NPWS Head Office must be immediately notified on (02) 9585 6444 or contact the Aboriginal Heritage Officer at the Heritage Branch on (02) 9873 8500 for further advice;
   - All details of the location and nature of the human remains must be provided to the relevant authorities; and
   - The remains should also be reported to the relevant Traditional Owners.

10.0 REFERENCES

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Legislation - Commonwealth

Aboriginal and Torres Strait Islander Heritage Protection Act 1984
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Satellite Imagery – Google Earth

NSW Globe (NSW Land and Property Information)

Historic Plans (NSW Land and Property Information)

- Parish of Bama, County of Cadell, 1914
- Parish of Bama, County of Cadell, 1928
- Parish of Bama, County of Cadell, no date

Aerial Photographs (NSW Land and Property Information)

- 1961 Aerial: Echuca Run 1 1082 5/46

- 1996 Aerial: Echuca 1:50000 NSW4341 M2012) Run 1 83-93
  12-12-96 7738m ASL

11.0 APPENDICES

Appendix 1: Qualifications of Cultural Heritage Advisor

Joanne Bell
Director
Jo Bell Heritage Services Pty. Ltd.

Qualifications:
BA (Hons) Archaeology, La Trobe University, Bundoora, 2000
Cert. IV Training and Assessment, ECEC 2006

Joanne is qualified in Indigenous Australian prehistory and non-Indigenous historic archaeology. She has more than fifteen years professional experience in heritage management, including development and research projects. Fields of research include Australian Indigenous archaeology, Australian historic archaeology, stone artefact analysis, cultural heritage management and heritage training.

Ashley Edwards
Project Archaeologist
Jo Bell Heritage Services Pty. Ltd.

Qualifications:
Master of Arts (Archaeology), University of New England, Armidale, 2010
BArch (Hons), La Trobe University, Bundoora, 2006

Ashley is qualified in Indigenous Australian prehistory and non-Indigenous historic archaeology. She has more than nine years' professional experience in heritage management, including development and research projects. Fields of experience include Australian Indigenous archaeology, Australian historic archaeology, stone artefact analysis and cultural heritage management.

Bridget Grinter
Project Archaeologist
Jo Bell Heritage Services Pty. Ltd.

Qualifications:
BA (Hons) Archaeology, La Trobe University, Bundoora 2008

Bridget is qualified in Indigenous Australian prehistory and non-Indigenous historic archaeology. She has more than six years' experience in the industry including survey, background research, artefact analysis and cultural heritage management.

Appendix 2: Documentation of Consultation

Consultation Record

Date	From	To	Description	Method	Notes
22 October 2015	Jo Bell (JBHS)	Moama LALC; Murray Shire Council; Murray CMA; NNTT, NTSCorp; OEH EPRG; ALR Registrar.	Letter requesting information in relation to any relevant Aboriginal people.	Letter	
27 October 2015	Joe Day, Moama LALC	Jo Bell	Response to initial letter.	Phone call	Message left
29 October 2015	Jo Bell	Joe Day, Moama LALC	Returning call.	Phone call	Joe indicated that MLALC would like to be involved and suggested that YYNAC should also be notified. He would also contact them and let them know
4 November 2015	ALR Registrar	Jo Bell	Response to initial letter.	Letter	No Registered Aboriginal owners. Suggested contacting the Moama LALC
6 November 2015	Peter Ewin (OEH)	Jo Bell	Response to request for information about relevant parties	Email / Letter	OEH provided a list of Aboriginal parties who may have an interest in the area, including Moama LALC; Deniliquin LALC; Bangerang Aboriginal Corporation; Yorta

Date	From	To	Description	Method	Notes
					Yorta Nation Aboriginal Corporation; Yarkuwa indigenous Knowledge Centre; Cummeragunga LALC; and Wakool Aboriginal Corporation
10 November 2015	Simon Arkinstall Director Environmental Services, Murray Shire	Jo Bell	Response to request for information about relevant parties	Letter	Suggested contacting Cummeragunja Land Council
10 November 2015	Sylvia Jagtman Senior Case Management Assistant, NNTT	Jo Bell	Response to request for information about relevant parties		No Native Title claims or Land Use Agreements for the activity area.
10 November 2015	Ashley Edwards (JBHS)	Riverine Herald	EOI Advertisement in Riverine Herald to go in tomorrow	Email	Deadline for responses 27 November 2015
19 November 2015	Vicki Atkinson (BAC)	Jo Bell Heritage Services (Bridget Grinter)	Vicki enquired into the EOI as she had not seen it. Asked for a copy to be emailed to her.	Phone	
19 November 2015	Bridget Grinter (JBHS)	Vicki Atkinson	EOI emailed to Vicki	Email	
24 November 2015	Vicki Atkinson	Jo Bell	Letter response to EOI indicating that they would like to be involved	Letter via Email	
25 November 2015	Jo Bell	Vicki Atkinson (BAC)	Thank you for the response. We will put her on the RAP register and contact her next week	Email	
27 November 2015	Wade Morgan (YYNAC)	Jo Bell	Letter response to EOI indicating that YYNAC would like to be involved	Letter via email	Letter has no date

Date	From	To	Description	Method	Notes
30 November 2015	Bridget Grinter	Peter Ewin (OEH)	Submission of RAP details	Email	
7 December 2015	Jo Bell	All Registered Aboriginal Parties	Invitation to first meeting to discuss the project, survey methodology and arrange a date for the field assessment	Email	
7 December 2015	Wade Morgan	Jo Bell	Confirmed attendance at inception meeting	Email	
9 December 2015	Bridget Grinter	Joe Day	Chasing up confirmation of attendance	Phone and Email	Confirmed attendance on phone
9 December 2015	Bridget Grinter	Vicki Atkinson	Chasing up confirmation of attendance	Phone and Email	Confirmed attendance on phone
16 December 2015	Bridget Grinter, Steve Hamilton (Hamilton Environmental Services) , Kane Henson (EMM Group)	Wade Morgan &, Tyrone Miller (YYNAC) Brett Hamilton (BAC) John Kerr (MLALC)		Face to Face meeting	Inception meeting held in Echuca with proponent. Arranged for field assessment to be undertaken on 6-7 January 2016.
4 January 2016	Bridget Grinter	All Registered Aboriginal Parties	Confirmed date and time for field assessment	Email	
6-7 January 2016	Bridget Grinter Jo Bell	John Kerr (MLALC) John B. Kerr (MLALC) Michael Bourke (YYNAC) Brett Hamilton (BAC)		Face to Face Field assessment	Carried out surface field assessment of the activity area. On-site discussion. Requested a statement of significance from each group. Will email through some information to assist

Date	From	To	Description	Method	Notes
					with the preparation of this
19 January 2016	Jo Bell	All Registered Aboriginal Parties	Provided maps showing the location of Aboriginal cultural heritage and information about significance assessments in preparation for the next meeting, which will discuss significance, impacts, management recommendations and any further requirements such as sub-surface testing and the AHIP process	Email	
29 February 2016	Jo Bell, Bridget Grinter, Steve Hamilton	OEH, Murray Shire Council, EMM Group		Face to Face on-site meeting	On-site meeting to discuss the proposed activity
26 February 2016	Bridget Grinter	All Registered Aboriginal Parties	Invitation to second meeting (11 March) to discuss the results, cultural significance, management recommendations and further investigations	Email	
3 March 2016	Bridget Grinter	All Registered Aboriginal Parties	Requested a change of date to 18 March 2016	Email	
3 March 2016	Wade Morgan	Bridget Grinter	Confirmation of attendance at meeting	Email	
	Bridget Grinter	Vicki Atkinson			Called a number of times to confirm. No response
17 March 2016	Joe Day	Bridget Grinter	Confirmation of attendance at meeting	Email	

Date	From	To	Description	Method	Notes
18 March 2016	Bridget Grinter, Jo Bell, Steve Hamilton, Kane Henson	Wade Morgan Brett Hamilton John Kerr	Delivered powerpoint on results of the assessment. Discussed cultural significance, impact assessment, avoiding harm, management recommendations and further investigations	Face to Face Meeting	
9 May 2016	Jo Bell	Wade Morgan, Vicki Atkinson, Joe Day	Copy of the draft Assessment report for comment with the request that comments be received by 6 June.	Email	No response

Sample letter sent to initiate consultation

21 October 2015
Our Ref: ARCH624

Peter Ewin
Senior Team Leader - Planning
Office of Environment and Heritage
PO Box 544
Albury NSW 2640

Dear Peter,

Re: Aboriginal Cultural Heritage Assessment for a Sand Quarry Extension at Moama – Notification of Project Proposal and Registration of Interest

Jo Bell Heritage Services Pty. Ltd. (JBHS) has recently been engaged by EMM Group Pty Ltd to undertake the Aboriginal Heritage Assessment component of the EIS being prepared by Steve Hamilton Environmental Consulting for a sand quarry extension at Lot 97 DP751140 (79 Rushy Road), Moama.

The approximate area of the extension is 53.9ha within a property of about 78ha in total. The property is located adjacent to Murray Valley National Park. Two existing sand extraction sites are located on the property, with a plan to extend this to other parts of the property. The subject land lies within the Murray Shire Council municipal boundary.

The proponent is Kane Henson, General Manager, EMM Group Pty Ltd, 26-42 Old Aerodrome Road, Echuca VIC 3564.

In accordance with the Office of Environment and Heritage (OEH, formerly DECCW) publication, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, we request information from you in relation to any relevant Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places that may exist within the activity area.

Should you have any questions in relation to this, please feel free to contact me on 0427 505 335.

Yours sincerely,

Joanne Bell
Director

EOI advertised in Riverine Herald 11/11/2015

Expressions of Interest Invited

EMM Group Pty Ltd (26-42 Old Aerodrome Road, Echuca VIC 3564) proposes to extend the existing sand quarry at Lot 97 DP751140 (on 11 Mile Road or Rushy Road), Moama. The property is located adjacent to the Murray Valley National Park.

Jo Bell Heritage Services P/L has been engaged to undertake an Archaeological and Aboriginal Cultural Heritage Assessment for the proposed project.

Expressions of interest are invited by relevant Aboriginal persons or organisations who may hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) in the area of the proposed project.

The purpose of community consultation with Aboriginal people is to assist the proposed applicant in the preparation of an application for an Aboriginal Heritage Impact Permit (AHIP) (if necessary) and to assist the Director General of the NSW Office of Environment and Heritage (OEH) in consideration and determination of the application.

Aboriginal persons or organisations are invited to register an interest in a process of community consultation with the proposed applicant regarding the proposed activity no later than COB Friday 27 November 2015.

Expressions of Interest may be submitted (in writing) to:
Jo Bell
Jo Bell Heritage Services Pty. Ltd.
PO Box 248
Euroa VIC 3666

Please note that details of all respondents will be provided to OEH and the LALC unless it is specified in the EOI that respondents do not wish their details released.

Appendix 3: Artefact Analysis

AHIMS No.	Depth (mm)	Raw Material	Primary Form	Cortex	Retouch (%)	Platform	Termination	Core scars	Longest Scar (mm)	Formal Tool / Core Type	Length (mm)	Width (mm)	Thick (mm)	Max. Dimension (mm)
MSQ1	0	Quartz	Complete Flake	0	0	Plain	Hinge				16.8	8.2	3.6.	17.7
MSQ1	0	Quartz	Core	0	0			3	23.3	Multidirectional	23.3	17.3	9.4	23.3
MSQ2	0	Mudstone	Cobble	0	100 (dressing)					Axe blank	94.4	73.2	24	103.4
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				10.1	7.6	3.9	13.3
MSQ3	0	Quartz	Proximal Flake	0	0	Plain					12.9	13.7	5.1	19.2
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Crushed	Feather				23.2	15.6	5.6	23.5
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				19.5	11.5	4.4	19.5
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				16.8	6.6	5.6	16.8
MSQ3	0	Quartz	Core	0	0			3	2		22.1	13.8	12	22.1
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				17.2	14.5	6.1	18.5
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Hinge				24.4	12.7	8.9	25.6
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Plain	Hinge				15.5	7.2	2.8	15.5
MSQ3	0	Quartz	Angular Fragment	0	0						14.5	6.9	5.5	14.5
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Hinge				19.6	12.3	5	19.7
MSQ3	0	Quartz	Angular Fragment	0	0						14.5	10.3	5.2	14.5
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Plain	Axial				17.7	16.1	9.5	20.4
MSQ3	0	Quartzite	Complete Flake	0	0	Crushed	Feather				27	10	3.9	27

AHIMS No.	Depth (mm)	Raw Material	Primary Form	Cortex	Retouch (%)	Platform	Termination	Core scars	Longest Scar (mm)	Formal Tool / Core Type	Length (mm)	Width (mm)	Thick (mm)	Max. Dimension (mm)
MSQ3	0	Quartz	Angular Fragment	0	0						13.3	8.2	5.3	13.3
MSQ3	0	Quartz	Angular Fragment	0	0						8.4	9.5	3.2	9.5
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				18.9	11.1	4.8	18.9
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				20	7.3	4.8	20
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Feather				20.1	11.7	3.9	20.9
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				16.3	8.8	6.7	21.1
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				14.6	14.6	4.3	19.5
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Feather				12.9	15.5	6.4	22.3
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Crushed	Feather				21.6	8.8	6.8	21.6
MSQ3	0	Smoky Quartz	Complete Flake	0	0	Crushed	Feather				15	5.7	3.1	15
MSQ3	0	Quartz	Angular Fragment	0	0						10	4.7	2.7	10
MSQ3	0	Quartz	Angular Fragment	0	0						17.2	8.2	6.5	17.2
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				17	10	2.7	17.8
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				11.6	7.9	1.7	11.6
MSQ3	0	Quartz	Broken Flake	0	0	Crushed					14.1	15.4	4.5	20.1
MSQ3	0	Smoky Quartz	Angular Fragment	0	0						13.5	10.5	5.1	13.5
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Axial				20.4	7.3	3.3	20.4
MSQ3	0	Quartz	Angular Fragment	0	0						14	8.4	5.4	14

AHIMS No.	Depth (mm)	Raw Material	Primary Form	Cortex	Retouch (%)	Platform	Termination	Core scars	Longest Scar (mm)	Formal Tool / Core Type	Length (mm)	Width (mm)	Thick (mm)	Max. Dimension (mm)
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				17.3	8.8	6.5	17.3
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				19.2	11.3	3	19.2
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				22.7	8.7	7.3	22.7
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Axial				20	7	5.2	20
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Axial				12.1	9.5	2.2	12.8
MSQ3	0	Quartz	Complete Flake	0	0	Crushed	Hinge				14.6	8.6	3.8	14.6
MSQ3	0	Rose Quartz	Complete Flake	0	0	Plain	Axial				38.7	17.3	7.9	38.7
MSQ3	0	Quartz	Complete Flake	0	0	Plain	Feather				30.4	16.8	7.2	30.4
MSQ3	0	Silcrete	Complete Flake	0	0	Plain	Axial			Core rejuvenation flake	36.9	7.5	6.8	36.9
MSQ3	0	Silcrete	Complete Flake	20	0	Plain	Feather				24.7	16	4.7	27.4
MSQ3	0	Crystal Quartz	Angular Fragment	0	0						19.6	12.2	9.9	19.6
MSQ3	0	Quartz	Proximal Flake	0	0		Feather				24	7	2.4	24
MSQ3	0	Silcrete	Complete Flake	0	0	Plain	Feather				16.6	13.7	3.3	16.6
MSQ3	0	Silcrete	Complete Flake	0	0	Plain	Hinge				27.7	7.6	5.9	27.7
MSQ3	0	Silcrete	Complete Flake	0	0	Plain	Axial				32.4	22.6	8.6	32.5

Appendix 4: RAP Comments on Draft Report

None were received

Appendix 5: Glossary

Activity
The development or use of land

Activity Area
The area or areas to be used or developed for an activity

Archaeology
The study of the past through the systematic recovery and analysis of material culture.

Artefact Scatter
A group of stone artefacts found scattered on the ground surface.

Assemblage
A collection of artefacts that are derived from the same Aboriginal place.

Burial (Human skeletal remains)
Usually represented by a concentration of human bones or teeth. Burials can be associated with charcoal or ochre, shell, animal bone or stone tools. They tend to be located in sandy areas, which were easy to dig or in rock shelters or tree hollows. They are usually exposed through earthworks or erosion.

Earth Feature
Includes mounds, rings, hearths, post holes and ovens.

Excavation
The systematic recovery of archaeological data through the exposure of buried sites and artefacts.

Material Culture
The tangible evidence or cultural remains that are produced by human activity.

Scarred Tree
Trees from which bark has been removed for the manufacture of utilitarian items such as containers, shelter sheets, canoes or medicine.

Shell Midden
A midden is the remains of a meal. In the case of shell middens, marine or freshwater molluscs are the dominant component.

APPENDIX 5: FOGEL 2019 GPR REPORT

BARMAH SAND MINE

Ground Penetrating Radar Investigation

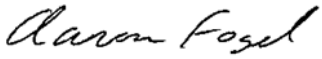
PR143027-1
Barmah Sand Mine
1.2
01 March 2019

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
1.1	Client Review	Aaron Fogel			27.02.2019
1.2	Final Report	Aaron Fogel	Alre Noel	Aaron Fogel	01.03.2019

Approval for issue

Aaron Fogel  1 March 2019

Prepared by:

RPS

Aaron Fogel
Senior Archaeological Geophysicist
Heritage Manager - QLD

Level 4, HQ South
520 Wickham Street
Fortitude Valley QLD 4006

T +61 7 3539 9500
E aaron.fogel@rpsgroup.com.au

Prepared for:

EMM Group Pty Ltd

Kane Henson
General Manager

26-42 Old Aerodrome Rd
Echuca VIC 3564

T 03 5480 6665
E kane@emmgroup.com.au

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Executive Summary

RPS Heritage was engaged by EMM Group to undertake a ground penetrating radar (GPR) survey at Barmah Sand Pit, 11 Mile Rd, Moama NSW. This survey has been implemented to determine the potential for human burials to be present. Ground surface conditions were suitable for the collection of high-quality GPR data. Soil conditions were also suitable with effective imaging of the subsurface to depths below where remains are expected to be located, if present.

Survey Area 1 is in a geomorphic context with a low likelihood of burials being present. Overwhelmingly, anomalies present in the data can be attributed to modern use of the area. GPR reflection patterns consistent with human burials have not been identified.

Survey Area 2 is in a geomorphic context much more amenable to be utilised by past Aboriginal peoples for human interment. As in Survey Area 1, surface disturbance from modern/historic period activity is present. Burrowing activity is prevalent through much of the area below the modern disturbance to depths up to approximately 1.5 metres. Below this, most variability in the GPR data has been attributed to geology. GPR reflection patterns consistent with human burials have not been identified.

1 INTRODUCTION

RPS Heritage was engaged by EMM Group to undertake a ground penetrating radar (GPR) survey at Barmah Sand Pit, 11 Mile Rd, Moama NSW. This survey has been implemented to determine the potential for human burials to be present in areas that may be subject to expansion of extraction operations.

The GPR survey was performed between 29 January and 8 February 2019 and was completed by Aaron Fogel (RPS Senior Archaeological Geophysicist) with assistance from several EMM Group employees. Data processing, imaging, reporting, oversight and project management were completed by Aaron Fogel.

Barmah sand mine is located north of Barmah Road, East of Rushy Road and west of Barmah National Park (Lot 97 on DP751140) approximately 15km northeast of Moama, NSW (Figure 1). The two Survey Areas were covered in sparse vegetation (Plates 1-4) due to extremely dry weather over the past months which was advantageous for survey and data quality. The paddocks were formerly used for agricultural purposes but are now used only for cattle. Minor surface disturbance was present from the cattle but did not hinder the GPR survey.

Figure 1: Location of the GPR Survey.

Plate 1: Survey Area 1 (looking east).

Plate 2: Survey Area 1 (looking west).

Plate 3: Survey Area 2 (looking north).

Plate 4: Survey Area 2 (looking south).

2 METHODS

2.1 GPR Theory

GPR is an active method of geophysical investigation. That is, the instrument actively emits electromagnetic energy into the soil and then measures returning waves that have reflected to the surface. The energy is reflected when it encounters a layer or object that has a sufficiently different conductivity (also referred to as dielectric permittivity) from the material above or surrounding it. Thus, the greater the difference in dielectric permittivity between adjacent materials the greater the reflection and easier it is to image subsurface features of interest. When archaeological features and deposits exhibit regular and repeatable GPR reflections, they can be readily identified during data interpretation and spatially mapped, leading to more effective long-term management of heritage resources.

2.2 GPR Field and Data Processing Procedures

The GPR survey used a Geophysical Survey Systems, Inc. (GSSI) Utility Scan DF. This instrument utilises two separate digital antennas (300 and 800MHz) contained within the single unit. This allows two separate data sets to be collected simultaneously. The 800MHz antenna provides higher resolution of near surface features and the 300MHz antenna provides the ability to image more deeply buried features, though at the expense of some resolution.

Instrument set up parameters included a time window of 22 nS (800MHZ) and 66 nS (300MHz), 512 samples per scan, 50 scans per metre and stacking value of 5. Two separate survey areas (Survey Area 1 to the north and Survey Area 2 to the south) were completed, each aligned to the local paddock boundaries. Survey transects were oriented approximately north-south, were collected in a zig zag fashion and were spaced 0.5m apart.

GPR data were processed using GPR Slice v7 to remove noise and highlight the subsurface features of interest. This included a time zero correction, background filter, bandpass filter, migration and gain enhancement. After completing these processes, linear data were converted from a set of vertical radargrams to horizontal amplitude slices to produce plan view maps of the survey area.

Cartography and georectification of the GPR survey data occurred in ESRI ArcGIS 10.6. The GPR data were georectified using referenced survey grid corners collected in the field using an Emlid Reach RS+ base and rover pair.

3 RESULTS

The identification of buried and preserved elements of archaeological or heritage importance in GPR data depends on pattern recognition in two-dimensional horizontal amplitude time slices and reflection patterns in the vertical radargrams. The radargrams are a direct output of the GPR as it collected data during the survey and documents reflections recorded for each survey transect in profile view. Following processing, these radargrams are collated in software and combined into a quasi-3D cube of data. Amplitude slice maps are extracted from the data cube to display GPR anomalies in plan view. This often results in a refined understanding of the spatial relationships, both horizontal and vertical, of reflections on successive transects that represent buried archaeology. The amplitude slice maps utilise a rainbow spectrum with red representing high amplitude (strong) reflections and blue representing low amplitude (weak) reflections. Factors used to assess individual GPR anomalies include shape, size, depth, strength of reflection, alignment and association with other anomalies.

3.1 Survey Area 1

Survey Area 1 was established west of the current sand pit and includes small areas to the north and south which wrap around the current extent of operations. This area has an approximately 3-5 metres of clay-rich overburden, below which is the sand resource desired for extraction as reported by Bell Cochrane & Associates in their 2015 geotechnical report. Figure 2 shows the current profile exposed by active sand mining operations immediately east of Survey Area 1. The modern overburden is redeposited material from current sand mining operations. The boundary between the modern overburden and the clay-rich overburden is the historic land surface and the surface which the GPR survey occurred on. The dark band at the top of the clay-rich overburden is evidence of pedogenesis. This is an indication of a relatively stable land surface for an extended period of time. This image was taken from the floor of the current pit and safety considerations prevented the insertion of a scale in the photograph. However, the clay-rich overburden is approximately 1.5 metres thick in this area.

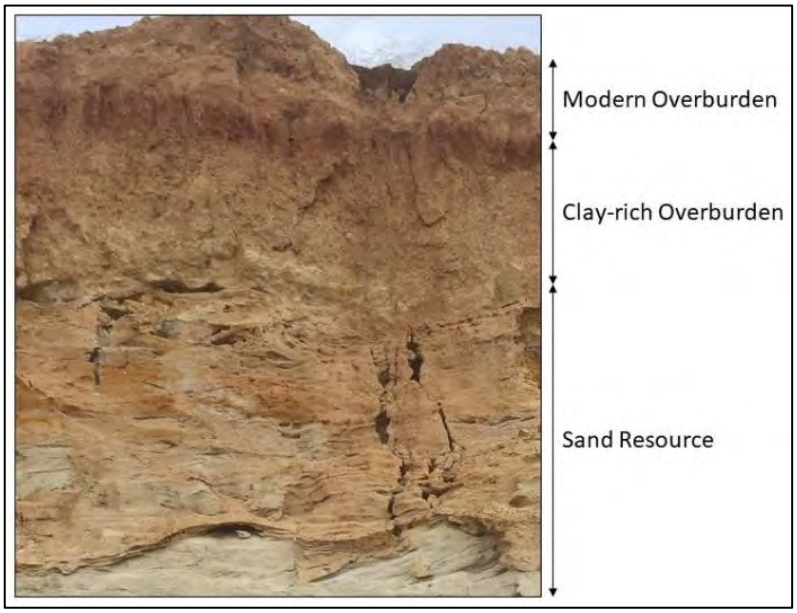

Figure 2: Exposed section of active sand pit.

Figure 3 displays four amplitude slices (each 20cm thick) of the 800Mhz data for Survey Area 1. In general, the area is very quiet (blue represents low amplitude reflections) with few significant anomalies. The anomalies present in the upper 40 cm (first two images) represent minor disturbances at the near surface likely caused by modern use of the area. There is one large anomaly in the north-central portion of the survey area which was caused by dense straw on the surface that had been placed to feed cattle. The remainder of the small, but high amplitude isolated anomalies were caused by random metal pieces across the survey area. Very little evidence for disturbance below the very near surface was present in the radargrams. This area is very unlikely to contain Aboriginal burials.

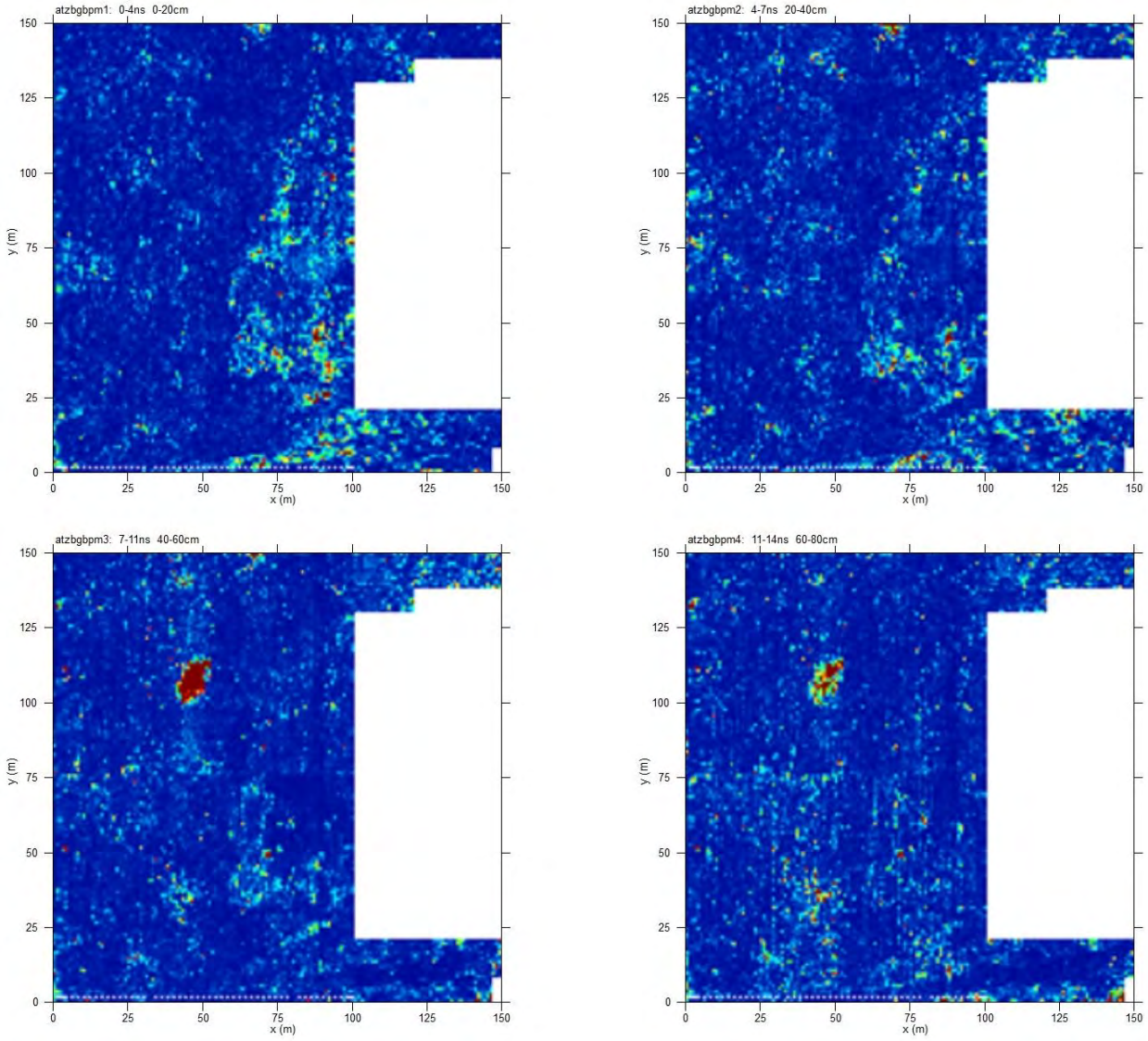

Figure 3: Survey Area 1, 800MHz amplitude slice maps.

3.2 Survey Area 2

Survey Area 2 is located to the south of Survey Area 1 (see Figure 1 above) and is centred over a local topographic rise consisting of fine sand (per geotechnical report). The sand deposit is of variable depth with the thickest (and highest elevation) in the centre of the GPR survey area. Below the sand deposit is a clay-rich deposit that is relatively level. Figures 3 and 4 display the 300MHz amplitude slice maps for Survey Area 2, each of which is approximately 20cm thick. The standout feature seen in all the images is the curvilinear red colour representing strong reflections caused by the boundary between the sand and clay-rich layers. It appears to move toward the centre of each successive depth due to topography. Anomalies outside of this reflection are in clay-rich sediments and unlikely to represent human burials. Anomalies inside of this reflection are located in sandy sediments. Additional analysis of these anomalies occurred to determine if they have potential of representing human burials.

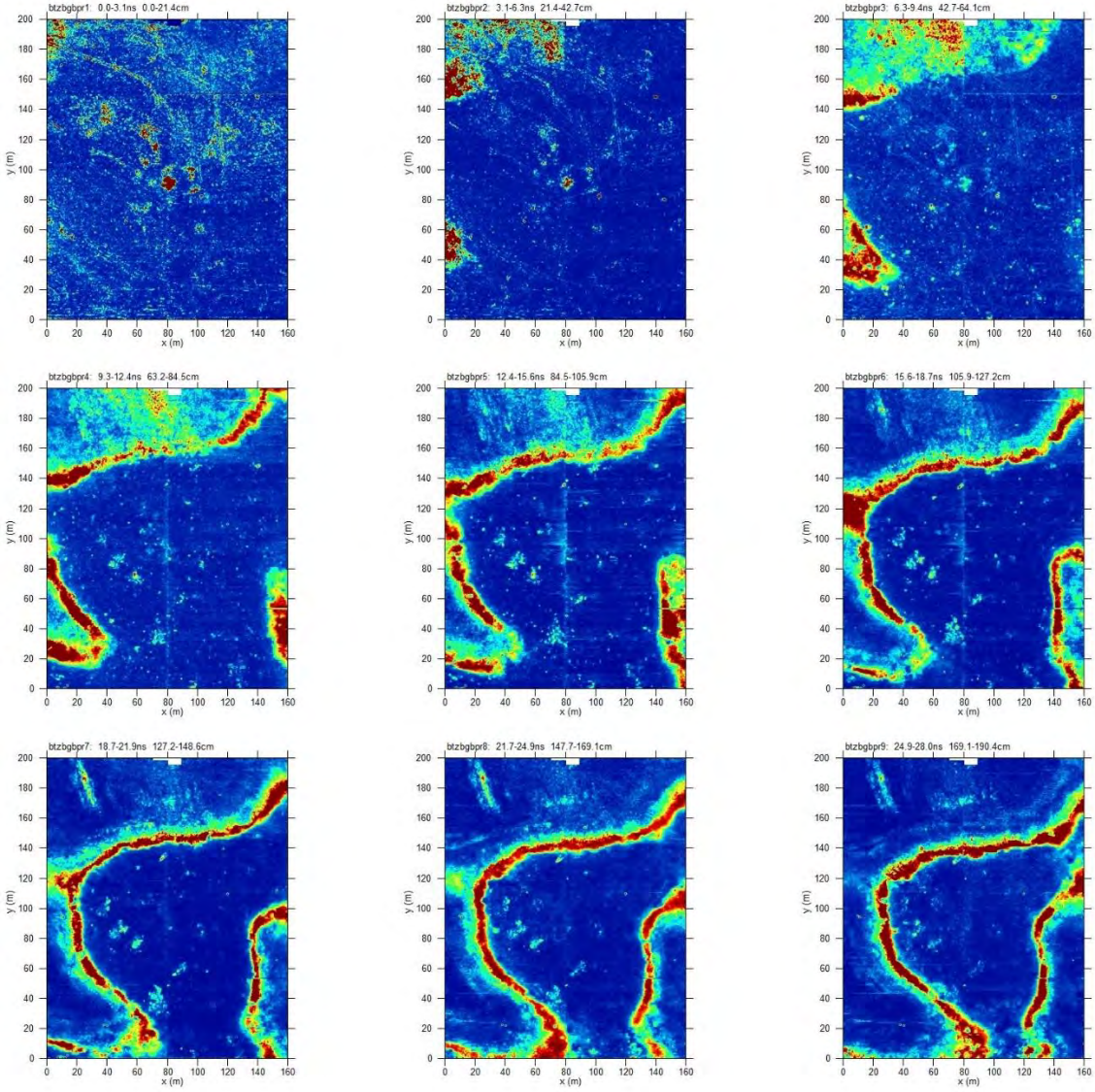

Figure 4: Survey Area 2, 300MHz amplitude slice maps (surface to 190cmbs).

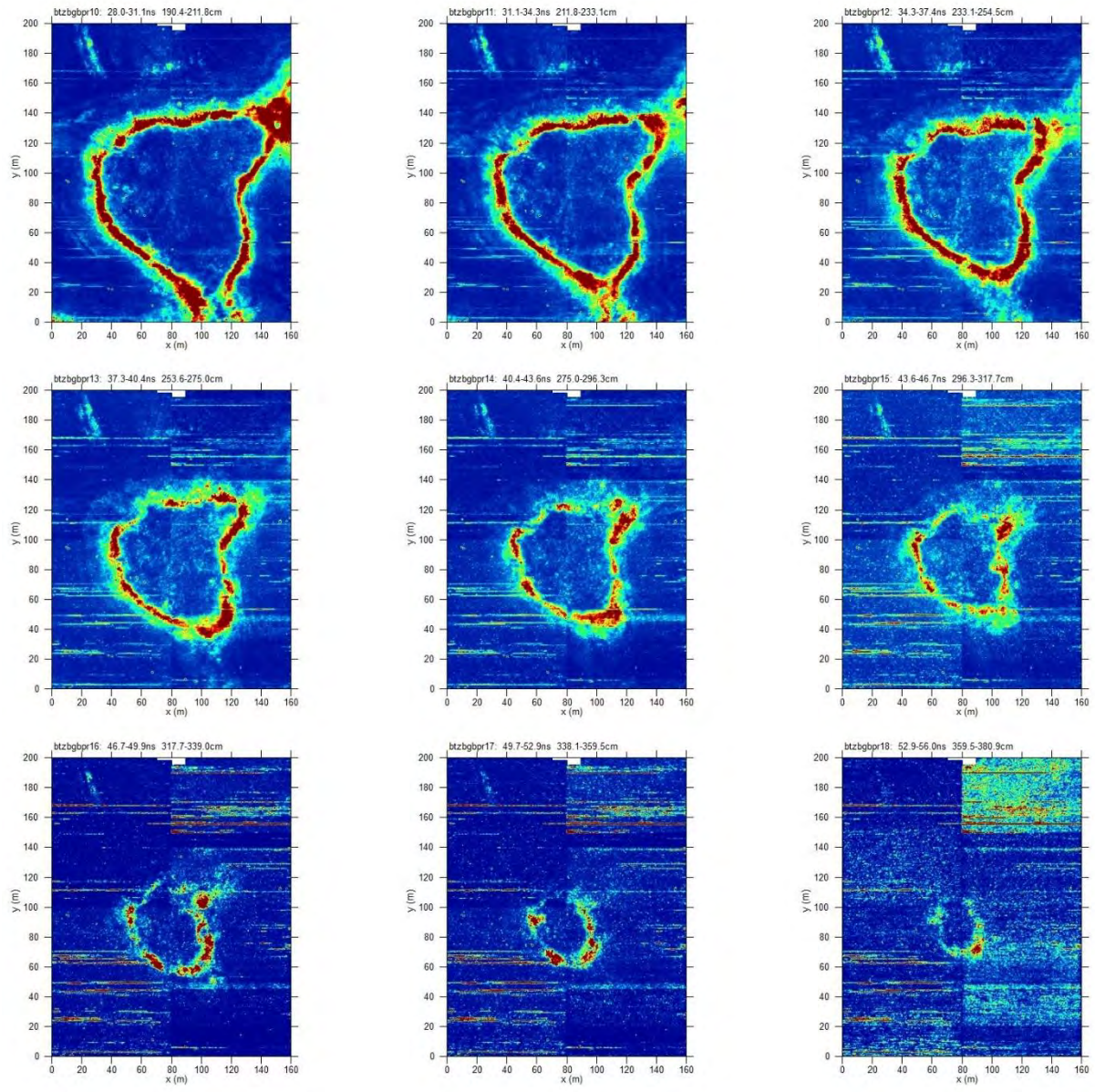

Figure 5. Survey Area 2, 300MHz amplitude slice maps (190 to 380cmbs).

During the survey, rain events occurred on a couple of days. The additional water in the soil column created slightly different conditions for radar propagation. This resulted in a mosaic effect with variable GPR responses for different days of data collection. This does not have any effect on the quality of any one day of data but when imaged together, variability in response can be seen in blocks. Attempts were made to remove this effect from the data set with significant improvements attained. However, variability is still present in Figures 4-6, especially at depth. Additionally, significant noise can be seen at increasing depths, outside the anomaly representing the sand/clay boundary. It is not apparent at the centre of each image, inside the sand/clay boundary, where sand deposits remain. This is due to signal attenuation occurring in the clay-rich deposits and not in the sand. Fortunately, sediments where signal attenuation occurred are unlikely to have burials.

Figure 6 displays four different overlay images from Survey Area 2. This data analysis technique combines the strongest reflections from each amplitude slice map into a single image. The four images in Figure 6 were created based on vertical trends in the GPR results and have their thickness presented in cm below surface (cmbs). The upper-left image displays all anomalies from the first three amplitude time slices in Figure 4. It is heavily dominated by modern disturbance from agricultural activities, pastoral activities and burrowing animals. The clay-rich sediment has been imaged along the northern and southwestern boundaries of the survey area. These areas represent where the sand deposit is thinnest. The upper-right image displays all anomalies from amplitude slices 4-8 in Figure 4. The image is dominated by the strong reflection caused by the sand/clay boundary. Inside this feature it is relatively quiet with a number of isolated clusters of strong reflections. These anomalies are likely representing animal burrows.

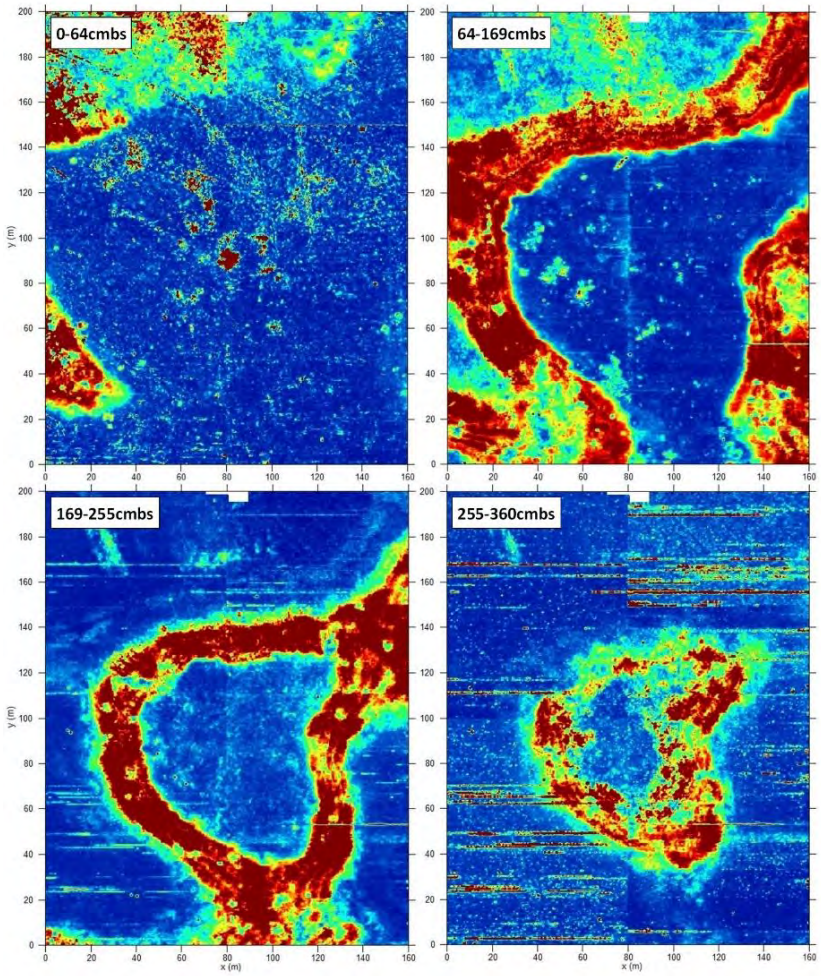

Figure 6: Survey Area 2, 300MHz overlay images.

The lower-left image displays all anomalies from amplitude slices 9-12 in Figures 4 and 5. The boundary between the sand and clay sediments is pronounced and continues to move toward the centre of the image. Within this feature, in the sandy sediments, significant anomalies are no longer present. The lower-right image displays all anomalies from amplitude slices 13-17 in Figure 5. At this depth the sand is nearly disappeared. No significant anomalies are present at these depths.

4 CONCLUSION AND RECOMMENDATIONS

Soils and sediments varied significantly between the survey areas. Survey Area 1 was dominated by clay-rich soils overlaying the sand deposits below. Survey Area 2 contained mostly sandy deposits at the surface with a distinct stratigraphic change to a clay-rich sediment at depth. The dual frequency GPR was ideal for these differing geomorphic settings. The 800MHz antenna, with higher resolution, was ideally suited for investigating Survey Area 1. Though the clay-rich soil reduced overall depth of imaging, the high resolution data set was suitable for the identification of disturbances that may be attributed to human burial practice. Conversely, the added depth of imaging possible with the 300MHz antenna was ideally suited for the much thicker sandy sediments in Survey Area 2.

Rain events that occurred during the survey caused mosaicking issues but did not adversely affect the quality of the GPR data. Mosaicking effects were minimised via data processing but not completely removed. Thus, some of the imagery presented here is not as aesthetically pleasing as it might otherwise be. However, these mosaicking effects did not reduce the interpretability of the data.

Survey Area 1 is a geomorphic context with a low likelihood of burials being present. The clay-rich soils/sediments present at the surface in this area and their thickness would have made hand excavation quite difficult. With the availability of adjacent sand bodies at the surface, it seems even less likely that Aboriginal burials exist in this area. The GPR data verifies this theory with a general lack of disturbance in the survey area. Overwhelmingly, anomalies present in the data can be attributed to modern use of the area. GPR reflection patterns consistent with human burials have not been identified.

Survey Area 2 is in a geomorphic context much more amenable to be utilised by past Aboriginal peoples for human interment. The sandy soil/sediments present here would have provided a relatively easy location to hand excavate for a burial. This is evident today with the significant number of rabbit burrows present (while none were present in Survey Area 1). These extant burrows have been imaged in the GPR data. Throughout the area numerous locales have reflection patterns consistent with animal burrows. In fact, more areas than are currently visible on the surface. Thus, it is likely that numerous abandoned burrows are likely to be present.

As in Survey Area 1, surface disturbance from modern/historic period activity is present. Burrowing activity is prevalent through much of the area below the modern disturbance to depths up to approximately 1.5 metres. Below this, most variability in the GPR data has been attributed to natural geology. GPR reflection patterns consistent with human burials have not been identified.

It is important to note that no geophysical method is capable of mapping all subsurface features of interest 100% of the time. Identification of archaeological features in GPR data is dependent upon those features being significantly different from the soil surrounding them, thus creating a radar reflection. It is also dependent upon the physical properties of local soils and the resultant energy penetration. Negative GPR results should not be used to conclude that features of interest are not present, though it is a good indication.