

Prepared for Ib Vogt Development Australia Pty Ltd

Aboriginal Cultural Heritage Assessment

Wagga Wagga North Battery Energy Storage System

Bavin Road, Bomen, NSW

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We acknowledge the Wiradjuri traditional owners of this land and pay our respect to Elders past, present and emerging. We recognise that the First Nations peoples of Australia have traditionally managed the resources of this land in a sustainable way, and that they are the original stewards of the Australian environment.

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Acronyms and abbreviations

ACHA	Aboriginal Cultural Heritage Assessment
ACHCRP	Aboriginal Cultural Heritage Consultation Requirements for Proponents
AHD	Elevation in metres to Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ASL	Above sea level
DD	Aboriginal Due Diligence Assessment
Development footprint	Defines the proposed works that will takes place within the development site and access road
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
ESD	Ecologically Sustainable Development
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
IBRA	Interim Biogeographic Regionalisation for Australia
km	kilometres
LGA	Local Government Area
m	metres
NGH	NGH Pty Ltd
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
NSW	New South Wales
PAD	Potential Archaeological Deposit
Project Area	Defines the area assessed by this report
RAP	Registered Aboriginal Party
SHI	State Heritage Inventory
SHR	State Heritage Register
Subject Land	Defines the area assessed by the Scoping Report (NGH 2024). This area includes the Project Area

Executive summary

Introduction

NGH Pty Ltd (NGH) have been engaged by Ib Vogt Development Australia Pty Ltd (Ib Vogt) to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the development of a Battery Energy Storage System (BESS) site at 116 Bavin Road, Bomen, NSW 2650. The proposed works would involve the construction and operation of a 120-megawatt (MW) BESS that would provide up to 480 megawatt hours (MWh) capacity. The Project Area for the proposed BESS is within Lot 2 of DP1115229 with connections to the neighbouring TransGrid Wagga North zone substation in Lot 1 DP1115229.

Note that Figure 1-1 shows the Project Area as assessed in this report as well as the Subject Land assessed in the Scoping Report (NGH 2024). The only difference between the two is that the Subject Land area includes the remaining portions of Lot 2 DP1115229 to the west of the Project Area; this area was not assessed by the ACHA and contains none of the proposed works for the BESS. The Subject Land is only shown in Figure 1-1 to keep some consistency across assessments, the remainder of the Figures in this assessment will only show the Project Area outlined in red.

The proposed works include activities that will require significant ground disturbance that have the potential to impact on Aboriginal heritage sites and objects which are protected under the NSW National Parks and Wildlife Act 1974 (NPW Act). To undertake the proposed works, the Proponent may need to apply for an Aboriginal Heritage Impact Permit (AHIP). The ACHA report may accompany the AHIP application and would provide the Heritage NSW with information about the nature, extent and significance of any Aboriginal sites and values. The ACHA would also assess the impacts to Aboriginal sites within the Project Area and provide management strategies that may mitigate any impacts.

Project proposal

The works to construct and operate this BESS would generally include the following components and are henceforth collectively referred to as the development footprint:

- Approximately 126 battery containers, housing battery cells in modules and associated cooling systems.
- Approximately 42 associated Power Conversion Systems (PCS) comprising of;
 - The inverters, which convert direct current (DC) to alternating current (AC);
 - The medium-voltage transformer, which converts the inverter output voltage to the medium-voltage of the system (33 kilovolt); and
 - The medium voltage switchgear, which contains the medium voltage circuit breakers and disconnectors for the PCS
- A control room, which will contain battery-monitoring equipment and allows operators to control the plant remotely.
- A short underground transmission line which would connect the BESS to the adjacent TransGrid Wagga North substation at its western side. The connection type is subject to TransGrid requirements and further detailed design.
- A switching substation, which collects all the individual medium voltage cables from the PCS units in one location, including:
 - 33kW switchgear.
 - One 33/132kV transformer.

- A 132kV circuit including busbars, circuit breakers, disconnectors, isolators, surge arresters, etc.
- A plant auxiliary transformer and diesel generator.
- A prefabricated Operations and Maintenance (O&M) building
- Staff amenities
- Water tanks for firefighting purposes
- Earthworks and stormwater management infrastructure (e.g. diversion banks, etc.)
- Perimeter security fencing.
- Temporary and/or permanent laydown area.

The site will be accessed through a new access track with the BESS area to connect with Bavin Road to the south.

These activities would require the use of heavy machinery and would cause significant ground disturbance and as such Aboriginal sites within the Project Area could therefore be subject to harm.

Aboriginal community consultation

The consultation with Aboriginal stakeholders for this project was undertaken in accordance with Section 60 of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2019* and following the process outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP). The guide outlines a four-stage process of consultation as follows:

Stage 1 – Notification of project proposal and registration of interest.

Stage 2 – Presentation of information about the proposed project.

Stage 3 – Gathering information about cultural significance.

Stage 4 – Review of draft cultural heritage assessment report.

As a result of this process, six Aboriginal groups registered their interest in the proposal. Notification of Registered Aboriginal Parties was provided to Heritage NSW and the Wagga Wagga LALC on 22 February 2024.

These were:

- Bundyi Aboriginal Cultural Knowledge
- Bidya Marra Consultants
- Konanggo Aboriginal Cultural Heritage Services
- Sonione Wakabut Rogers
- Thomas Dahlstrom
- Wagga Wagga LALC

Survey fieldwork and subsequent subsurface test excavation was carried out from 7–9 May 2024 by two archaeologists from NGH and two Aboriginal RAP representatives.

A draft version of this Aboriginal Cultural Heritage Assessment Report for the proposal (this document) will be forwarded to the RAPs inviting comment on the results, the significance assessment and the recommendations post completion of the testing program. A minimum of 28 days will be allowed for responses to the document and all responses will be incorporated into this document.

The Aboriginal Community Consultation that was conducted in this assessment and has been outlined in detail in Section 2 of this report.

Fieldwork results

Survey results

No new Aboriginal objects were identified during the survey and therefore no new AHIMS sites were registered. No previously recorded AHIMS sites were located within the Project Area. While some native vegetation was present within the Project Area—especially in the ecological corridor on the eastern boundary—none of the trees present contained any signs of Aboriginal modification consistent with archaeological identification techniques (see Long 2005). It should be noted that the visual observations during the survey confirmed that the desktop landform identification was accurate. Therefore, no updates were made to the boundaries of landforms within the Project Area.

Subsurface test excavation results

The subsurface test excavation programme was carried out in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. A total of 12 test pits were excavated across three landforms—the spur, mid slopes, and upper slopes—where they intersected with the development footprint. A total of 3 m² was excavated during the subsurface test excavations, with a total of 0.77 m³ of soil being excavated and sieved.

No Aboriginal objects were identified during the test excavations. The excavation suggests that the Project Area is comprised of a relatively similar soil profile (see below for more detail). The results of the test excavations are within expectations based on the desktop predictive models that were prepared prior to the assessment.

Potential impacts

No Aboriginal sites or PADs were identified during the assessment. Furthermore, no previously recorded AHIMS sites are located within the Project Area. As a result, there are no Aboriginal heritage values associated with the Project Area and therefore the proposed works within the development footprint will not impact any values. However, the remainder of the spur landform outside of the development footprint must be avoided as it may contain sensitivity due to its connection with the same ridgeline as the Bomen Axe Quarry Aboriginal Place.

Recommendations

The recommendations are based on the following information and considerations:

- Results of the current archaeological survey and subsurface test excavations within the Project Area;
- Consideration of results from other archaeological assessments which have occurred in the Project Area;
- Consideration of results from other regional archaeological studies;
- Results of consultation with the registered Aboriginal parties;
- The assessed significance of the sites;
- Appraisal of the proposed development; and
- Legislative context for the development proposal.

It is recommended that:

1. The proposed works within the development footprint can proceed with no further archaeological assessment required.

- a. Further archaeological assessment may be required if the proposed works extend outside of the Project Area as assessed in this report. This would include consultation with the Registered Aboriginal Parties and may include further field assessments.
2. All access to the site and laydown areas must be within the Project Area as assessed by this report.
3. Prior to the commencement of the proposed works for the project, Aboriginal Cultural Heritage Awareness training should be included as part of the Induction, and all site personnel who will work on the project must complete it. The Aboriginal Heritage Awareness training must be prepared in consultation with the Registered Aboriginal Parties for this project.
4. If any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop and Heritage NSW notified. The find will need to be assessed and if found to be an Aboriginal object, and Aboriginal Heritage Impact Permit (AHIP) may be required.
5. In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity; Heritage NSW and the police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. If the remains are deemed to be Aboriginal in origin, the Registered Aboriginal Parties should be advised of the find as directed by the appropriate heritage team within Heritage NSW. Heritage NSW would advise the Proponent on the appropriate actions required.
6. The remainder of the spur landform outside of the development footprint must be avoided as it may contain sensitivity due to its connection with the same ridgeline as the Bomen Axe Quarry Aboriginal Place.

Ib Vogt Development Australia Pty Ltd is reminded that it is an offence under the *National Parks and Wildlife Act 1974* to harm an Aboriginal object without a valid approval.

1. Introduction

NGH Pty Ltd (NGH) have been engaged by Ib Vogt Development Australia Pty Ltd (Ib Vogt) to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the development of a Battery Energy Storage System (BESS) site at 116 Bavin Road, Bomen, NSW 2650 as shown in Figure 1-1 below. The proposed works would involve the construction and operation of a 120-megawatt (MW) BESS that would provide up to 480-megawatt hours (MWh) capacity.

Note that Figure 1-1 shows the Project Area as assessed in this report as well as the Subject Land assessed in the Scoping Report (NGH 2024). The only difference between the two is that the Subject Land area includes the remaining portions of Lot 2 DP1115229 to the west of the Project Area; this area was not assessed by the ACHA and contains none of the proposed works for the BESS. The Subject Land is only shown in Figure 1-1 to keep some consistency across assessments, the remainder of the Figures in this assessment will only show the Project Area outlined in red.

The proposed works include activities that will require significant ground disturbance that have the potential to impact on Aboriginal heritage sites and objects which are protected under the *NSW National Parks and Wildlife Act 1974* (NPW Act). To undertake the proposed works, the Proponent may need to apply for an Aboriginal Heritage Impact Permit (AHIP). The ACHA report may accompany the AHIP application and would provide the Heritage NSW with information about the nature, extent and significance of any Aboriginal sites and values. The ACHA would also assess the impacts to Aboriginal sites within the Project Area and provide management strategies that may mitigate any impacts.

The purpose of the ACHA and ATR is to determine if Aboriginal objects are to be harmed by the proposal and determine if an AHIP application to impact identified Aboriginal cultural heritage sites is required.

1.1 Statutory context

The proposed BESS site is located within the Wagga Wagga Special Activation Precinct (SAP), which “capitalises on the town’s proximity to the inland rail and aims to foster manufacturing, agribusiness, and freight and logistics” (NSW Government n.d.). The SAP process aims to facilitate the approval of certain developments within defined SAP areas. A precinct wide ACHA and Cultural Heritage Management Plan (CHMP) has already been completed for the SAP area. However, certain areas – of which the current area forms a part of – were identified as requiring further assessment under the standard codes and guidelines for the investigation of Aboriginal heritage assessments within NSW.

The proposed works include activities that will require significant ground disturbance that have the potential to impact on Aboriginal heritage sites and objects which are protected under the *NSW National Parks and Wildlife Act 1974* (NPW Act).

Aboriginal heritage is primarily protected under the NPW Act (1974) and as subsequently amended in 2010 with the introduction of the *National Parks and Wildlife Amendment (Aboriginal Objects and Places) Regulation 2010*. The aim of the NPW Act includes:

The conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including but not limited to places, objects and features of significance to Aboriginal people.

An Aboriginal object is defined as:

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 the occupation of that area by persons on non-Aboriginal extraction and includes Aboriginal remains.

Part 6 of the NPW Act concerns Aboriginal objects and places and various sections describe the offences, defences and requirements to harm an Aboriginal object or place. The main offences under section 86 of the NPW Act are:

A person must not harm or desecrate an object that the person knows is an Aboriginal object.

A person must not harm an Aboriginal object.

For the purposes of this section, "circumstances of aggravation" are:

- that the offence was committed in the course of carrying out a commercial activity, or
- that the offence was the second or subsequent occasion on which the offender was convicted of an offence under this section.

A person must not harm or desecrate an Aboriginal place.

Under section 87 of the NPW Act, there are specified defences to prosecution including authorisation to harm in accordance with an Aboriginal Heritage Impact Permit (AHIP) or through exercising due diligence or compliance through the regulation.

Section 89A of the Act also requires that a person who is aware of an Aboriginal object must notify the Director-General in a prescribed manner. In effect this section requires the completion of an AHIMS site card for all sites located during heritage surveys.

Section 90 of the NPW Act deals with the issuing of an AHIP, including that the permit may be subject to certain conditions.

The EP&A Act is legislation for the management of development in NSW. It sets up a planning structure that requires developers (individuals or companies) to consider the environmental impacts of new proposals. Under this Act, cultural heritage is a part of the environment. This Act requires that Aboriginal cultural heritage and the possible impacts to Aboriginal heritage that development may have formally considered in land-use planning and development approval processes.

1.2 Objectives of assessment

The purpose of this study is to identify Aboriginal cultural material and/or areas of archaeological sensitivity within the Project Area and, if identified, to assess their Aboriginal cultural heritage value and significance.

The objectives of the assessment are therefore to:

- Conduct Aboriginal consultation as specified in Section 60 of the National Parks and Wildlife Regulation 2019 and in accordance with the consultation process outlined in the ACHCRP;
- Undertake an archaeological survey of the project area to identify any surface Aboriginal objects as well as characterise the landforms present and their potential for containing subsurface archaeological deposits;
- Undertake subsurface testing (if required) to identify the character and extent of any archaeological deposit present; and
- Provide management recommendations for any Aboriginal cultural heritage objects and values identified.
- Broadly, the archaeological aims of the project would be to:
 - Assess the likely extent and nature of any such cultural material;
 - Assess the archaeological significance of any cultural material;
 - Provide an opportunity for Aboriginal stakeholders to assess the cultural significance of any material; and
 - Assess the management requirements for any cultural material.

1.3 Report format

The ACHA report was prepared in accordance with the following guidelines:

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011);
- Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (OEH 2010a); and Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH 2010b).

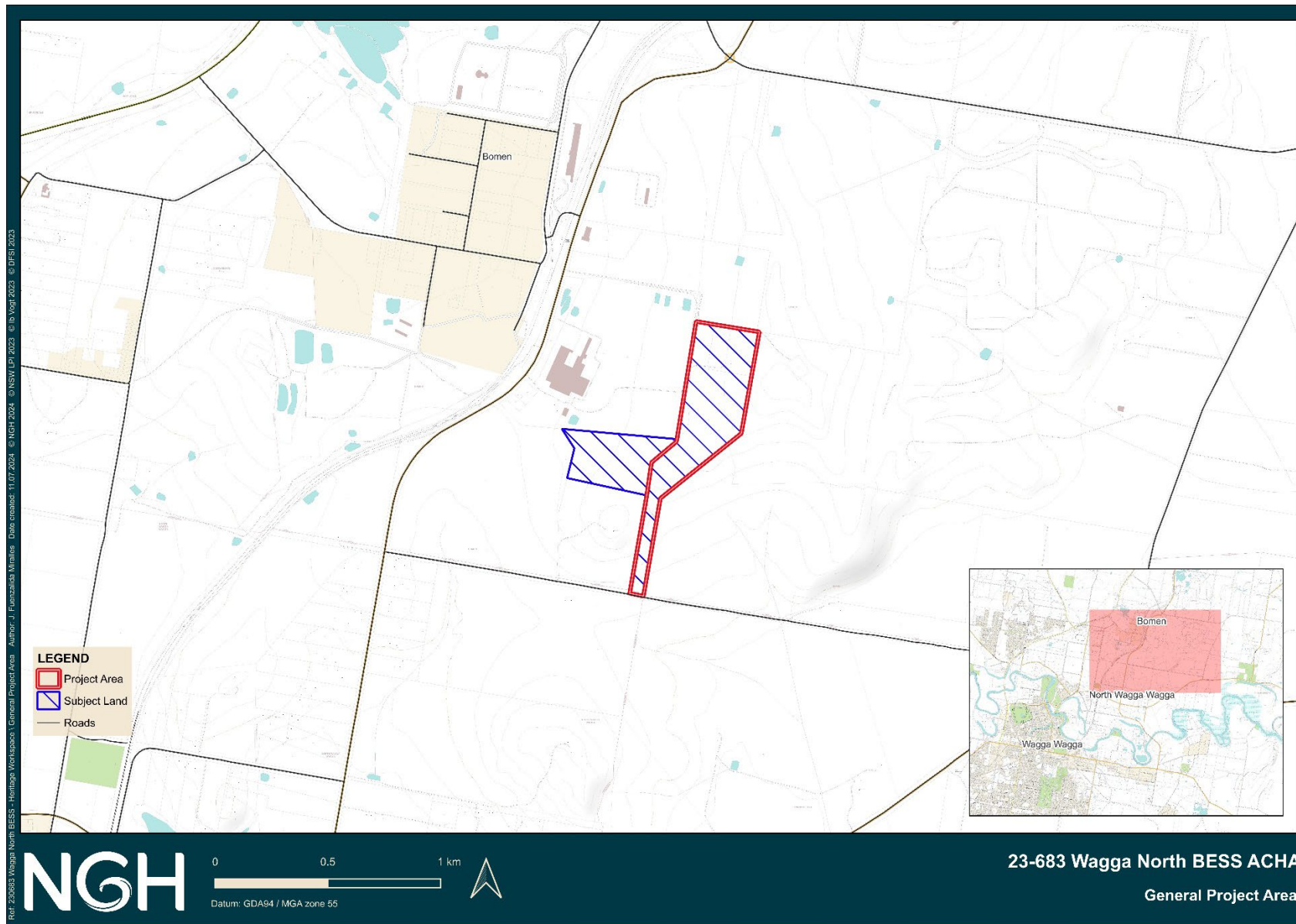


Figure 1-1 General location of Proposal Area.

2. Description of the area

2.1 Project location

The Project Area for the proposed BESS is within Lot 2 of DP1115229 with connections to the neighbouring TransGrid Wagga North zone substation in Lot 1 DP1115229 and is shown in Figure 2-1 below. The proposed works within the development site and access road will be henceforth referred to as the development footprint within this report.

The Project Area used in this assessment excludes the western portion of Lot 2 DP1115229 encompassing the area shown in Figure 2-1.

The proposed BESS site is located within the Wagga Wagga Special Activation Precinct (SAP), which “capitalises on the town’s proximity to the inland rail and aims to foster manufacturing, agribusiness, and freight and logistics” (NSW Government n.d.). The SAP process aims to facilitate the approval of certain developments within defined SAP areas. A precinct wide ACHA and Cultural Heritage Management Plan (CHMP) has already been completed for the SAP area. However, certain areas—of which the current area forms a part of—were identified as requiring further assessment under the standard codes and guidelines for the investigation of Aboriginal heritage assessments within NSW.



Figure 2-1 Detail of Project Area

2.2 Landscape context

Understanding the landscape context of the Project Area may assist us to better understand the archaeological modelling of the area and assist in identifying local resources which may have been used by Aboriginal people in the past. This information can then potentially be used to predict the nature of Aboriginal occupation across the landscapes within the Project Area.

Factors that are typically used to inform the archaeological potential of landscapes include the presence or absence of resources that would have been used by Aboriginal people including water, animal and plant foods, stone, and other resources. The environmental context is equally important in terms of the taphonomic process, erosion or other factors that may influence the detectability of Aboriginal heritage sites.

The landscape context assessment for the Project Area is based on a number of classifications that have been made at national, regional and local levels to help us better understand the archaeological modelling of the area based on the geology, topography, hydrology, flora and fauna, and past land disturbances within and adjacent to the Project Area.

The landscape context of the Project Area is further based on a number of classifications that include the National Interim Biogeographic Regionalisation for Australia (IBRA) system, Mitchell landscapes, NSW soil landscapes, digital elevation models (DEM), and geological maps. The combination of these differing resolutions of landform data provides a comprehensive and multi scaled understanding of the landscape within the Project Area and its immediate surroundings.

2.2.1 Geology

The Project Area is primarily comprised of two different geological formations – with a small portion of a third in the southern section – as mapped by Colquhoun et al. (2021) The dominant formation is the Colluvium of the Cenozoic Sedimentary Province with sections of the Wantabadgery Granite formation straddling the eastern and south eastern boundaries; a small section of Residual Deposits is located in the southern section of the Project Area. All three geological formations are described in Table 2-1 below and are shown in Figure 2-2. It should also be noted that dataset provided by Colquhoun et al. (2021) describes the presence of three metamorphic facies in the region, the Benambran, Tabberabberan, and Kanimblan-Tablelands formations. These metamorphic facies are primarily comprised of greenschist or sub-greenschist, which are metamorphic rocks that contain a variety of minerals, including quartz.

Table 2-1 Geological formations within the Project Area (Colquhoun et al. 2021).

Geological Formation	Description
Residual Deposits (Cenozoic Sedimentary Province)	Characterised by a weakly-consolidated regolithic residuum such as soil or saprolite mostly developed in-situ as a result of advanced weathering and/or pedogenesis.
Colluvium (Cenozoic Sedimentary Province)	Characterised by poorly sorted, weakly cemented to unconsolidated colluvial lenses of polymictic conglomerate with medium- to very coarse-grained sand matrix; interspersed with unconsolidated clayey and silty red-brown (aeolian) sand layers, modified by pedogenesis.
Wantabadgery Granite	Grey, medium-to-coarse-grained, biotite/muscovite/cordierite granite to granodiorite; equi to inequi-granular; rare feldspar megacrysts. Foliated margins. Microgranitoid and surmicaceous enclaves. Rare layered pegmatite and leucocratic granite dykes.

While the residual deposits and colluvium geological formations are not known for their rich deposits of raw material suitable for the production of stone tools, pebbles of quartz are known to appear in these formations.

On the other hand, the description of the Wantabadgery Granite formation shows that it contains a suitable material for stone tool production, notably the variety of granitic rocks that are known to have been used for axe heads in the region. It should be noted that the Bomen Axe Quarry – a declared Aboriginal Place of high significance – is located within a pocket of the Wantabadgery Granite formation further north east (as shown in Figure 2-2 below). However, Go Green (2011, p.16) states that a sample of the rock from the quarry was analysed and identified as

“a hydrothermally altered alkali basalt, high in sodium (Na) and potassium (K). The rock is likely to be a hypabyssal basalt, which has formed a small dike or sill within the surrounding mid-Silurian age Wantabadgery Granite.”

As a result – and considering that the Wantabadgery Granite formation extends along the eastern and south eastern boundaries of the Project Area – there is some potential for the dike/sill of hypabyssal basalt to continue in these areas.

It is well known that stone resources were traded long distances and therefore material that is not locally present would have been imported from elsewhere. The variety in recorded lithic material culture within the previous archaeological studies in the region supports the suggestion that Aboriginal people had a variety of stone resources available to them; although the main local focus was on the basalt that was available in this small geographical area. As a result, due to the potential abundance of locally available stone resources and knowledge of lithic variety in previous archaeological studies, it is highly likely that stone artefacts will be identified within surface or subsurface deposits within the Project Area. However, it is considered unlikely that these artefacts will be identified in dense concentrations.

2.2.1 Topography

It is important to consider the topography of the Project Area as well as the wider region in order to understand how it facilitated the movement of Aboriginal people through the area and which areas were more likely to have been frequented. The Project Area is located in a landscape that has transitioned from the floodplain associated with the Murrumbidgee and its tributaries to the undulating hills that form a part of the Junee Hills and Foothills Mitchell landscape. The Project Area itself is mainly comprised of mid to upper slopes, with a single spur, several open depressions, and disturbed landforms. The area (in Ha) of each landform is shown in Table 2-2 below. The landforms identified during the desktop assessment are also displayed in Figure 2-6.

Table 2-2 Area of each landform within the Project Area.

Landform	Area (Ha)
Upper Slopes	7.27
Mid Slopes	6.71
Disturbed	3.33
Spur	2.79
Open Depression	1.55
TOTAL	21.65

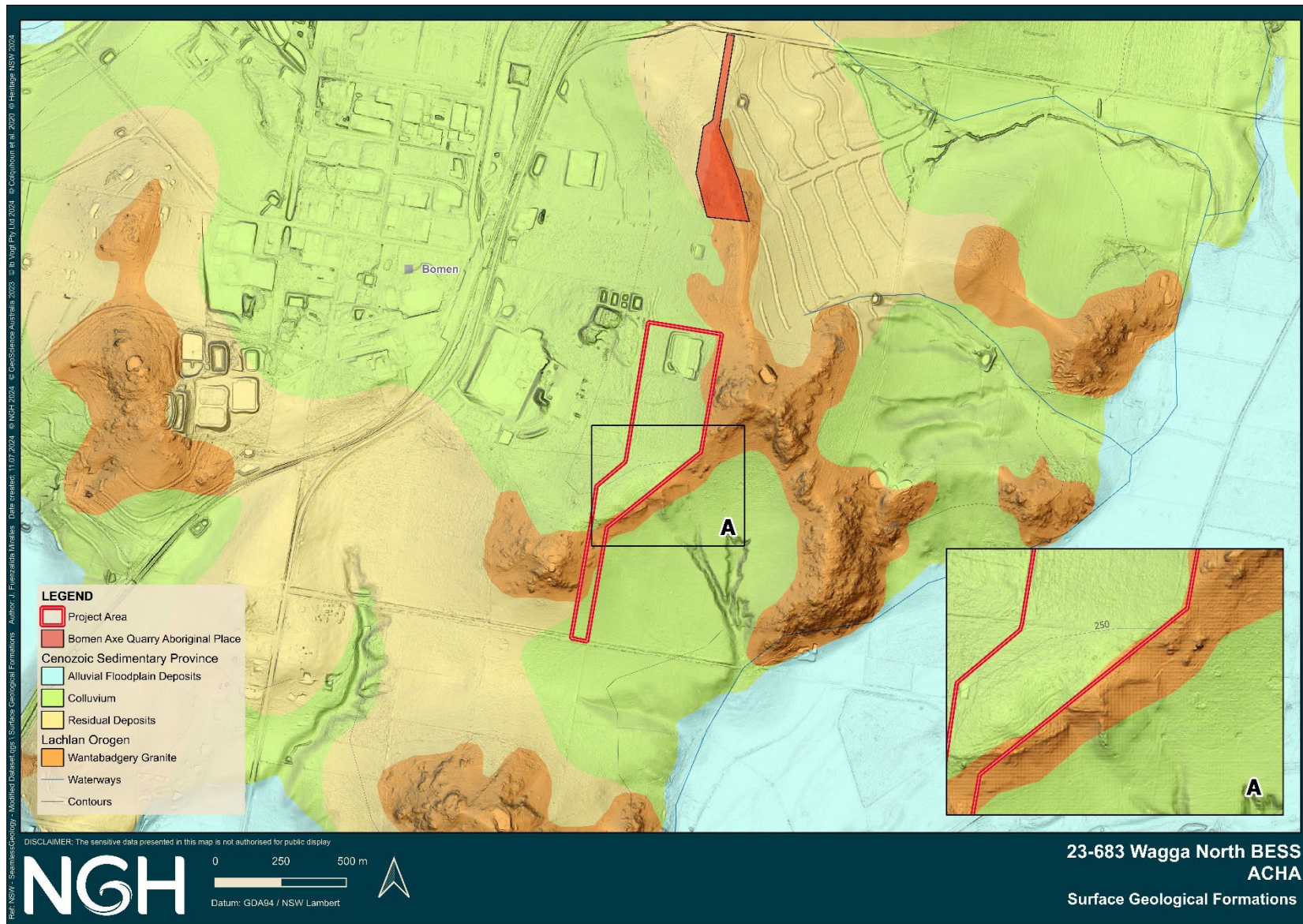


Figure 2-2 Surface geological formations present within the Project Area and surrounding region.

2.2.2 Soils

The Project Area is located across two different soil landscapes – the East Bomen and Glenmornon landscapes – as mapped by Chen and McKane (1996, pp.44–48; 131–136). Both of these landscapes are described in Table 2-3 below while a stratigraphic view of the horizons within the two landscapes can be seen from Figure 2-3 to Figure 2-4 below.

Table 2-3 Description of the soil landscapes present within the Project Area and their dominant soil materials and qualities (adapted from Chen & McKane 1996, pp.44–38; 131–136).

Soil Profile	Description
East Bomen	Eb1 – Dull loam (topsoil – A1 horizon): Dark to dull, sandy loam to clay loam. Field pH 5.0 to 5.5 (moderately to slightly acidic). Eb2 – Reddish light clay (subsoil – B1 horizon): Reddish brown light clay. Field pH 6.0 to 6.5 (slightly acidic). Eb3 – Reddish brown light clay (subsoil – B horizon): Bright reddish brown to reddish brown light clay to light medium clay. Field pH 6.0 to 7.5 (slightly acidic to neutral). Eb4 – Yellowish light medium clay (subsoil – B22 horizon): Dull yellow orange to yellowish brown light medium clay. Field pH 6.0 to 7.0 (slightly acidic to neutral). Eb5 – Bright sandy light clay (subsoil – BC horizon): Orange to bright yellowish brown coarse sandy light clay to light clay. Field pH 6.0 to 8.0 (slightly acidic to neutral to slightly alkaline).
Glenmornon	Gl1 – Dark sandy clay loam (topsoil – A1 horizon): Dark brown to dark reddish brown coarse sandy clay loam to coarse sandy loam. Field pH 5.5 to 6.0 (slightly acidic). Gl2 – Brown sandy clay loam (topsoil – A2 horizon): Reddish brown to dull brown coarse sandy clay loam to coarse sandy loam. Field pH 5.0 to 5.5 (moderately to slightly acidic). Gl3 – Reddish brown clay (subsoil – B horizon): Dark reddish brown light medium clay. Field pH 5.0 to 6.5 (moderately to slightly acidic). Gl4 – Reddish brown clay loam (subsoil – B horizon): Reddish brown clay loam. Field pH 5.5 to 6.5 (slightly acidic). Gl5 – Yellowish sandy clay (subsoil – BC horizon): Yellowish brown to bright brown light sandy clay to medium sandy clay. Field pH 5.5 to 6.5 (slightly acidic).

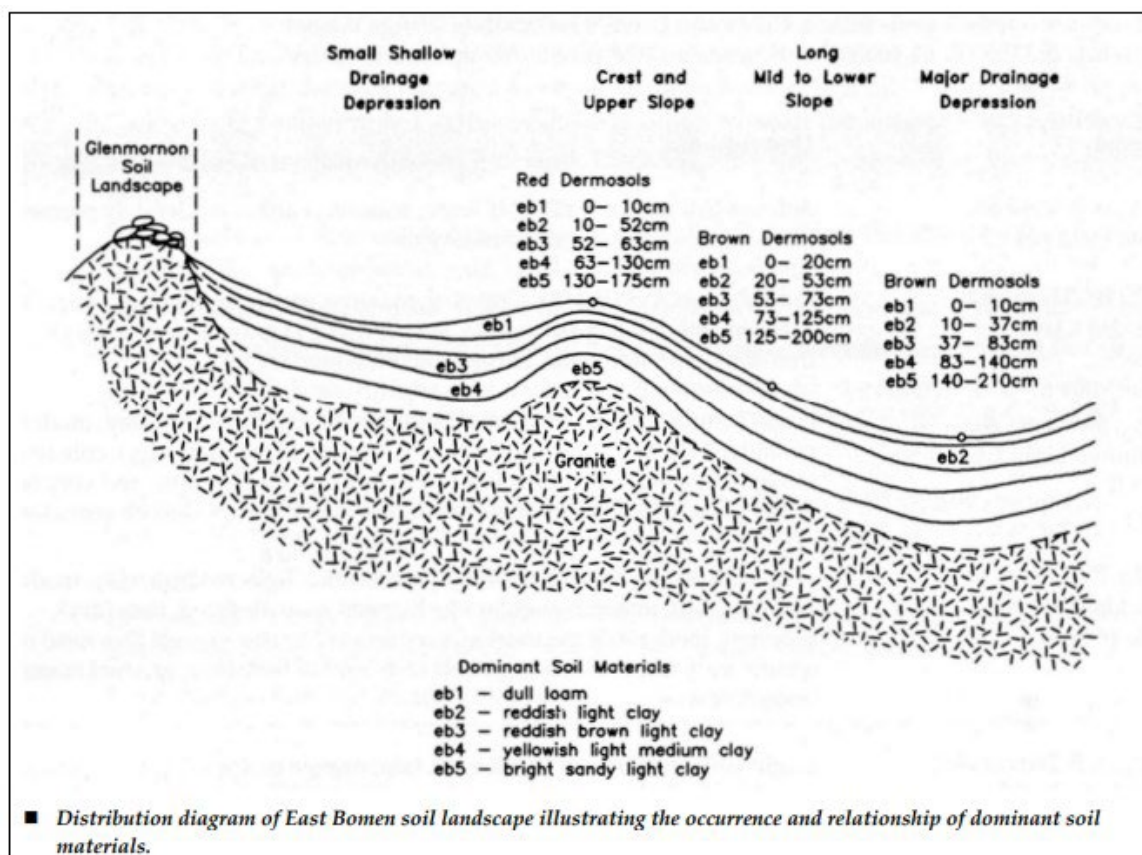


Figure 2-3 Stratigraphic view of the soil horizons present within the East Bomen soil landscape (Chen & McKane 1996, p.136).

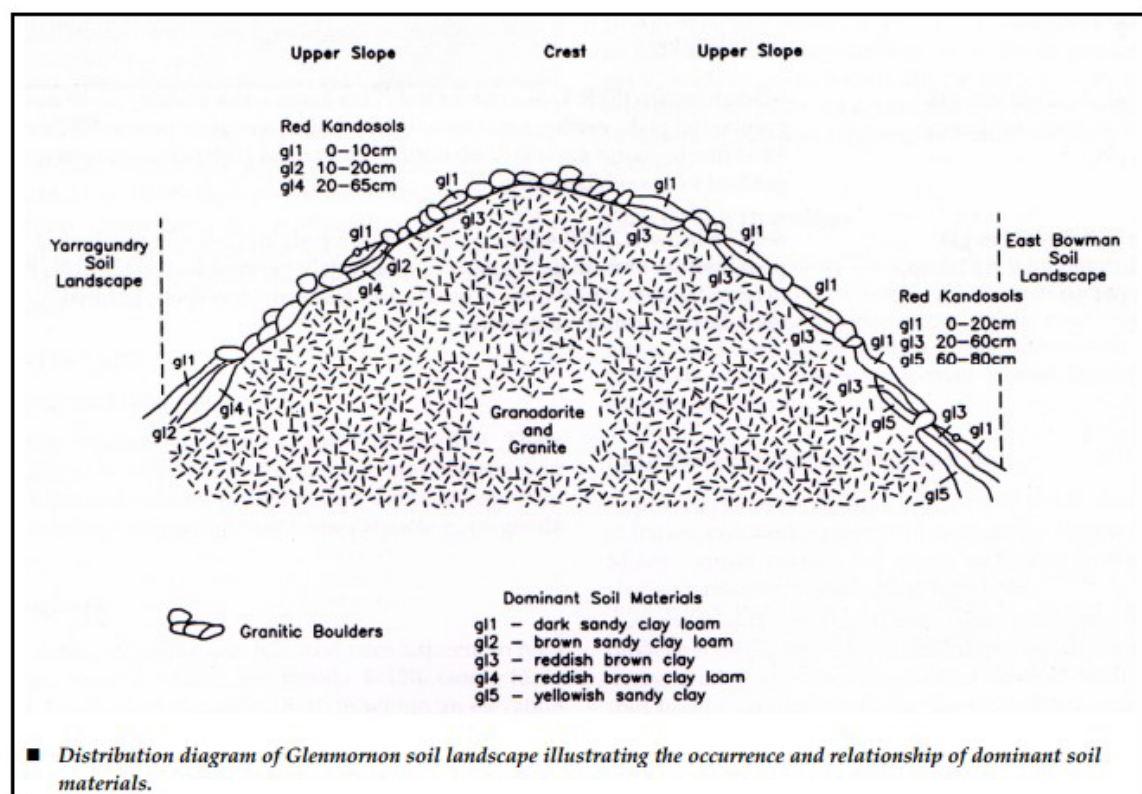


Figure 2-4 Stratigraphic view of the soil horizons present within the Glenmornon soil landscape (Chen & McKane 1996, p.48).

The description of the two soil landscapes suggest that the Project Area is characterised by a variety of soil profiles with a clay base (i.e., either sandy or loamy clays). Both of these landscapes are comprised of loams, clay loam, light clays, sandy clays, or normal clays with the field pH ranging from 5.0 to 8.0 (moderately acidic to slightly alkaline). Therefore, it can be expected that any PADs are likely to be shallow due to their clayey soils. It should also be noted that previous archaeological excavations on PADs in the area suggest that the subsurface artefact bearing deposits are generally confined to the top 30 cm of soil deposit. The variable pH level across the soil landscapes further suggests that any PADs will not be comprised of organic material due to the relatively acidic nature of the soils. Therefore, should any PADs be identified within the Project Area it is expected that they will consist of stone artefacts, which preserve well in acidic soils, and will be confined to the upper soil horizons.

2.2.3 Hydrology

In order to evaluate the hydrological resources available directly within – or in proximity to – the Project Area, the Strahler Stream ordering system must be used. This is a classification system that gives a waterway an order that is determined by the number of tributaries associated with the waterway (Strahler 1952). The Strahler Stream ordering system is illustrated in Figure 2-5 below.

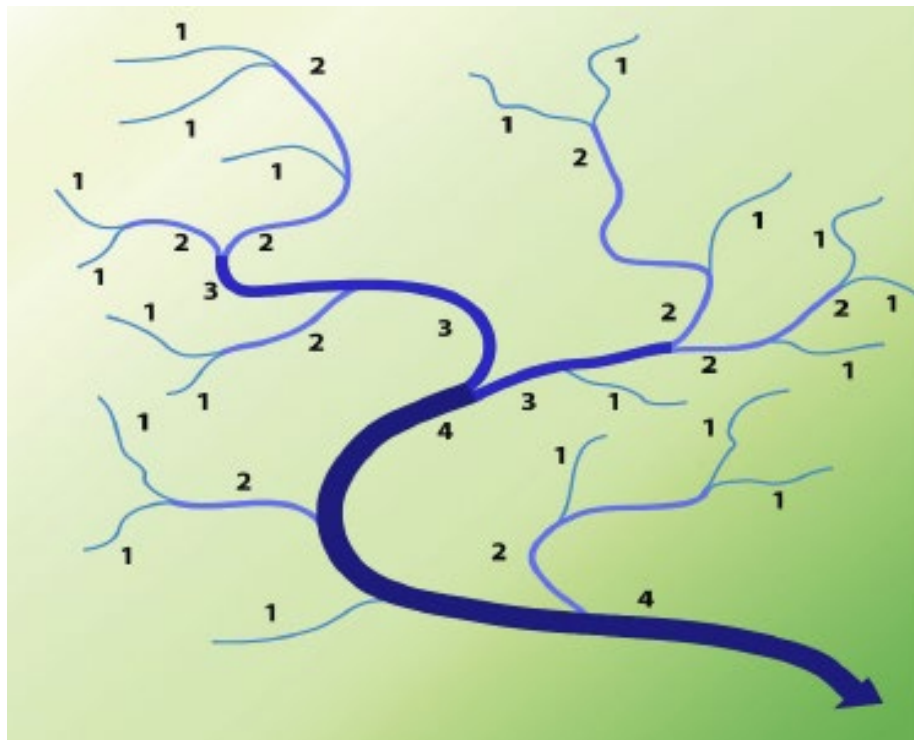


Figure 2-5 The Strahler Stream ordering system illustrated (DPIE 2020, p.79).

No waterways or waterbodies are located within the Project Area. The closest mapped waterway is an unnamed ephemeral stream (1st order) approximately 230 m south east of the Project Area. The closest named waterways are Dukes Creek (approximately 2 km north west; 3rd order), the Murrumbidgee River (approximately 2 km south east; 9th order), and Wheel of Fortune Creek (approximately 3 km south east by east; 5th order). It should also be noted that the Bomen Lagoon Aboriginal Place is located approximately 2.1 km south west of the Project Area. While these major regional waterways are some distance from the Project Area, the topography transitions to a floodplain less than 600 m south east of the Project Area, suggesting that these waterways – especially the Murrumbidgee River to the south east – were easily accessible.

Previous archaeological studies show the importance of these water resources would have provided valuable food resources in the form of fish and yabbies to Aboriginal communities as well as bark the native trees that would have been abundant along the banks of the waterways and lagoons. The plentiful water would have also attracted native fauna such as Kangaroos and Possums which in turn are likely to have been hunted for their resources. As no waterways are located within the Project Area – and because the higher order waterways are at least 2 km away – it is highly unlikely that certain Aboriginal sites (i.e., midden, hearths) are unlikely to be identified within the Project Area as the focus for these activities is more likely to have taken place within proximity to these water sources.

2.2.4 Flora and fauna

The Project Area is largely cleared of all native vegetation except for a handful of pockets of the Western Slopes Grassy Woodlands and Upper Riverina Dry Sclerophyll Forests (as described by Keith 2004, p.96). While the Project Area is currently cleared it is likely that these two would have characterised the overwhelming majority of the vegetation within the Project Area prior to European land clearances in the area. Therefore, it is possible to suggest what type of resources would have been available to Aboriginal people in the past. A description of both vegetation classes' provided by Keith (2004) are shown in Table 2-4 below.

Table 2-4 Vegetation classes currently present within or directly adjacent to the Project Area (Keith 2004).

Vegetation Class	Description
Western Slopes Grassy Woodlands	Once ubiquitous on fertile soils throughout the western slopes of the Great Dividing Range. The tree canopy is typically up to 20 m tall with well-spaced crowns. Tussock grasses dominate the understorey and are interspersed with a variety of herbs and a sparse layer of emergent shrubs. While it was originally the most extensive class of grassy woodlands in the state, it is now largely reduced to small fragments degraded by overgrazing and weed invasion.
Upper Riverina Dry Sclerophyll Forests	The western fall of the southern tablelands and the parts of the Snowy River gorge support a suite of dry eucalypt forests that grow up to 20 m tall and have an open sclerophyllous shrub stratum and a patchy ground cover of grasses. These forests grow in areas with soils of moderate fertility derived from granites and metamorphosed siltstones, on terrain that ranges from steep to flat, between 300 m and 800 m elevation. Their main area of distribution is between Burrinjuck and Albury, though they extend a short distance into Victoria. They also occur in the Snowy River gorge in a rain shadow on the eastern side of the Main Range.

These species would have provided a wide variety of resources for the manufacturing of wooden implements, medicine and food, as well as habitats for animals that were also used for food and materials. If any mature native trees remain, there is a possibility that modified trees may be present as they were used for the extraction of bark for use as canoes, shields, and containers by Aboriginal people. The presence of other modified trees (carved or scarred) in the area suggests that there is potential for unrecorded modified trees to be present.

2.2.5 Historic land use and land disturbance

The lands surrounding the Project Area are currently used for roads, manufacturing and industrial, grazing and modified pastures, cropping, utilities (electricity substation and transmission), and managed resource protection (Biodiversity). Prior to these land uses, it is highly likely that the area was used for agricultural practices since the initial European settlement of the Wagga Wagga region. Historically imagery from 1966 shows that the Project Area had been almost entirely cleared of native vegetation, with very few trees remaining; otherwise, the land use appears consistent with grazing or cropping land practices. Imagery from 1971 shows that no discernible changes in land use took place in the intervening five years. This trend would continue until 1980, when some development began to take place within or adjacent to the western sections of the Project Area. By 1990, significant development had taken place within the western section of the Project Area. These developments are expected to have wholly destroyed any potential Aboriginal objects in these areas due to the destructive nature of the works (i.e., landscaping, road/yard sealing). However, the majority of the Project Area continued to be used for grazing or cropping land practices, with the only major alterations coming from the various 'farm tracks' that were used. Since 1990, more development has

occurred within the Project Area, the substation that exists within the northeastern section was constructed around 2006 (according to Google Earth historical imagery).

Through analysis of DEM data, it is clear that the area surrounding the substation was modified extensively during its construction, and is likely to have destroyed any Aboriginal objects present within the substation area. More recently, current satellite imagery shows that a concrete rectangular pad has been installed in the central section of the Project Area. It is unknown whether any further construction has taken place near this area, but the establishment of the concrete pad is again expected to have caused significant disturbance to any Aboriginal objects potentially present in that area.

Overall, the historical imagery shows that the land use of the Project Area has been varied over the last 60 years, with an increasing emphasis on more intensive developments. This land use has resulted in the large-scale clearance of vegetation within the Project Area, leaving few patches of native mature vegetation and potentially removing modified trees. The prolonged use of the area is also likely to have caused superficial surface disturbances from stock movement/low-intensity agriculture. This has a dual effect in that it may impact the integrity of shallow PADs or the upper layers of soil deposits as well as remove subsurface in situ artefacts, bringing them into a disturbed surface context. Where more intensive development has taken place, these areas are expected to be in a very disturbed context and therefore hold very little scientific value, if Aboriginal objects remain. However, it should be noted that stone artefacts are known to survive these kinds of disturbances – both from superficial cropping/pastoralism and from more intensive developments – and still hold significant cultural value to the local Aboriginal community. Furthermore, PADs can still be present in areas where superficial surface disturbances have taken place, albeit in various stages of disturbance.

Although there has been variable land use since Europeans arrived, there is also traditional Aboriginal land use of the region over thousands of years. This may have included such things as managing fire and conducting deliberate burns, and the potential for farming type activities or manipulation of plant and environments to provide food, although these activities have not been identified in the archaeological record of the Project Area.



Figure 2-6 Landforms within the Project Area

2.2.6 Ethnographic setting

There are several ethnographic recordings of Aboriginal life in the Riverina region from the 1800s that notably focus on the prevalence of Aboriginal people around waterways in the region. It is important to consider that the Aboriginal people alive at the time of such observations were survivors of serious epidemics of infectious disease such as smallpox, brought by Europeans, that greatly affected the population sizes and distribution of people within the landscape. Consequently, European records may not necessarily reflect pre-contact population distributions and traditional ways of life (Dowling 1997; Littleton & Allen 2007).

The dispossession from traditional lands and acts of violence against the Aboriginal people caused great social upheaval meaning that access to traditional resource gathering and hunting areas, religious life, marriage links and sacred ceremonial sites was disrupted or prevented. Despite this, Aboriginal people continued to maintain their connections to sites and the landscape in a variety of ways. The Wiradjuri people of the region continue to have a strong connection to their land.

2.2.7 Tribal boundaries and social structure

Cultural areas are difficult to define and “must encompass an area in which the inhabitants have cultural ties, that is, closely related ways of life as reflected in shared meanings, social practices and interactions” (Egloff, Peterson & Wesson 2005, p.8). Depending on the culture defining criteria chosen - i.e., which cultural traits and the temporal context (historical or contemporary) - the definition of the spatial boundary may vary. In Australia, Aboriginal “marriage networks, ceremonial interaction and language have been central to the constitution of regional cultural groupings” with the distribution of language speakers being the main determinant of groupings larger than a foraging band (Egloff, Peterson & Wesson 2005, pp.8, 16).

The Project Area is within an area identified as part of the Wiradjuri language group (see Figure 2-7 below). This is an assemblage of many small clans and bands speaking a number of similar dialects (Tindale 1974; MacDonald 1983; Horton 1994). It should be noted that there is no consistent agreement on the boundaries Wiradjuri Country. The majority of the studies performed on this have been done through a European perspective and do not adequately explain the complexities of connection to Country.

The Wiradjuri language group was the largest in NSW prior to European settlement. However, the borders were not static and would expand and contract over time to the movements of smaller family or clan groups. Boundaries ebbed and flowed through contact with neighbours, the seasons, and periods of drought and abundance.

It was the small family group that was at the core of Aboriginal society and the basis for their hunting and gathering life. The immediate family camped, sourced food, made shelter, and performed daily rituals together. The archaeological manifestations of these activities are likely to be small campsites, characterised by small artefact scatters and hearths across the landscape. Places that were visited more frequently would develop into larger site complexes with higher numbers of artefacts and possibly more diverse archaeological evidence.

These small family units formed part of the larger band that comprised of several families. These bands would move within an area defined by their religious sites (MacDonald 1983). Such groups would come together on special occasions such as pre-ordained times for ceremonies, rituals, or when they would cross paths with one another. They may have also joined together at different times of the year at different locations where resources were known to be abundant. The archaeological legacy of these gatherings would be larger sites rather than small family camps. They may include large hearth or oven complexes, contain a number of grinding implements and a larger range of stone tools and raw materials.

Identification and differentiation of such sites are difficult in the field. A family group and their antecedents and descendants occupying a particular campsite repeatedly over a long period of time may leave a similar pattern of archaeological signatures as a large group camped over a shorter period.

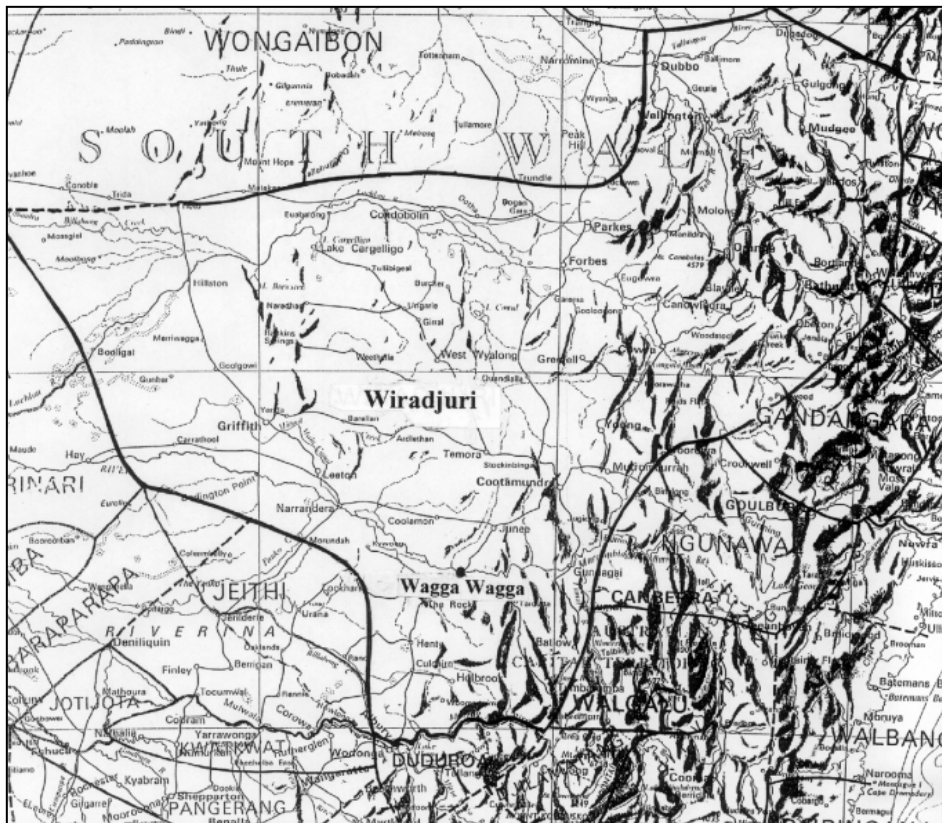


Figure 2-7 Aboriginal Tribes of Australia (Tindale 1974).

In 1824, the explorers Hume and Hovell were the first Europeans to mention Aboriginal people in the Wagga Wagga area as they noted fires and footprints as they explored the rivers of what would come to be known as the Riverina. European settlers started arriving in the district in the 1830s after Captain Charles Sturt passed through the region in 1829 (NGH Environmental 2013, p.5). The ethnohistory of Wagga Wagga compiled by Green (2002) notes that between the 5th and 8th of December 1829, two Wiradjuri men guided Charles Sturt's expedition from Wantabadgery past the future site of Wagga Wagga to Mount Arthur (Go Green Services 2002; Montgomery 2011).

Soon after European arrival in the area the Aboriginal population began to decline due to diseases such as smallpox and influenza. This decrease in the local Aboriginal population was made apparent to the European settlers when the numbers of Aboriginal people in attendance at the annual blanket distributions suddenly dropped. This event – where blankets were distributed each year by the government to the Aboriginal community as part of the commemoration of Queen Victoria's birthday – would bring large groups to Wagga Wagga to receive and distribute the blankets throughout the community. This event would eventually become part of the traditional ceremonial practices of the Wiradjuri in the Wagga Wagga region (Kabaila 2011, as cited in Montgomery 2011). In combination with the drop of population via disease, violence, land dispossession, and European settlement further compounded social stresses on the Aboriginal community.

Dispossession from traditional lands and acts of violence against the Aboriginal community caused significant social upheaval and partial disintegration of the traditional way of life. This meant that access to traditional resource gathering and hunting areas, religious life, marriage links, and access to sacred ceremonial sites were disrupted via European land practices (i.e., fencing of private property) or were outright destroyed. However, despite these disruptions Aboriginal people continued to maintain their connections to sites and the land in the early days of European settlement. Where Aboriginal people were taken to places like Warangesda, a mission established near Darlington Point in 1880, or Brungle Reserve between Gundagai and Tumut, people were able to maintain at least some form of association with Country and maintain

traditional stories. As the proliferation of agricultural livestock occurred, traditional food resources quickly diminished, leading to many Aboriginal people relocating onto properties to exchange labour for goods and resources (Kabaila 2011, as cited in Montgomery 2011). By 1900, Green (2002, p.105) suggests that there were as few as 20 local Aboriginal people who remained in the Wagga Wagga LGA.

Early European settlers who wrote about the Wiradjuri people and customs differentiated between the origin of some groups, referring to people as the Lachlan, Murrumbidgee, or Levels tribes for those between the two major rivers (Woolrych 1890). The extent of the Wiradjuri group means that there were many different environments that were exploited for natural resources and food. Like everywhere in Australia, the Wiradjuri people were adept at identifying and utilising resources either on a seasonal basis or all year round.

2.2.8 Material culture, food and resources

Seasonal food availability was often predicted by Wiradjuri astronomy. The recognition of movement and star patterns were interpreted to predict flora and faunal movements, nesting and offspring fluctuations with availability indication of Bogong moth seasons, emu egg availability and tuber procurement read from the stars (Matthews 1905, as cited in Go Green Services 2002).

Terrestrial animals such as the possum were noted by many early observers as a prime food source and the skins were made into fine cloaks that evidently were very warm (Evans 1815; Oxley 1820; Mitchell 1839). Kangaroos were also eaten, and their skins made into cloaks as well. A range of reptiles and other mammals were food sources. Fish and mussels would have been prevalent from the rivers and creeks and insects were also a common food type, in particular grubs and ants and ant eggs (Pearson 1981; Fraser 1892). Birds including emus were common as a food source, often being caught in nets made from fibres of various plants such as flax, rushes and kurrajong trees. Bird hunts were also often undertaken as group activities, with emus, ducks and other birds targeted through groups of people flushing them out and driving them into prearranged nets with many Wiradjuri able to mimic bird calls (Ramson 1983; Go Green Services 2002).

Plant foods were equally as important and mostly consisted of roots and tubers, such as Typha or Cumbungi whose tubers were eaten in late summer and the shoots in early spring. Other edible plants from the Wiradjuri region include the Yam Daisy or Murnong, eaten in summer and autumn, the Kurrajong seeds and roots, Acacia seeds and other rushes (Gott 1982).

Some of the early settlers such as pastoralists, surveyors, explorers, administrators, and others observed traditional Aboriginal activities, including their ceremonies, burial practices, and general ways of living, and recorded these in letters, journals, and books. These early records of Aboriginal lifestyle and society within the region assist in understanding parts of the traditional Aboriginal way of life, albeit already heavily disrupted at the time of the observations and through the eyes of largely ignorant and uninformed observers.

The early observations also note that some weapons and tools were carried, some made from wood such as spears, spear throwers, clubs, shields, boomerangs, digging sticks, bark vessels, and canoes. Other materials were observed in use such as stone axes, shell and stone scrapers, and bone needles.

In an archaeological context few of these items would survive, particularly in an open site context. Any item made from bark, timber and animal skins would decay quickly in an open environment. However, other items – in particular those made of stone – would survive where they were made, placed, or dropped. Shell material may also survive in an archaeological context. Sources of raw materials, such as the extraction of wood or bark leave scars on the trees that are archaeologically visible, although few trees of sufficient age survive in the modern context. Outcropping stone sources also provide clues to their utilisation through flaking, although pebble beds may also provide sources of stone which leave no archaeological trace.

2.2.9 AHIMS search

The Aboriginal Heritage Information Management System (AHIMS) provides a database of previously recorded Aboriginal heritage sites in NSW. A search provides basic information about any sites previously

identified within a search area. However, a register search is not conclusive evidence of the presence or absence of Aboriginal heritage sites, as it requires that an area has been inspected and details of any sites located have been provided to add to the register. As a starting point, the search will indicate whether any sites are known within or adjacent to the investigation area.

On 19 December 2023, a search of the AHIMS database was undertaken over an area from:

- From: Latitude: -35.1078; Longitude: 147.3576.
- To: Latitude: -35.0412; Longitude: 147.4812.

The AHIMS Client Service ID was 850350. There were 91 Aboriginal sites recorded within the search area and three declared Aboriginal Places; two of the Aboriginal sites—AHIMS# 56-1-0109 and # 56-1-0111—are duplicates of the same site. The duplicated sites are of Bomen Isolated Find 1, and while AHIMS# 56-1-0111 is marked as 'deleted' on the AHIMS register it still comes up within the search results. NGH do not consider that the duplication of site affects the search result significantly. The Aboriginal Places are the Bomen Axe Quarry, Bomen Lagoon, and Wiradjuri Reserve & Gobba Beach, which are – respectively – 650 m north, 2270 m south west, and 4225 m south west. It should be noted that a further two places – the Wollundry Lagoon & Tony Ireland Reserve and Flowerdale Lagoon – are located outside of the AHIMS search area but within the township of Wagga Wagga. While none of the Aboriginal Places will be directly impacted by the proposed works – given that the Project Area does not intersect with any of their boundaries – the proximity of the Bomen Axe Quarry to the Project Area suggests that the Project Area may be of a higher overall sensitivity due to its close geographical association with the Aboriginal Place. A more detailed description of the Aboriginal Places is provided in Section 2.4.1 below.

On the 14 February 2025, a new AHIMS extensive search—over the exact same area as described above—was performed due to the expiration of the previous search (AHIMS Client Service ID was 975659). The results of this search established that there were 92 Aboriginal sites within the search area, indicating that a single additional Aboriginal site was registered on AHIMS between the 19 December 2023 and the 14 February 2025. The additional site, AHIMS# 56-1-0775, is not within the current Project Area and therefore will not be subject to the proposed works as assessed by this report.

The results of the AHIMS search area are shown in Figure 2-8 below. Search results are summarised in Table 2-5 below.

Table 2-5 Breakdown of previously recorded Aboriginal sites in the region.

Site Type	Number
Artefact	68
Modified Tree	21
Stone Quarry, Artefact	2
Stone Quarry	1
Total	92

While no previously recorded Aboriginal sites or Aboriginal Places are located within the Project Area, a total of 9 registered AHIMS sites and a single Aboriginal Place are located within 1 km. These sites are shown in Figure 2-9 below and the registered AHIMS sites are summarised in Table 2-6 below.

Table 2-6 AHIMS sites within 1 km of the Project Area.

Site Number	Site Name	Site Type	Distance to project (m)	Site Status on AHIMS	Description
56-1-0775	Bavin Rd Scar Tree 1	Modified Tree (Carved or Scarred)	Approximately 490 m west of the Project Area	Valid	Recorded as a modified tree with two scars into an old yellow box tree
56-1-0552	BSF-IA6-18	Artefact	Approximately 588 m north east of the Project Area	Destroyed	A single surface quartz flake
56-1-0533	Bomen 539070	Artefact	Approximately 600 m north east of the Project Area	Valid	Surface artefact scatter of six artefacts within a 1 m x 1 m scatter
56-1-0532	Bomen 539085	Artefact	Approximately 600 m north east of the Project Area	Valid	A single quartz core
56-1-0044	EAST BOMEN IF2	Artefact	Approximately 617 m north east of the Project Area	Valid	A single surface milky quartz bipolar flake.
56-1-0538	Bomen 539071	Artefact	Approximately 639 m north east of the Project Area	Valid	Surface artefact scatter of four artefacts within a 1 m x 1 m scatter
56-1-0043	EAST BOMEN 1	Stone Quarry, Artefact	Approximately 825 m north of the Project Area	Valid	An Aboriginal surficial hardstone quarry and axe manufacturing site
56-1-0601	Wagga Wagga SF AFT 5	Artefact	Approximately 864 m north east of the Project Area	Partially Destroyed	Subsurface artefact scatter containing at least six artefacts within an 18 m x 10 m area
56-1-0534	Bomen 538732	Artefact	Approximately 876 m north east of the Project Area	Valid	A single volcanic core
56-1-0045	EAST BOMEN IF1	Artefact	Approximately 972 m north east of the Project Area	Valid	A single surface black micro-crystalline banded chert broken flake

2.2.10 Additional searches

Other heritage register searches were also undertaken to identify any items or places in proximity to the Project Area, with a focus on the Project Area and surrounding landscape. The following resources were used as part of this assessment:

The NSW State Heritage Inventory (SHI), this includes items on the State Heritage Register and items listed by state agencies and local Government, to identify any items currently listed within or adjacent to the proposal site.

The Australian Heritage Database, this includes items on the National and Commonwealth Heritage Lists, to identify any items that are currently listed within or adjacent to the proposal site.

The results of the NSW SHI database search indicated there are no items listed for Historic or Aboriginal values within the Project Area. However, the Bomen Railway Station (including the Bomen Stationmasters Residence) – which is located 525 m north of the Project Area – is registered on the State Heritage Register (SHR ID: 01093), the Section 170 register, and within the Wagga Wagga Local Environmental Plan (LEP) (LEP ID: I8 – Bomen Railway Station; LEP ID: I9 – Bomen Stationmasters Residence). None of these listings will be impacted by the proposed works.

The results of the Australian Heritage Database search indicated that there are no items listed within the Project Area or Bomen suburb.

No other known previously recorded heritage sites are located within or adjacent to the Project Area.

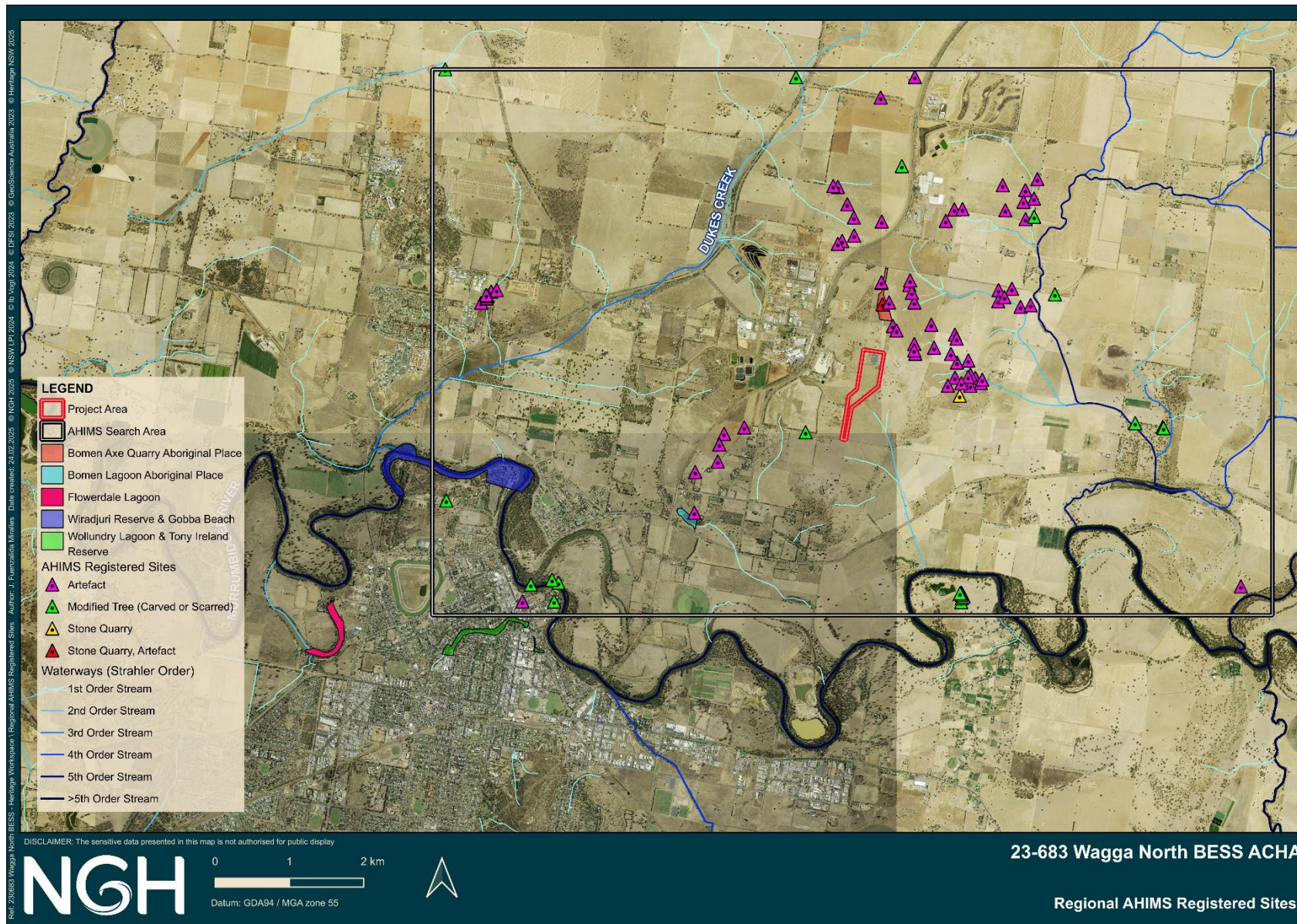


Figure 2-8 AHIMS sites within the search area.

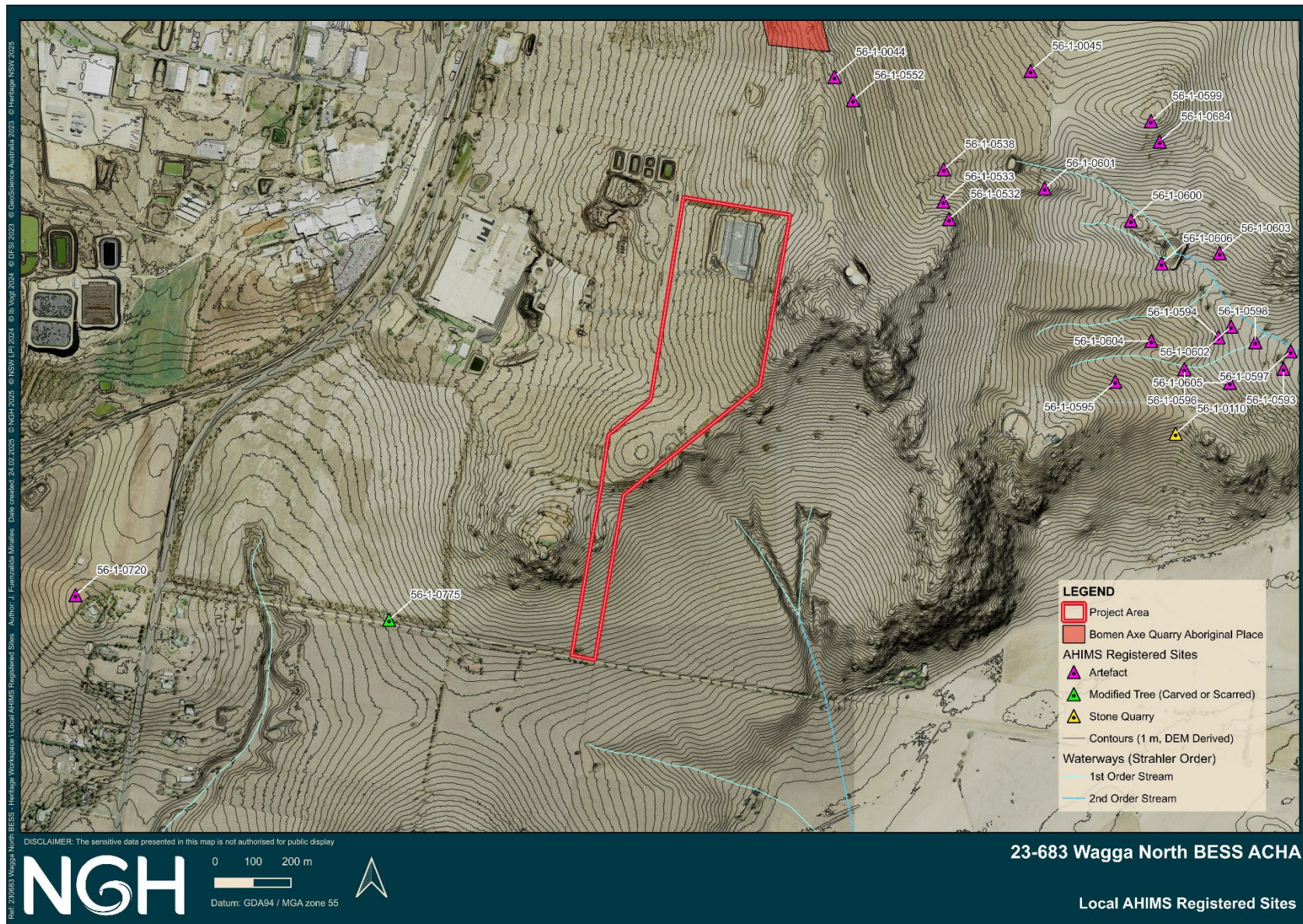


Figure 2-9 AHIMS sites close to Project Area.

2.3 Regional archaeological studies

Aboriginal people have occupied what we now know as the Australian continent for at least 40,000 years and perhaps 60,000 years before present (BP) and beyond. There have been no known dated excavations in the Wagga Wagga region, however archaeological excavations within the wider region have yielded dateable material.

- Between 690 BP (± 100 years) and 3,445 BP (± 130 years) using radiocarbon (C14) dating at the Mudgegonga 2 rockshelter (Godfrey et al. 1999); approximately 142 km south of Wagga Wagga.
- 590 BP (± 60 years) using C14 dating at the Mooroopna Common 4 midden near Shepparton (Godfrey et al. 1999); approximately 232 km south west of Wagga Wagga.
- Between 8,000 BP (± 420 years) and 10,000 BP (± 250 years) using C14 dating at Kow Swamp near Gunbower (Thorne & Macumber 1972); approximately 300 km south west of Wagga Wagga.

The following are summaries of archaeological survey reports that have been completed in the region, these have been primarily driven by development and infrastructure requirements. The purpose of reviewing and summarising relevant local and regional archaeological studies is to establish an understanding of the archaeological context of the Project Area. This includes understanding the type, extent, and possible distribution of sites which may be located within the Project Area.

Silcox (1987) conducted a series of test excavations using a backhoe on the northern side of the Murrumbidgee River at Gumly Gumly (approximately 10 km east of Wagga Wagga) based on the results of a survey for a water augmentation project. The Potential Archaeological Deposit (PAD) named GG1 was proposed for test excavation due to its proximity to a reliable water source and because it was situated on an elevated, well-drained flat surface suitable for camping; the absence of previous ground disturbance activities further suggested some archaeological potential may be present. Seventeen test pits at seven locations were excavated and 52 artefacts were recovered. All of the artefacts were of quartz and were confined to the top 25 centimetres (cm) of the soil deposit. Silcox also identified the presence of a thin layer of mussel shell within one trench. The results indicated that there a low-density scatter of artefacts was present in this area, similar to many other sites on within the lower Murrumbidgee floodplain.

Australia Archaeological Survey Consultants (1995) conducted a study about 12.5 km south east of the current Project Area for a proposed upgrade of the Sturt Highway. The majority of the survey area had been highly disturbed by activities associated with the previous construction of the highway. Despite good visibility, no sites were located, and it was concluded this was an accurate reflection of the Aboriginal use of this steep hill slope area with limited water availability in the area.

Go Green (2002) compiled a comprehensive study of Wiradjuri heritage for the Wagga Wagga area. The study focused on Wiradjuri and non-indigenous heritage, oral histories, insight into the pre-European Wiradjuri culture, a timeline of Wiradjuri history and highlighted potential tourism, education and employment opportunities. Green also identified a number of plant and animal resources in the Wagga Wagga area that have been utilised by Wiradjuri people in the past; and continue to be used in the present. During the study, Green identified three scarred trees and an artefact scatter in association with either the Bomen Lagoon (approximately 2.25 km south of the Project Area) or Wollundry Lagoon (approximately 4.9 km south west of the Project Area).

Navin Officer Heritage Consultants (2002) conducted a survey for the Lloyd Neighbourhood Land Release Area; approximately 10 km south west of the current Project Area. A total of five Aboriginal sites were located during the survey, including three artefact scatters, one isolated artefact, and one probable culturally modified tree. The artefacts recorded were predominantly characterised by flaked quartz materials with occasional tuff/mudstone inclusions. The sites with artefacts were considered not to be rare or unusual and areas surrounding these sites were deemed unlikely to be associated with in situ subsurface deposits. Additionally, three PADs were identified during the survey and were considered the most likely locations

where subsurface archaeological material may be present. It was recommended that a limited archaeological subsurface testing programme be conducted in order to ascertain the true archaeological potential of these areas and to facilitate the development of informed management strategies for these areas.

Kelton (2005) conducted a primarily desktop study and brief field assessment within the Henwood property, between Coolamon Road the Olympic Highway and Sutherlands Road; approximately 3 km west of the current Project Area. While the survey visibility of the area was poor, a number of areas of archaeological sensitivity and PAD were identified. The PADs were primarily located along the western banks and adjacent terraces of Dukes Creek and its surrounding low hillslopes. Hill crest and ridge landforms in were also identified as archaeologically sensitive landforms in the area.

Austral Archaeology (2005) conducted a survey for the proposed Wagga Wagga Rail Bridge Replacement; approximately 4.5 km south west of the Project Area. A total of six areas of PAD were identified during the assessment. Areas of high potential were identified along the Murrumbidgee floodplain. These areas were relatively undisturbed and contained deep soil profiles and a high potential for in situ subsurface finds. Areas of moderate sensitivity were determined to be north of the Murrumbidgee River on the north-west side of the track – between the riverbank and the fence line – in a relatively flat to the undulating floodplain. Areas of low archaeological potential were determined to be south of the Murrumbidgee River on the south-east side of the track, between the riverbank and the fence line.

Umwelt (2014) performed excavations for the extensions to the Wagga Wagga Courthouse; approximately 4.9 km south west of the current Project Area. A total of 23 artefacts were recorded from 18 test pits during the excavations. The site – recorded as Wiradjuri 1 – consisted of flakes, broken flakes, and flaked pieces, all of which were manufactured from quartz. During the consultation process, it was noted that the local Aboriginal community associated the study area location with a burial ground, although no human remains were identified during excavations.

NGH (2016a) investigated an area for the extension of Brunslea Park estate, approximately 8.2 km south east of the Project Area. A total of 19 stone artefacts, a single piece of a mussel shell, pieces of burnt clay, and eight lithic fragments were recovered from 40 test pits with an additional 17 surface artefacts recorded across the area. The majority of the subsurface artefacts were recovered from between 5 cm -15 cm below the surface. Flakes or portions of flakes were the dominant artefact typology for both the surface and subsurface finds with only a single core recovered. Quartz was the common lithology with the exception of a fragment of volcanic material. A single surface finds flake was also recorded as having retouch, but it was not assigned a formal tool type, though it was noted to be similar in shape to a Tula adze. Following the subsurface testing programme the sites were recorded as sites Brunslea Park AS7 and Brunslea Park AS8, both of which were characterised by low-density artefact scatters on low gradient slopes and along the crest of a broad ridgeline. The average artefact density was 1.9 artefacts/m² with a peak of 28/m² in one test pit. While the sites were deemed to have a low scientific value it was considered that the development area as a whole was likely to contain Aboriginal heritage objects and an AHIP was recommended for the entire proposed development area. The excavation results in this area supported previous predictive models as the of areas of archaeological sensitivity in the Wagga Wagga area and that archaeological sensitivity in the area will increase in areas with a gentle slope or raised above regular flood levels.

NGH (2022) completed an ACHA and ATR for the proposed Riverina Water Solar Pilot Plant; approximately 4.1 km south west of the current Project Area. These assessments were completed as a follow-up to a previous Due Diligence assessment done by NGH. The archaeological survey relocated two areas of PAD identified during the original Due Diligence assessment as well as an additional PAD (PAD 7) and culturally modified tree (AHIMS# 56-1-0688). The assessment also involved subsurface archaeological test excavations within PAD 7, where 12 artefacts were recovered from five of the test pits. The subsurface results were determined to be characteristic of a discrete low-density cluster of artefacts. It was further argued that the results of the survey and subsurface testing supported the archaeological modelling for the region, where sites and artefacts are present throughout the landscape, especially within elevated areas adjacent to

waterways. The density of the surface and subsurface assemblage present suggests that short-term use of the area was likely as no long-term occupation sites were evident.

NGH (2022) undertook an Aboriginal Heritage Due Diligence assessment for the proposed decommissioning of the existing 45 megalitres open reservoir at Willans Hill; approximately 6.7 km south west of the current Project Area. A site inspection was undertaken, where two low-density artefact scatters and two isolated finds were recorded. The artefacts recorded were all manufactured from quartz, the dominant raw material for the Wagga Wagga region. The site – Willan's Hill AFT1 – was associated with fill material and was assumed to have been brought onto the site from an unknown location.

2.4 Local archaeological studies

The following are summaries of those archaeological survey reports that have been completed in the Bomen area which have been primarily driven by development and infrastructure requirements.

Smith (1992) completed a preliminary archaeological survey for the proposed Optus fibre optic cable route from Albury to Cootamundra and passing within 2.2 km of the current Project Area. The purpose of the preliminary survey was to identify areas of archaeological sensitivity along the entire proposed cable route and recommend areas for further heritage investigation. In the Wagga Wagga region, these included the flats, banks, terraces, and anabranches of the Murrumbidgee River and ephemeral creek lines. These areas have high potential to contain scarred trees, burials, artefact scatters and subsurface artefacts (Smith 1992, p.9). The recommendations resulting from the survey suggested avoiding all trees along the proposed route, a systematic foot survey of any areas of archaeological potential, subsurface testing of areas of alluvial deposit along creek banks, creek flats, and terraces, and the relocation of registered sites of Aboriginal cultural heritage.

Navin Officer Heritage Consultants (1996) performed a follow up cultural heritage assessment – the original assessment was performed two years earlier by Navin et al. (as cited in Navin Officer Heritage Consultants 1996) – of the Wodonga to Wagga Wagga natural gas pipeline; ending approximately 65 m south of the Project Area. After the surveys, a total of 65 Aboriginal sites – 38 artefact scatters, 19 isolated artefacts, and eight PADs – were identified to be present within proximity to the pipeline corridor. Based on the survey results it was reflected that artefact scatters are likely to be located in well drained contexts adjacent to water sources. A number of test pits were excavated within the PADs along the proposed route with quartz being the dominant raw material. It was concluded from the excavations that there were not sustained or repeated visits to particular areas within the pipeline corridor.

HLA Envirosiences (1997) undertook an assessment for a proposed expansion of effluent irrigation system for the Bomen Abattoir; approximately 1 km south west of the current Project Area. They examined the alignment of a proposed pipeline, the location of a proposed holding dam, and the proposed irrigated paddocks. It was noted that the surface visibility across the majority of the route was high, with little vegetation cover and few rocks visible on the surface. While a significant amount of quartz was observed across the survey route, none of it was recorded as artefactual. HLA argued that the flaws and impurities present in the quartz would have made its use in the production of stone tools difficult. Only a single isolated artefact, ISF BOM1 (AHIMS# 56-1-0033), was identified within the survey corridor. It was recorded as a piece of coarse silcrete that had evidence of grinding on one surface and was located within a spur/saddle landform. While only a single artefact was recorded, it should be noted that silcrete artefacts are rare in the Wagga Wagga archaeological landscape, with the overwhelming majority of identified stone artefacts being comprised of quartz. The silcrete artefact that was identified in this study had almost certainly been imported from elsewhere as no silcrete sources are known to be present in the immediate region.

Kelleher Nightingale Consultants (2008) completed an ACHA as part of the Wagga Wagga City Council's Local Environmental Study to implement the strategic planning of the Wagga Wagga Spatial Plan 2007. As part of this study, environmental assessments were undertaken for eight sites that were subject to rezoning. These included Lloyd, Bomen, Estella West, Edison Road, Hammond Avenue, Copland Street, Boorooma

East, and Moorong Street; the current Project Area is partially located in the south of the Bomen study area. Kelleher Nightingale Consultants noted that the surface visibility conditions during the site visit were not conducive to the identification of Aboriginal objects across the entire assessed area. Furthermore, they observed that a significant level of landscape modification had taken place in association with the existing industrial properties in the area and along the road and railway corridors present. However, a significant portion of the area – especially where gently undulating terrain along waterways or higher terrain is present – contained moderate to high levels of archaeological sensitivity, including sections of the current Project Area. Despite the poor ground surface visibility encountered during the survey, an isolated find (Bomen IF 1, AHIMS# 56-1-0109) was recorded within proximity to an ephemeral waterway within a gully landform. It was recorded as a mid-reddish brown mudstone flake with a flaked platform, feather termination, several dorsal flake scars, and approximately 10% dorsal cortex. The isolated find was further noted to be located within an area of high surface visibility and moderate exposure visibility. While only a single artefact was identified during the survey, the results and observations of the landscape were used to prepare an archaeological sensitivity model for the Bomen area. This model, which was prepared according to the knowledge available in 2008, is presented in Figure 2-10 and .

Table 2-7 below.

Table 2-7 Archaeological sensitivity model for Bomen prepared by Kelleher Nightingale Consultants (2008).

Landform	Archaeological Sensitivity	Sensitivity Description	New Sites
Granite Outcrop along Upper Hillslope/Crest	High	Increased sensitivity where potential artefact raw material present, such as quartz	1 quarry
Undulating Flat/Colluvial Deposits	Moderate to High	Increased sensitivity in association with drainage lines/terraces	n/a
Drainage Line and Associated Alluvial/Colluvial Deposits	Moderate to High	Increased sensitivity where gentle slopes or raised above regular floods	Isolated Find
Ridgeline Crest	Moderate	Less exposed to prevailing winds, increased sensitivity with proximity to drainage/open drainage/terraces	n/a
Lower Hillslope	Low to Moderate	Increased sensitivity in association with alluvial/colluvial deposits associated with drainage lines	n/a
Upper/Mid Hillslope	Low	Less possibility of intact archaeological deposits, increased sensitivity with gentler slopes and proximity to open drainage lines/terraces	n/a

The predictive model prepared by Kelleher Nightingale Consultants places emphasis on landforms that contained known archaeological sites in 2008, including what is now known as the Bomen Axe Quarry Aboriginal Place. As a result, it is a relatively limited model as it relies on the assessment performed by Kelleher Nightingale Consultants and the assessments performed on the Bomen Axe Quarry, both of which did not conduct a 100% coverage of the Bomen area. However, since 2008 several large assessments have been conducted in the area, all of which can be used in conjunction with the landscape context of the Project Area to refine the initial model prepared by Kelleher Nightingale Consultants.

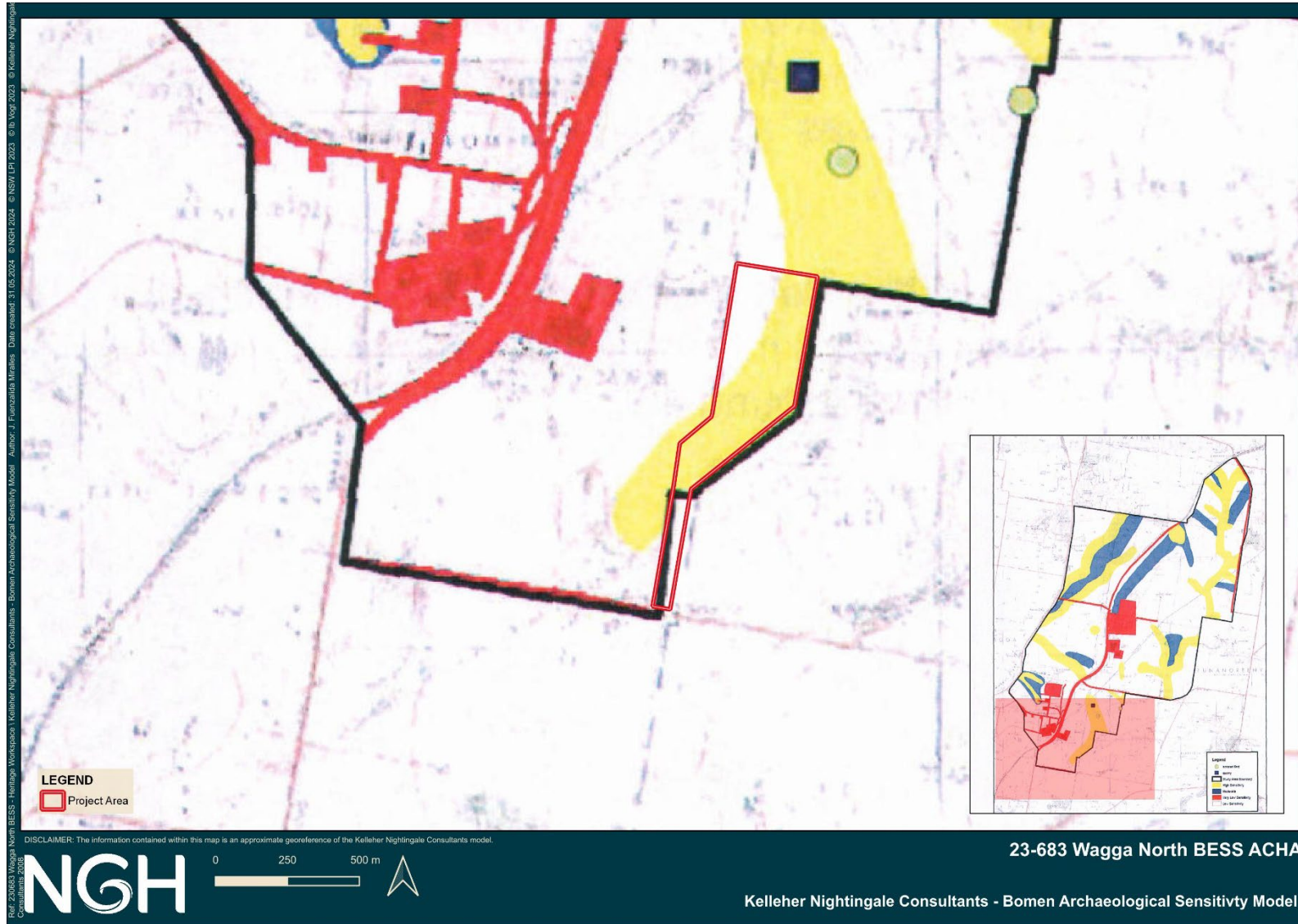


Figure 2-10 Project Area within the Kelleher Nightingale Consultants (2008, p.17) Bomen archaeological sensitivity model. Note the areas of yellow, blue, and red signify areas of high, moderate, and very low sensitivity respectively.

NGH was engaged to perform an Aboriginal Heritage Due Diligence assessment (2015) and several ACHAs (NGH Environmental 2016b, 2018; NGH Pty Ltd 2020) for Stages 1, 2, and 3 of the proposed Riverina Intermodal Freight and Logistics (RIFL) Hub at Bomen Park; beginning approximately 500 m north of the current project Area. The initial Due Diligence assessment of the Stage 1 area resulted in the identification of three isolated artefacts within disturbed contexts – Bomen RIFL IF1, Bome RIFL IF2, and Bomen RIFL IF3 – as well as two areas of archaeological sensitivity that were not identified during the Kelleher Nightingale Consultants (2008) study. The report concluded that an ACHA would be required to further assess the Aboriginal heritage within the RIFL area and to use as supporting documentation in the application for an AHIP. The subsequent ACHA assessment (NGH Environmental 2016b) continued the assessment based on the recommendations of the Due Diligence and included a select part of Stage 2 for the construction of the rail infrastructure; this included both survey and subsurface test excavations. The surface and subsurface investigations resulted in the identification of an additional surface isolated find (Bomen RIFL IF4), a subsurface isolated find (Bomen RIFL IF5), four artefact scatters with subsurface deposits (Bomen RIFL AS1, Bomen RIFL AS2, Bomen RIFL AS3, and Bomen RIFL AS4), and a scarred tree (Bomen RIFL ST1). Observations of the remainder of the landscape during the survey suggested that the majority of the area contained a negligible archaeological potential. However, the two areas of archaeological sensitivity that were identified by the Kelleher Nightingale Consultants (2008) were included in the subsurface test excavation programme. A total of 73 test pits were excavated across eight areas of the Stage 1 and Stage 2 study area, with 28 artefacts being recovered from 14 of those test pits. NGH argued that the results of this assessment were characteristic of other assemblages in the area, as the majority of artefacts were comprised of quartz raw material and no retouched artefacts were identified.

The Stage 1 and Stage 2 assessments (NGH Environmental 2015, 2016b) for the Bomen RIFL Hub only resulted in the identification of discrete low-density artefact scatters or isolated finds. NGH argued that the results of the assessments suggest that the regional site distribution was not restricted to any particular landform, as sites were both absent and present across the predicted ‘sensitive’ landforms that were subject to survey and subsurface test excavations. Although it should be noted that the results of the assessment did indicate that Aboriginal sites were more likely to be present along ridgeline crests and the upper/mid slopes in proximity to drainage depressions. NGH argued that the Aboriginal sites identified show that the area was frequented by small groups of Aboriginal people in the past, but that no large sites would be present within the RIFL Hub area. NGH further argued that the Kelleher Nightingale Consultants (2008) sensitivity model should be revised based on the results of the RIFL Hub assessments. The Kelleher Nightingale Consultants model attributed high sensitivity to landforms based on their proximity to water. NGH argued that this was inaccurate as many of the broad, open depressions that were identified for their potential to hold water do not frequently hold water and therefore should not influence the overall sensitivity of adjacent landforms. Furthermore, the test excavations did not identify any large, stratified sites within the landforms adjacent to these drainage depressions. As a result, NGH concluded that the drainage depressions should only be considered as part of the wider undulating landscape, and not as an indicator of higher archaeological sensitivity. They also argued that generally level crests and low gradient upper hillslopes should have a moderate archaeological sensitivity instead of the moderate to low archaeological sensitivity predicted by Kelleher Nightingale Consultants (2008).

In their final assessment for the RIFL Hub, NGH (2020) performed an ACHA for Stage 3 of the precinct. The survey for the assessment did not result in the identification of any new Aboriginal sites due to the low ground surface visibility that was encountered. However, a single area of PAD – named Dukes Creek PAD 1 – was identified on an elevated flat landform on western side of Dukes Creek near the Olympic Highway. No test excavations occurred within Dukes Creek PAD 1 as the proposed works were not going to impact the PAD area. NGH concluded that no further test excavations were required within the Bomen RIFL Hub area so long as the proposed works did not change.

AECOM Australia (2018) conducted an Aboriginal and historic archaeological assessment for the proposed Bomen Solar Farm; approximately 210 m north of the Project Area. A total of nine sites – six isolated finds,

two artefact scatters, and one potential scarred tree – were recorded by AECOM during the field survey. RAP representatives recorded a further eight artefact scatters after the survey. All of the AECOM recorded artefacts were made from quartz and were either cores (unidirectional, multidirectional), flakes (proximal or complete), or angular fragments/flaked pieces. No typological information is available for the artefacts recorded by the RAP representatives, however the majority of that assemblage appears to be quartz from site images. AECOM noted that the majority of the sites they identified were located on lower (n=17, 47.2%) or upper slopes (n=12, 33.3%), with the remainder on either lower slopes (n=17, 16.7%) or a crest (n=1, 2.8%). Following the survey, AECOM identified areas of archaeological sensitivity by categorising the proposed Solar Farm into areas of nil, low and high sensitivity (see Table 2-8).

Table 2-8 Archaeological sensitivity model developed by AECOM for the Bomen Solar Farm (adapted from AECOM Australia Pty Ltd 2018, pp.60–61).

Sensitivity Rating	Sensitivity Description
Nil	Areas of damming, built structures, and roads have been identified as having no potential for subsurface deposits.
Low	The majority of the Bomen Solar Farm area has been assessed as being of low archaeological sensitivity due to slope and historic disturbances such as ploughing.
High	Areas of high archaeological sensitivity have been linked to crests and creek line flats within the Bomen Solar Farm area.

Subsequently, two test excavation programmes took place across two areas of the solar farm which had been identified as containing high archaeological sensitivity. The first area – located approximately 930 m north of East Bomen Road – was located within lower slopes in association with a 1st order waterway. A total of 20 test pits were excavated across this area and the soil were described as consistent with the East Bomen soil landscape described by Chen and McKane (1996). Across these test pits, 29 stone artefacts were identified during the test excavations; all of which were from test pits on the western side of the creek. Quartz was the most common raw material type, with two pieces of fine-grain siliceous being identified. Typological (and in descending order), the assemblage was represented by angular shatter, flake shatter, proximal flaks, complete flakes, and a multidirectional core. No retouched tools were identified within the assemblage and cortex poorly represented. Modern archaeological material (glass, ceramic fragments, etc.) were also recovered within the upper deposits in seven of the 20 test pits.

After the conclusion of the first test excavation programme, a second programme was required to investigate the subsurface potential of the solar farm area south of East Bomen Road; terminating approximately 210 m north east of the current Project Area. During the second test excavation programme, 58 test pits were excavated in a linear transect following the proposed transmission line as it passed through areas of low and high archaeological sensitivity. No stone artefacts were identified during the second test excavation programme, although a significant amount of fractured quartz gravels was noted within most test pits. The presence of fractured quartz gravels was likely determined by the presence of the Collinguille Granite geological formation. AECOM argued that none of the quartz gravels identified satisfied the technical criteria to be recorded as stone artefacts.

The two test excavation programmes across the Bomen Solar Farm – as well as the surface sites identified – are representative of a background scatter resulting from the periodic use of the area by small groups of Aboriginal people in the past. No large, stratified archaeological sites were identified within the Bomen Solar Farm area and the results of the assessment show that there is a low potential for any to be present. The results further support the conclusion of other recent local archaeological studies, showing that the archaeological record in the Bomen region is characterised by low-density surface and subsurface artefact scatters on lower and upper slopes as well as ridgelines and hill crests.

Access Archaeology and Heritage (2018) undertook an ACHA for the proposed Wagga Wagga Solar Farm development in Bomen; beginning approximately 75 m north of the Project Area and with the main area located approximately 950 m north east. During the course of the archaeological survey two artefact scatters and two isolated artefacts were identified, with a total of 103 individual stone artefacts across the four sites. Furthermore, two areas of PAD were also identified. The assemblage was predominantly characterised by quartz material (~86%) with a second major material comprising metamorphized sedimentary stone (~5.8%). The subsurface testing focused on the two PAD areas (WWSF-PAD1 and WWSF-PAD2) and areas of sensitivity associated with an extensive artefact scatter along the creek line (WWSF-1), isolated find (WWSF-3), and a drainage line. A total of 55 test pits were manually excavated across these four areas, with 45 subsurface finds being recovered. Most of the subsurface material was recovered from spit 1 (n=15) or spit 2 (n=22), although small amounts of material were identified in both spit 3 (n=5) and spit 4 (n=3). Quartz was the dominant lithology within the subsurface assemblage, with one fine-grained volcanic artefact recovered. Moderate revisions to the modelling prepared by Kelleher Nightingale Consultants (2008) were proposed based on these results. Higher archaeological sensitivity was identified in association with the higher order water courses and raised, level and well-drained landforms on the boundary of the northern Murrumbidgee floodplain. This sensitivity was again increased if these areas coincided with the junction of one or more creek or drainage lines. Areas of lower sensitivity were found further away from these water sources. Level terraces, spurs, and rises closer to low order drainage lines were assigned low to moderate archaeological sensitivity.

NGH (2019) completed an ACHA for the proposed Wagga Wagga Solar Farm South at Bomen; approximately 525 m east of the current Project Area. Despite the variable visibility encountered across the area during the survey, a total of four artefact scatter and five isolated finds were recorded. The three areas of PAD that were identified during the original Due Diligence assessment were also reinspected and refined. The PADs were located within several landforms, including an east to west running spurline (PAD 1) and within elevated flats adjacent to a drainage line (PAD 2 and PAD 3). A further three PADs were identified during the test excavations. As a result, the test excavation programme was extended to cover all six PADs identified. A total of 49 test pits were excavated, with 34 artefacts recorded within 19 of the test pits. The artefacts identified within each test pit ranged from zero to eight; except in PAD 6, where no subsurface archaeological material was identified. The entire identified artefact assemblage was comprised of quartz. The surface artefact assemblage comprised of cores, flakes, proximal fragments, a broken flake, and a hammerstone. Meanwhile, the subsurface artefact assemblage was comprised of flakes, proximal fragments, distal fragments, and flaked pieces. An average density of 2.75 artefacts/m² was recorded across the site. The results of the assessment show that the area was represented by the characteristic low-density artefact clusters that are commonplace in the Wagga Wagga region. NGH suggested that the sites are representative of a short-term or transient occupation of the region – especially in association with level or gently sloping low elevations near waterways – instead of long-term occupation, supporting the generally accepted archaeological site modelling for the region. It was further argued that longer-term occupation sites were more likely associated with spurlines and resources areas, such as that identified at the Bomen Axe Quarry.

2.4.1 Archaeological Assessments of the Bomen Axe Quarry Aboriginal Place

Navin Officer Heritage Consultants (1998) surveyed an area for a proposed power plant site at Bomen; approximately 225 m north of the current Project Area. The survey resulted in the identification of three Aboriginal sites, the axe manufacturing and quarry site East Bomen 1 (AHIMS# 56-1-0043) – also known as the Bomen Axe Quarry – as well as East Bomen IF1 (AHIMS# 56-1-0045) and East Bomen IF2 (AHIMS# 56-1-0044). The Bomen Axe Quarry is situated on the crest of a ridge line that consists of exposures of granite and basalt. The basalt material was utilised for the manufacture of axe blanks, which were then most likely carried off-site for final production. It was argued that the site contained distinct working areas, with primary flaking areas close to the basalt outcrop and secondary working areas located a further away. An estimated 500 stone artefacts were recorded within a scatter measuring 150 m x 70 m. The overwhelming majority of the artefacts were comprised of the naturally occurring basalt found at the quarry, with hammerstones, cores,

primary flakes, and secondary flakes being identified within the assemblage. The general spatial distribution of artefacts is shown in Figure 2-11 below. While the two isolated finds were considered to have low archaeological significance, the Bomen Axe Quarry was identified as highly significant to the local Aboriginal community and of high archaeological significance. The area has now been declared an Aboriginal Place under the NPW Act.

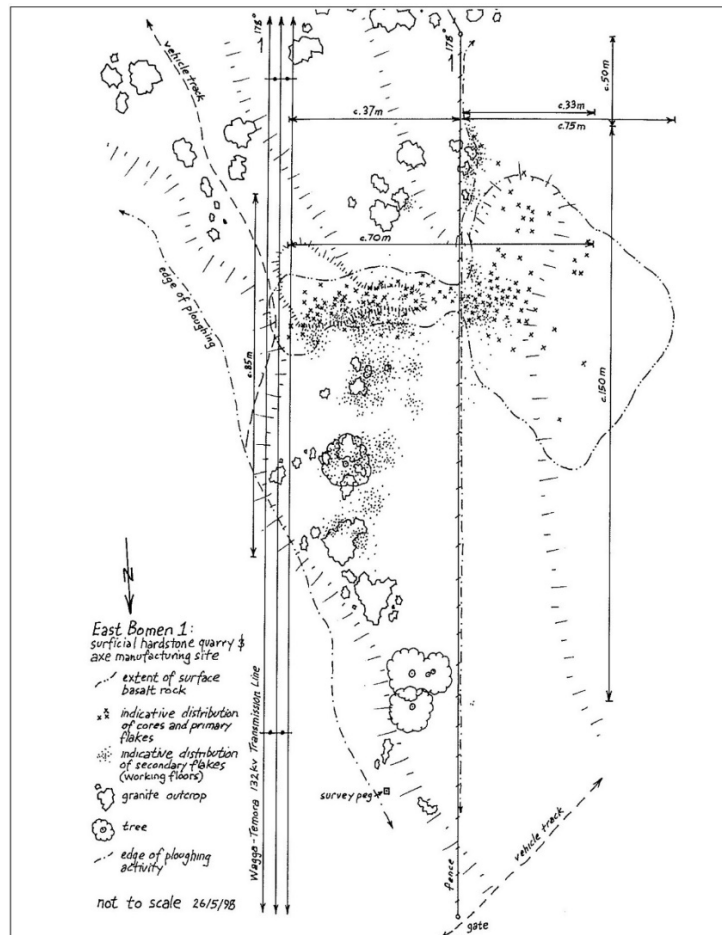


Figure 2-11 Archaeological mud map of the Bomen Axe Quarry site, note that the map is not to scale (Navin Officer Heritage Consultants 1998, p.20).

Go Green Services (2011) completed an assessment report for the Aboriginal Place Nomination for the Bomen Axe Quarry and Manufacturing Site; approximately 2.2 km north east of the current Project Area. The report assessed the significance of the axe quarry based on the nomination made by the Waagan Waagan Project Group. The Bomen Axe Quarry was identified in 1998 during an archaeological survey for a proposed power plant site (Navin Officer 1998, as cited in Go Green Services 2011). Go Green argued that the site was a rare example of a surface hard rock quarry and axe manufacturing site and had a high scientific significance as well as very high education and cultural significance to the local and Aboriginal community. The numerous high values of the Bomen Axe Quarry led to its declaration as an Aboriginal Place. While the reassessment of the site by Go Green Services did not necessarily provide further information about the Bomen Axe Quarry, it clearly explained the high significance of the area to the community for cultural, scientific, and educational purposes.

Go Green Services (2013) completed an assessment report for the Aboriginal Place Nomination for the Bomen Lagoon; approximately 350 m south of the current Project Area. The report assessed the significance of the lagoon based on the nomination made by the Waagan Waagan Project Group. The Bomen Lagoon was noted to be a valuable fishing resource place. Furthermore, during the earliest European exploration of the area by Captain Charles Sturt, the lagoon was the site of the first contact made between the expedition party

and the Wiradjuri inhabitants of the area. In recent times, the lagoon has been valued by the local Aboriginal community as a recreation and learning place, particularly in relation to native birdlife, cultural and aesthetic values. The Bomen Lagoon is also located on part of the Bomen Travelling Stock Reserve. The lagoon contains an artefact scatter (AHIMS# 56-1-0011), recorded in 2002, on the original foreshore that would have existed during Wiradjuri occupation. The site contains mostly quartz flakes on the southern edge of the lagoon where a flood plain drainage channel intersects. The area also contains traditional Wiradjuri medicinal and food resource plants, including old man weed and the bush plant nardoo. The presence of these plants suggests that short term campsites would have existed on the fringes of the lagoon. Evidence of Aboriginal occupation in the low sandhills near the lagoon and the nearby Eunonyhareenyha homestead also demonstrate the Aboriginal occupation of this area, including former cooking oven sites, which remained present until at least the 1960s. The sandhills would have also been ideal for camping, meeting and burial sites.

2.4.2 Previous Archaeological Assessment Within the Project Area

Only a single previous archaeological assessment is known to have taken place within the current Project Area. It is described below.

AECOM Australia (2010) conducted the Aboriginal and historic heritage study for Stage 1 of a 61 km pipeline project from Bethungra to Wagga Wagga; terminating within the western section of the current Project Area. The survey methodology was designed to only target specific portions of landscapes where archaeological evidence was most likely to be found, resulting in 18 transects being surveyed. A total of 36 Aboriginal sites – 30 artefact scatters and 6 isolated artefacts – were identified along the proposed pipeline route, including 24 previously unrecorded sites. The majority of sites recorded during the survey were associated with or in close proximity to an ephemeral water source with over two-thirds of sites located within 50 m of a water source.

2.5 Summary of archaeological context and site location model

The AHIMS database is a record of those places that have been identified and had site cards submitted to AHIMS. It is not a comprehensive list of all places in NSW as site identification relies on an area being surveyed and on the submission of site forms to AHIMS. There are likely to be many areas within the region and wider NSW that have yet to be surveyed and therefore will have no registered AHIMS sites. However, this does not mean that no Aboriginal sites are present in those areas.

The results of these previous archaeological surveys in the Bomen and Wagga Wagga region show there are Aboriginal sites present in a range of landforms and that these sites are generally low to moderate density artefact scatters, isolated artefacts, and modified trees (carved or scarred). Generally speaking, these sites strongly correlate to the presence of potential resources for Aboriginal use, especially when located close to raw material sources or waterways. They are also commonly associated with certain landforms such as well-drained elevated flats, spurs, hill crests, and saddles. The common characteristic of all sites that have been subject to subsurface testing is that the density of sites is generally relatively low and they are typically confined to the upper levels of soil deposits. No high-density sites have been identified within proximity to the Project Area.

The Aboriginal land use of the Wagga Wagga area is little understood, as few in-depth studies have been completed and no sites have been dated. However, it is possible to ascertain that proximity to raw materials and resources was a key factor in the location of Aboriginal sites. It is also reasonable to expect that Aboriginal people ventured away from more permanent habitation areas to utilise the broader landscape, especially considering that there are known resource areas to the north (Bomen Lagoon) and south (Bomen Lagoon and Murrumbidgee River) of the current Project Area. There appears to be a preference for elevated and well-drained landforms in association with water or resource areas as they would have been safer areas or easier to traverse when the Murrumbidgee River and plain flooded.

The Aboriginal site modelling for the region to date suggests that Aboriginal sites are highly common within proximity to waterways and any associated elevated terraces or gentle slopes. These studies also suggest that most site types in the region are comprised of isolated artefacts and artefacts scatters, with some landforms also containing potential for subsurface archaeological deposits. The previously recorded AHIMS sites in the region support this conclusion. While the historical land use of the Proposal Area has caused significant surface disturbances, it is unknown to what extent this has impacted subsurface deposits.

The likely archaeological site types for the local area, and the potential for their presence within the Proposal Area, is outlined in Table 2-9 below.

Table 2-9 Aboriginal site prediction statements.

Site Type	Site Description	Potential
Stone artefact scatters and isolated artefacts	Artefact sites can range from high-density scatter concentrations through to isolated finds.	Moderate potential to occur in low densities within the Project Area.
Modified trees	Trees that have undergone cultural modification.	Low potential to occur within the Project Area due to extensive vegetation clearance. However, there is always potential where remnant mature native trees are present.
PAD	Potential archaeological deposit containing high density in situ cultural material.	High potential to occur within the spur landform. Low potential to occur across other landforms.

2.5.1 Limits on information

With regard to the limitations of the information available, archaeologists rely on Aboriginal parties to divulge information about specific places with cultural or spiritual significance in situations where non archaeological or intangible values may be threatened by development. To date, we have not been told of any such specific places within the Wagga North BESS Project Area however concerns have been raised by one RAP about potential impacts on significant locations in the area from development in the Project Area.

The RAPs for the project have stated that the Project Area sits in a broader cultural landscape and that any sites identified during this assessment are an important part of this cultural landscape.

3. Aboriginal community consultation

The consultation with Aboriginal stakeholders for this project was undertaken in accordance with Section 60 of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2019* and following the process outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP). The guide outlines a four-stage process of consultation as follows:

Stage 1 – Notification of project proposal and registration of interest.

Stage 2 – Presentation of information about the proposed project.

Stage 3 – Gathering information about cultural significance.

Stage 4 – Review of draft cultural heritage assessment report.

The full list of consultation steps, including those groups and individuals who were contacted, and a consultation log is provided in Appendix A. This will be redacted in all public versions of this report. A summary of actions carried out in following these stages are as follows.

Stage 1. Letters outlining the development proposal and the need to carry out an ACHA were sent statutory authorities including Heritage NSW, as identified under the ACHCRP on 1 December 2023. An advertisement was placed in the local newspaper, Daily Advertiser (Wagga Wagga) on 23 January 2024 seeking registrations of interest from Aboriginal people and organisations. A further series of letters was sent to other organisations identified by Heritage NSW in correspondence with NGH on 30 January 2024. In each instance, the closing date for submission was 14 days from receipt of the letter.

As a result of this process, eleven Aboriginal groups registered their interest in the proposal. Notification of Registered Aboriginal Parties was provided to Heritage NSW and the Wagga Wagga LALC on 22 February 2024.

These were:

- Bundyi Aboriginal Cultural Knowledge
- Bidya Marra Consultants
- Konanggo Aboriginal Cultural Heritage Services
- Sonione Wakabut Rogers
- Thomas Dahlstrom
- Wagga Wagga LALC

The consultation log in Appendix A will be redacted in all public versions of this report.

Stage 2. On 3 March 2024, an Assessment Methodology document for the Wagga North BESS was sent via to all six Registered Aboriginal Parties (RAPs) listed above. This document provided details of the background to the project, a summary of previous archaeological surveys, and the proposed heritage assessment methodology for the project. The document invited comments regarding the proposed methodology and sought any information regarding known Aboriginal cultural significance values associated with the Project Area and/or any Aboriginal objects contained therein. A minimum of 28 days was allowed for a response to the document.

While some of the responding RAPs expressed concerns about the potential development project impacts more broadly, all who responded expressed agreement with the proposed assessment methodology. The RAPs who raised concerns were informed that the matters raised would be addressed and clarified during the implementation of the assessment. None of the registered parties raised any objections to the methodology and many expressed interest in participating in fieldwork.

Stage 3. The Assessment Methodology outlined in Stage 2 included a written request to provide any information that may be relevant to the cultural heritage assessment of the Project Area. It was noted that sensitive information would be treated as confidential. Mark Saddler (Bundyi Aboriginal Cultural Knowledge) stated that the land on which the Project Area is sited and surrounded by are the traditional lands of the Wiradjuri people and that the Wiradjuri have “lived and farmed this land for thousands of years” should be acknowledged in the assessment and subsequent report. No other cultural information was received in response to the methodology however comments were made regarding the treatment of any cultural materials located regarding their assessment and possible relocation. (No cultural material was identified during the assessment).

The survey fieldwork was organised, and two of the six registered groups were selected for fieldwork participation by the Proponent. The survey fieldwork and subsequent subsurface test excavation was carried out from the 7 –9 May 2024 by two archaeologists from NGH and two Aboriginal RAP representatives. The Aboriginal community representatives who participated in the fieldwork were Jordan and Benjamin Ingram representing Bidya Marra Consultants.

Stage 4 A draft version of this Aboriginal Cultural Heritage Assessment Report for the proposal (this document) will be forwarded to the RAPs inviting comment on the results, the significance assessment and the recommendations post completion of the testing program. A minimum of 28 days will be allowed for responses to the document and all responses will be incorporated into this document.

3.1 Aboriginal community feedback

On the 6th August 2024, Mark Saddler (Bundyi Aboriginal Cultural Knowledge) provided a series of comments on the draft ACHA and ATR—NGH provided a response to his comments on the 9th August 2024. The comments provided by Mark Saddler and NGHs response are detailed in Table 3-1 below. Mark Saddler provided thanks to our response on the same day (9th August 2024) and provided no further comments.

Table 3-1 Comments on the draft ACHA from Bundyi Aboriginal Cultural Knowledge and NGHs response.

Bundyi Aboriginal Cultural Knowledge Comment	NGH Response
“Why do NGH not have an “Acknowledgement of Wiradjuri Country” in bold and highlighted at the very start of these reports ????? A very small paragraph on page 2, that is written in an insensitive and cold way, does not do it right !”	An acknowledgement of Wiradjuri Country has been included in the front of the report.
<i>“Also correct me if I’m wrong, but no mention of the long-term care and love of this area by Wiradjuri people. Also, some more personal history about our people and land would go a long way to help to assist your client better understand our culture.”</i>	NGH believes that our ethnography section provides a detailed account of the ways in which Wiradjuri communities lived their lives when Europeans first arrived in the area and also illustrates how many aspects of this continue to the present day. The report also notes how long Wiradjuri people have lived in Wagga Wagga area and provides several pages of archaeological report reviews that also further the evidence of consistent and repeated occupation of the entire landscape.
<i>“I would also mention that your report item 7.1 it needs to enforce that even though no sites were found, “due Diligence” and “Unexpected Finds” must</i>	The recommendations note that even though nothing was recorded, works will need to stop if an item suspected of being Aboriginal in origin is discovered.

Bundyi Aboriginal Cultural Knowledge Comment	NGH Response
<i>be adhered too and understood by your client."</i>	Then the unexpected finds protocol will be followed.
<i>"As I struggle to also read and write, can you advise me if your client is going to undertake "Cultural Immersion Training" for themselves and their contractors ?"</i>	We will note your comment and desire to see this take place and pass that information on directly to the client.

NGH note that "Cultural Immersion Training" prior to the construction of the BESS has been added as a recommendation for this ACHA. No further changes have been made to the assessment based on the comments received from Mark Saddler.

On the 12th August 2024, Konanggo Aboriginal Cultural Heritage Services provided the following comment on the draft ACHA:

"Unfortunately, KACHS can't comment as we wasn't invited to walk on Country to support the land culturally - sorry

KACHS needs to feel the land/country and to see the contour of the land today and looking back before this beautiful land was disturbed today for tomorrow."

NGH provided a response on the 21st August 2024 noting their comments. No changes to the assessment were made.

4. Archaeological investigation results

The Project Area is primarily comprised of cleared land that has historically been utilised for crop agriculture—at present it is used for pastoral grazing practices. The north eastern corner of the Project Area is currently used as a substation and was not accessible during the survey. The central portion of the Project Area is predominantly a medium slope that has been subject to slope wash erosion and agricultural practices. An ecological corridor is also present along the majority of the eastern boundary of the Project Area.

Survey transects were undertaken by foot and traversed the entire Project Area.

The survey was impeded by poor overall ground surface visibility due to the dense grass cover present across the Project Area. Despite this, some exposures were still present in all landforms across the Project Area—namely in areas associated with internal tracks, fence line, and slope wash erosion. The effective ground surface visibility ranged from upwards of 40% within the few exposures to less than 1%; overall the average ground surface visibility across the Project Area was considered to be 5%. Between the survey participants approximately 14.2 km of transects were walked across the Project Area by the survey team during the field survey for this ACHA. Allowing for an effective view width for each of the four survey participants and given the variability in ground surface visibility across the Project Area, the overall survey effectively examined 0.56% of the Project Area.

It is considered by NGH that the survey of the Project Area during this investigation had sufficient survey coverage. Plate 4-1 to Plate 4-8 show examples of the transect landforms and visibility across the Project Area.

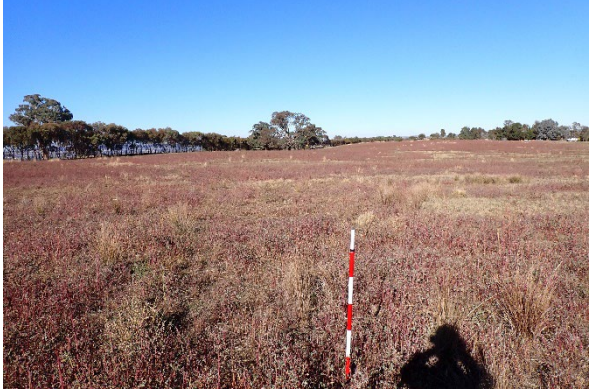


Plate 4-1 View to the north in the southern portion of the Project Area showing the upper slopes landform that dominated the Project Area.



Plate 4-2 View to the south in the southern portion of the Project Area showing evidence of slope wash erosion along the proposed access track for the BESS site.



Plate 4-3 View to the west in the southern portion of the Project Area showing an isolated zone of outcropping granite.	Plate 4-4 View to the north west in the southern portion of the study area showing multiple stockpiles of imported material from the landholder.
	
Plate 4-5 View to the west in the central portion of the Project Area showing the mid slopes from the upper slopes	Plate 4-6 View to the north east in the northern portion of the Project Area showing the existing substation.
	
Plate 4-7 View of the poor GSV within the central portion of the Project Area on the medium slope at the proposed BESS site location.	Plate 4-8 View to the south in the central portion of the Project Area showing the medium slope at the proposed BESS site location.

Due to the general lack of visibility during the field survey and proximity to the Bomen Axe Quarry Aboriginal Place a limited test excavation programme was also undertaken.

The subsurface test excavation programme was carried out in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. A total of 12 test pits were excavated across three landforms—the spur, mid slopes, and upper slopes—where they intersected with the development footprint (see Figure 4-1). Transect 1—comprised of four test pits—was placed from the mid slope landform into and across the spur landform as it was considered to contain a moderate potential for subsurface deposits. This transect was adjacent to the informal track which may be formalised as an access route for the construction and maintenance of the BESS. Transect 2 and Transect 3—comprising a total of eight test pits—were placed across the mid slopes and extending into the upper slopes. Transect 2 and 3 were placed within the proposed area of highest disturbance from the development within the area of the proposed BESS. A total of 3 m² was excavated during the subsurface test excavations, with a total of 0.77 m³ of soil being excavated and sieved. The test pits ranged in depth from 18 cm to 30 cm. No Aboriginal objects were identified during the test excavations. The excavation suggests that the Project Area is comprised of a relatively similar soil profile (see below for more detail). The results of the test excavations are within expectations based on the desktop predictive models that were prepared prior to the assessment.



Plate 4-9 View north along transect 1 from test pit 1 in area adjacent to existing access track.



Plate 4-10 View south along transect 1 from test pit 4.

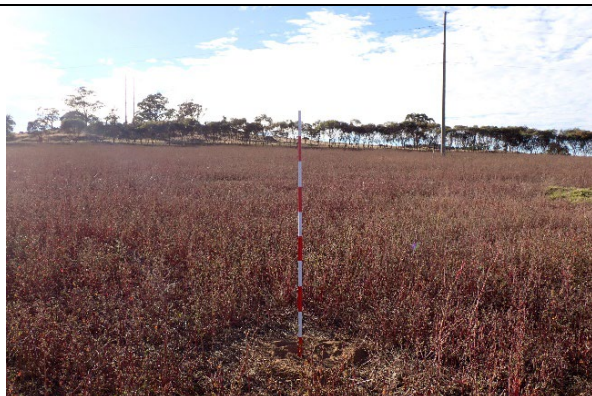


Plate 4-11 View east along transect 2 within proposed BESS area.

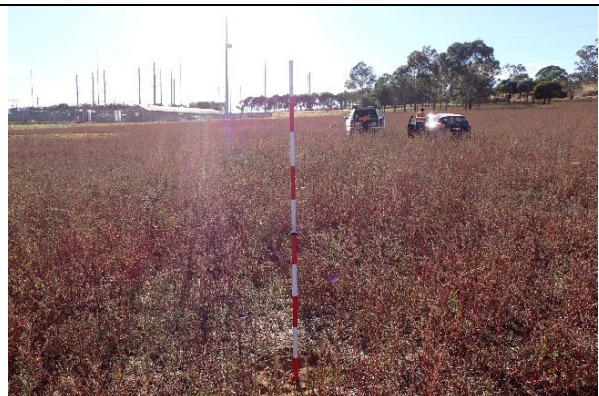


Plate 4-12 View north east along transect 3 within proposed BESS area.



Figure 4-1 Test pit locations. No Aboriginal objects were identified during the excavation.

5. Cultural heritage values and statement of significance

5.1 Assessment criteria

The assessment of the significance of Aboriginal archaeological sites is currently undertaken largely with reference to criteria outlined in the ICOMOS Burra Charter (Australian ICOMOS 2013). Criteria used for assessment are:

- **Social or Cultural Value:** In the context of an Aboriginal heritage assessment, this value refers to the significance placed on a site or place by the local Aboriginal community – either in a contemporary or traditional setting.
- **Scientific Value:** Scientific value is the term employed to describe the potential of a site or place to answer research questions. In making an assessment of scientific value issues such as representativeness, rarity and integrity are addressed. All archaeological places possess a degree of scientific value in that they contribute to understanding the distribution of evidence of past activities of people in the landscape. In the case of flaked stone artefact scatters, larger sites or those with more complex assemblages are more likely to be able to address questions about past economy and technology, giving them greater significance than smaller, less complex sites. Sites with stratified and potentially in situ sub-surface deposits, such as those found within rock shelters or depositional open environments, could address questions about the sequence and timing of past Aboriginal activity, and will be more significant than disturbed or deflated sites. Groups or complexes of sites that can be related to each other spatially or through time are generally of higher value than single sites.
- **Aesthetic Value:** Aesthetic values include those related to sensory perception and are not commonly identified as a principal value contributing to management priorities for Aboriginal archaeological sites, except for art sites.
- **Historic Value:** Historic value refers to a site or place's ability to contribute information on an important historic event, phase or person.
- **Other Values:** The Burra Charter makes allowance for the incorporation of other values into an assessment where such values are not covered by those listed above. Such values might include Educational Value.

All sites or places have some degree of value, but some have more than others. In addition, where a site is deemed to be significant, it may be so on different levels or contexts ranging from local to regional to national, or in very rare cases, international. Further, sites may either be assessed individually, or where they occur in association with other sites the value of the complex should be considered.

5.2 Significance assessment

5.2.1 Social or cultural value

While the true cultural and social value of Aboriginal sites can only be determined by local Aboriginal people, as a general concept, all sites hold cultural value to the local Aboriginal community. An opportunity to identify cultural and social value was provided to the Aboriginal representatives for this proposal through the consultation process which included providing comments on the methodology, participating in fieldwork and draft reporting process.

Conversations with RAPs during the field component of this assessment demonstrated that the local Aboriginal community view the area surrounding the Bomen Axe Quarry Aboriginal Place as containing a very high cultural value, a value which is shared to some extent with the surrounding areas. Furthermore,

RAPs noted that a spur crest east of the Project Area would hold more value than anything that was observed within the Project Area.

No further social or cultural values were identified within the Project Area by the RAPs during the fieldwork or review of the ACHA assessment.

5.2.2 Scientific (archaeological) value

As described in this report, no new Aboriginal sites or PADs were identified by this assessment. Furthermore, no previously recorded AHIMS sites are located within the Project Area. As a result, the Project Area—as assessed in this report—is considered to contain a negligible scientific value as it is highly unlikely that there is any information regarding past Aboriginal land use within the Project Area. This is due to the previous and current land use of Project Area as well as the sloping landforms and stripped topsoils, which are likely to have removed any Aboriginal sites or PADs from the Project Area. These conditions have reduced the scientific value of the Project Area to a negligible level.

5.2.3 Aesthetic value

There are no aesthetic values directly associated with the Project Area. Furthermore, the proposed works do not obstruct or impact the view between the Bomen Axe Quarry Aboriginal Place and Kengal Aboriginal Place.

5.2.4 Historic value

There are no historic values directly associated with the Project Area.

5.2.5 Other values

There are no other known heritage values associated with the subject area.

6. Proposed activity

The works to construct and operate this BESS would generally include the following components:

- Approximately 126 battery containers, housing battery cells in modules and associated cooling systems.
- Approximately 42 associated Power Conversion Systems (PCS) comprising of;
 - The inverters, which convert direct current (DC) to alternating current (AC);
 - The medium-voltage transformer, which converts the inverter output voltage to the medium-voltage of the system (33 kilovolt); and
 - The medium voltage switchgear, which contains the medium voltage circuit breakers and disconnectors for the PCS
- A control room, which will contain battery-monitoring equipment and allows operators to control the plant remotely.
- A short underground transmission line which would connect the BESS to the adjacent TransGrid Wagga North substation at its western side. The connection type is subject to TransGrid requirements and further detailed design.
- A switching substation, which collects all the individual medium voltage cables from the PCS units in one location, including:
 - 33kW switchgear.
 - One 33/132kV transformer.
 - A 132kV circuit including busbars, circuit breakers, disconnectors, isolators, surge arresters, etc.
 - A plant auxiliary transformer and diesel generator.
- A prefabricated Operations and Maintenance (O&M) building
- Staff amenities
- Water tanks for firefighting purposes
- Earthworks and stormwater management infrastructure (e.g. diversion banks, etc.)
- Perimeter security fencing.
- Temporary and/or permanent laydown area.

The site will be accessed through a new access track with the BESS area to connect with Bavin Road to the south.

These activities would require the use of heavy machinery and would cause significant ground disturbance and as such Aboriginal sites within the Project Area could therefore be subject to harm.

6.1 Assessment of harm

As described in this report, no Aboriginal sites or PADs were identified during the assessment. Furthermore, no previously recorded AHIMS sites are located within the Project Area. As a result, the assessment of harm for the proposed works is nil.

6.2 Consideration of ESD principles

Consideration of the principles of Ecologically Sustainable Development (ESD) and the use of the precautionary principle was undertaken when assessing the harm to the sites within the Proposal Area. The precautionary principle in relation to Aboriginal heritage implies that development proposals should be carefully evaluated to identify possible impacts and assess the potential consequences. The principle of inter-

generational equity requires the present generation to ensure that the health and diversity of the archaeological record is maintained or enhanced for the benefit of future generations. As there were no Aboriginal sites identified within the Proposal Area there will be no impact to Aboriginal heritage from the proposed development. Therefore, there are no reasons based on ESD principles that the development should not proceed.

7. Avoiding or mitigating harm

7.1 Measures to avoid harm

No previously identified AHIMS sites are located within the Project Area and no new Aboriginal sites or PADs were identified during this assessment. As a result, no measures are required to avoid the harm of Aboriginal heritage.

7.2 Mitigation of harm

Mitigation of harm to cultural heritage sites generally involves some level of detailed recording to preserve the information contained within the site (or within the portion of the site to be impacted). Mitigation can be in the form of minimising harm, through slight changes in the development plan or through direct management measures of the artefacts. It is argued here that mitigation in the form of alteration or avoidance is neither feasible nor warranted in this situation due to the negligible scientific significance attributed to the Project Area and the negligible potential for *in situ* artefacts to be present within the development footprint.

As no Aboriginal heritage items or PADs are present within the Project Area, the proposed works within the development footprint—as assessed in the report—will avoid any impacts to physical Aboriginal heritage. Therefore, no further mitigation measures are required for the proposed Wagga North BESS.

8. Recommendations

The recommendations are based on the following information and considerations:

- Results of the current archaeological survey and subsurface test excavations within the Project Area;
- Consideration of results from other archaeological assessments which have occurred in the Project Area;
- Consideration of results from other regional archaeological studies;
- Results of consultation with the registered Aboriginal parties;
- The assessed significance of the sites;
- Appraisal of the proposed development; and
- Legislative context for the development proposal.

It is recommended that:

1. The proposed works within the development footprint can proceed with caution.
 - a. Further archaeological assessment may be required if the proposed works extend outside of the Project Area as assessed in this report. This would include consultation with the Registered Aboriginal Parties and may include further field assessments.
2. All access to the site and laydown areas must be within the Project Area as assessed by this report.
3. Prior to the commencement of the proposed works for the project, Aboriginal Cultural Heritage Awareness training should be included as part of the Induction, and all site personnel who will work on the project must complete it. The Aboriginal Heritage Awareness training must be prepared in consultation with the Registered Aboriginal Parties for this project.
4. If any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop and Heritage NSW notified. The find will need to be assessed and if found to be an Aboriginal object, and Aboriginal Heritage Impact Permit (AHIP) may be required.
5. In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity; Heritage NSW and the police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. If the remains are deemed to be Aboriginal in origin, the Registered Aboriginal Parties should be advised of the find as directed by the appropriate heritage team within Heritage NSW. Heritage NSW would advise the Proponent on the appropriate actions required.
6. The remainder of the spur landform outside of the development footprint must be avoided as it may contain sensitivity due to its connection with the same ridgeline as the Bomen Axe Quarry Aboriginal Place.

Ib Vogt Development Australia Pty Ltd is reminded that it is an offence under the *National Parks and Wildlife Act 1974* to harm an Aboriginal object without a valid approval.

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Appendix A Consultation log and documentation

The consultation log has been redacted and can be provided on request.

Appendix B Archaeological technical report

Prepared for Ib Vogt Development Australia Pty Ltd

Archaeological Technical Report

Wagga Wagga North Battery Energy Storage System

Bavin Road, Bomen, NSW

February 2025

Project Number: 23-683

Document verification and authorship

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Project Number:	23-683
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Consultant:	NGH Pty Ltd
Proponent:	Ib Vogt Development Australia Pty Ltd

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Final v1.1 <i>Minor edits to update outdate AHIMS search</i>	24/02/2025	Jorge Fuenzalida Miralles	Matthew Barber	Matthew Barber

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

We acknowledge the Wiradjuri traditional owners of this land and pay our respect to Elders past, present and emerging. We recognise that the First Nations peoples of Australia have traditionally managed the resources of this land in a sustainable way, and that they are the original stewards of the Australian environment.

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Acronyms and abbreviations

ACHA	Aboriginal Cultural Heritage Assessment
ACHCRP	Aboriginal Cultural Heritage Consultation Requirements for Proponents
AHD	Elevation in metres to Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ASL	Above sea level
DD	Aboriginal Due Diligence Assessment
Development footprint	Defines the proposed works that will takes place within the development site and access road
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
ESD	Ecologically Sustainable Development
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
IBRA	Interim Biogeographic Regionalisation for Australia
km	kilometres
LGA	Local Government Area
m	metres
NGH	NGH Pty Ltd
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
NSW	New South Wales
PAD	Potential Archaeological Deposit
Project Area	Defines the area assessed by this report
RAP	Registered Aboriginal Party
SHI	State Heritage Inventory
SHR	State Heritage Register
Subject Land	Defines the area assessed by the Scoping Report (NGH 2024). This area includes the Project Area

Executive summary

Introduction

NGH Pty Ltd (NGH) have been engaged by Ib Vogt Development Australia Pty Ltd (Ib Vogt) to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the development of a Battery Energy Storage System (BESS) site at 116 Bavin Road, Bomen, NSW 2650. The proposed works would involve the construction and operation of a 120-megawatt (MW) BESS that would provide up to 480 megawatt hours (MWh) capacity. The Project Area for the proposed BESS is within Lot 2 of DP111.5229 with connections to the neighbouring TransGrid Wagga North zone substation in Lot 1 DP1115229.

The proposed works include activities that will require significant ground disturbance that have the potential to impact on Aboriginal heritage sites and objects which are protected under the *NSW National Parks and Wildlife Act 1974* (NPW Act). To undertake the proposed works, the Proponent may need to apply for an Aboriginal Heritage Impact Permit (AHIP). The ACHA report may accompany the AHIP application and would provide the Heritage NSW with information about the nature, extent and significance of any Aboriginal sites and values. The ACHA would also assess the impacts to Aboriginal sites within the Project Area and provide management strategies that may mitigate any impacts. Note that Figure 1-1 shows the Project Area as assessed in this report as well as the Subject Land assessed in the Scoping Report (NGH 2024). The only difference between the two is that the Subject Land area includes the remaining portions of Lot 2 DP1115229 to the west of the Project Area; this area was not assessed by the ACHA and contains none of the proposed works for the BESS. The Subject Land is only shown in Figure 1-1 to keep some consistency across assessments, the remainder of the Figures in this assessment will only show the Project Area outlined in red.

Aboriginal Community Consultation was conducted in this assessment and has been outlined in detail in Section 2 of the Aboriginal Cultural Heritage assessment ACHA.

Survey and test excavation results

A pedestrian survey and test excavation under the Code of Practice was undertaken by NGH archaeologists and Aboriginal community representatives in May 2024. Ground surface visibility was generally poor during the survey and no Aboriginal sites were identified within the Project Area. Test excavation was undertaken which consisted of 12 test pits across three transects (see Figure 8-1). No Aboriginal objects were identified from any of the test pits.

The Project Area is located in an area that contains moderate superficial surface disturbances from previous and current land use—the majority is also located on landforms with a moderate to steep slope. The only relatively level sections of the Project Area are within the central sections of the spur landform, an area outside of the development footprint and therefore not subject to test excavations. The soil profiles across the development footprint were very consistent, demonstrating that there is effectively no topsoil present, and that hard clays or degrading granite boulders are encountered rapidly. The regional archaeological record suggests that any subsurface archaeological deposits are typically confined to the upper 20 cm of soil deposits. The lack of any topsoil suggests that if these archaeological deposits were here in the past, they have since washed away downslope. While visibility potentially hampered the identification of surface artefacts during the field survey, the level of previous disturbance and the slope of the Project Area suggests that it is unlikely for surface artefacts to be present within the Project Area.

Potential impacts

As described in this report, no Aboriginal sites or PADs were identified during the assessment. Furthermore, no previously recorded AHIMS sites are located within the Project Area. As a result, the assessment of harm

for the proposed works is nil. However, the remainder of the spur landform outside of the development footprint must be avoided by the proposed development as it may contain sensitivity due to its connection with the same ridgeline as the Bomen Axe Quarry Aboriginal Place.

Recommendations

The recommendations are based on the following information and considerations:

- Results of the current archaeological survey and subsurface test excavations within the Project Area;
- Consideration of results from other archaeological assessments which have occurred in the Project Area;
- Consideration of results from other regional archaeological studies;
- Results of consultation with the registered Aboriginal parties;
- The assessed significance of the sites;
- Appraisal of the proposed development; and
- Legislative context for the development proposal.

It is recommended that:

1. The proposed works within the development footprint can proceed with caution.
 - a. Further archaeological assessment may be required if the proposed works extend outside of the Project Area as assessed in this report. This would include consultation with the Registered Aboriginal Parties and may include further field assessments.
2. All access to the site and laydown areas must be within the Project Area as assessed by this report.
3. Prior to the commencement of the proposed works for the project, Aboriginal Cultural Heritage Awareness training should be included as part of the Induction, and all site personnel who will work on the project must complete it. The Aboriginal Heritage Awareness training must be prepared in consultation with the Registered Aboriginal Parties for this project.
4. If any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop and Heritage NSW notified. The find will need to be assessed and if found to be an Aboriginal object, and Aboriginal Heritage Impact Permit (AHIP) may be required.
5. In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity; Heritage NSW and the police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. If the remains are deemed to be Aboriginal in origin, the Registered Aboriginal Parties should be advised of the find as directed by the appropriate heritage team within Heritage NSW. Heritage NSW would advise the Proponent on the appropriate actions required.
6. The remainder of the spur landform outside of the development footprint must be avoided as it may contain sensitivity due to its connection with the same ridgeline as the Bomen Axe Quarry Aboriginal Place.

Ib Vogt Development Australia Pty Ltd is reminded that it is an offence under the *National Parks and Wildlife Act 1974* to harm an Aboriginal object without a valid approval.

1. Introduction

NGH Pty Ltd (NGH) have been engaged by Ib Vogt Development Australia Pty Ltd (Ib Vogt) to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the development of a Battery Energy Storage System (BESS) site at 116 Bavin Road, Bomen, NSW 2650. The proposed works would involve the construction and operation of a 120-megawatt (MW) BESS that would provide up to 480 megawatt hours (MWh) capacity. The Project Area for the proposed BESS is within Lot 2 of DP1115229 with connections to the neighbouring TransGrid Wagga North zone substation in Lot 1 DP1115229 and is shown in Figure 1-1 and Figure 1-2 below. The Project Area used in this assessment excludes the western portion of Lot 2 DP1115229 encompassing the area shown in Figure 1-2. Note that Figure 1-1 shows the Project Area as assessed in this report as well as the Subject Land assessed in the Scoping Report (NGH 2024). The only difference between the two is that the Subject Land area includes the remaining portions of Lot 2 DP1115229 to the west of the Project Area; this area was not assessed by the ACHA and contains none of the proposed works for the BESS. The Subject Land is only shown in Figure 1-1 to keep some consistency across assessments, the remainder of the Figures in this assessment will only show the Project Area outlined in red.

The proposed BESS site is located within the Wagga Wagga Special Activation Precinct (SAP), which “capitalises on the town’s proximity to the inland rail and aims to foster manufacturing, agribusiness, and freight and logistics” (NSW Government n.d.). The SAP process aims to facilitate the approval of certain developments within defined SAP areas. A precinct wide ACHA and Cultural Heritage Management Plan (CHMP) has already been completed for the SAP area. However, certain areas—of which the current area forms a part of—were identified as requiring further assessment under the standard codes and guidelines for the investigation of Aboriginal heritage assessments within NSW.

The proposed works include activities that will require significant ground disturbance that have the potential to impact on Aboriginal heritage sites and objects which are protected under the *NSW National Parks and Wildlife Act 1974* (NPW Act). To undertake the proposed works, the Proponent may need to apply for an Aboriginal Heritage Impact Permit (AHIP). The ACHA report may accompany the AHIP application and would provide the Heritage NSW with information about the nature, extent and significance of any Aboriginal sites and values. The ACHA would also assess the impacts to Aboriginal sites within the Project Area and provide management strategies that may mitigate any impacts.

The purpose of the ACHA and ATR is to determine if Aboriginal objects are to be harmed by the proposal and determine if an AHIP application to impact identified Aboriginal cultural heritage sites is required.

1.1 Investigation contributors

The ACHA report was completed by Jorge Fuenzalida Miralles (*NGH Senior Heritage Consultant - BA Hons Archaeology with 5 years experience*), Brendan Fisher (*NGH Heritage Consultant – BA Archaeology with 4 years experience*) and Dr Tessa Bryant (*NGH Senior Heritage Consultant - PhD, with 10 years experience*) who conducted research, GIS mapping, Aboriginal community consultation and report preparation. NGH archaeologists Brendan Fisher and Peta Rice undertook the fieldwork. Matthew Barber (*BA(Hons), MAACA with 33 years experience*) NGH Technical Director- Heritage, reviewed the report for quality assurance purposes.

Consultation with the Aboriginal community was undertaken following the process outlined in the *Aboriginal cultural heritage consultation requirements for proponents 2010*.

The Registered Aboriginal Parties (RAPs) for this project were:

- Wagga Wagga Local Aboriginal Land Council;
- Bundyi Aboriginal Cultural Knowledge (BAC);
- Bidya Marra Consultancy;

- Konanggo Aboriginal Cultural Heritage Services;
- Sonione Wakabut Rogers; and
- Thomas Dahlstrom.

In line with the *Aboriginal cultural heritage consultation requirements for proponents 2010*, Riverina Water chose to invite three Aboriginal groups who had registered their interest in the project to attend fieldwork. However, only one group responded that was available. The Aboriginal community representatives who participated in the survey and test excavation fieldwork were:

- Jordan Ingram (Representing Bidya Marra),
- Benjamin Ingram (Representing Bidya Marra)

Further details and an outline of the consultation process is provided in Section 2 of the ACHA.

1.2 Report structure

This report is structured in accordance with the outline provided under Requirement 11 in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010). The report includes the following components:

Section 1 – Background context for the project and study objectives

Section 2 – Details of the project proposal

Section 3 – Details of previous archaeological studies and site models

Section 4 – Landscape context

Section 5 – Summary of contextual information

Section 6 – Site prediction model

Section 7 – Details of sampling strategy

Section 8 – Field methodology

Section 9 – Field results

Section 10 – Analysis and Discussion of results

Section 11 – Significance Assessment

Section 12 – Impact assessment

Section 13 – Management and mitigation considerations

Section 14 – Recommendations

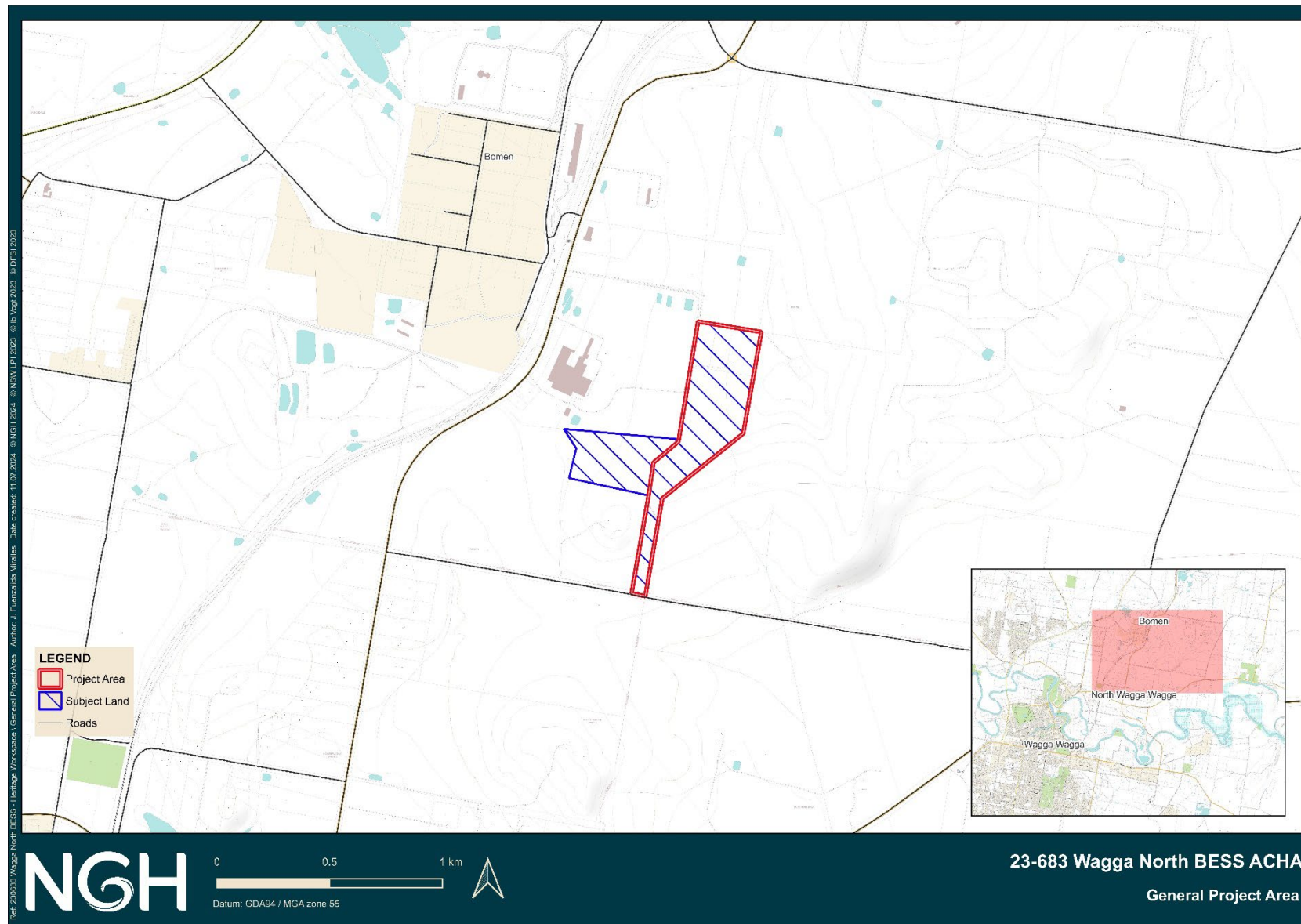


Figure 1-1 General location of the Project Area and Subject Land.



Figure 1-2 Project Area

2. Project proposal

The works to construct and operate this BESS would generally include the following components and are henceforth collectively referred to as the development footprint:

- Approximately 126 battery containers, housing battery cells in modules and associated cooling systems.
- Approximately 42 associated Power Conversion Systems (PCS) comprising of;
 - The inverters, which convert direct current (DC) to alternating current (AC);
 - The medium-voltage transformer, which converts the inverter output voltage to the medium-voltage of the system (33 kilovolt); and
 - The medium voltage switchgear, which contains the medium voltage circuit breakers and disconnectors for the PCS
- A control room, which will contain battery-monitoring equipment and allows operators to control the plant remotely.
- A short underground transmission line which would connect the BESS to the adjacent TransGrid Wagga North substation at its western side. The connection type is subject to TransGrid requirements and further detailed design.
- A switching substation, which collects all the individual medium voltage cables from the PCS units in one location, including:
 - 33kW switchgear.
 - One 33/132kV transformer.
 - A 132kV circuit including busbars, circuit breakers, disconnectors, isolators, surge arresters, etc.
 - A plant auxiliary transformer and diesel generator.
- A prefabricated Operations and Maintenance (O&M) building
- Staff amenities
- Water tanks for firefighting purposes
- Earthworks and stormwater management infrastructure (e.g. diversion banks, etc.)
- Perimeter security fencing.
- Temporary and/or permanent laydown area.

The site will be accessed through a new access track with the BESS area to connect with Bavin Road to the south.

These activities would require the use of heavy machinery and would cause significant ground disturbance and as such Aboriginal sites within the Project Area could therefore be subject to harm.

3. Previous archaeological work

3.1.1 Ethnographic setting

There are several ethnographic recordings of Aboriginal life in the Riverina region from the 1800s that notably focus on the prevalence of Aboriginal people around waterways in the region. It is important to consider that the Aboriginal people alive at the time of such observations were survivors of serious epidemics of infectious disease such as smallpox, brought by Europeans, that greatly affected the population sizes and distribution of people within the landscape. Consequently, European records may not necessarily reflect pre-contact population distributions and traditional ways of life (Dowling 1997; Littleton & Allen 2007).

The dispossession from traditional lands and acts of violence against the Aboriginal people caused great social upheaval meaning that access to traditional resource gathering and hunting areas, religious life, marriage links and sacred ceremonial sites was disrupted or prevented. Despite this, Aboriginal people continued to maintain their connections to sites and the landscape in a variety of ways. The Wiradjuri people of the region continue to have a strong connection to their land.

3.1.2 Tribal boundaries and social structure

Cultural areas are difficult to define and “must encompass an area in which the inhabitants have cultural ties, that is, closely related ways of life as reflected in shared meanings, social practices and interactions” (Egloff, Peterson & Wesson 2005, p.8). Depending on the culture defining criteria chosen - i.e., which cultural traits and the temporal context (historical or contemporary) - the definition of the spatial boundary may vary. In Australia, Aboriginal “marriage networks, ceremonial interaction and language have been central to the constitution of regional cultural groupings” with the distribution of language speakers being the main determinant of groupings larger than a foraging band (Egloff, Peterson & Wesson 2005, pp.8, 16).

The Project Area is within an area identified as part of the Wiradjuri language group (see Figure 3-1 below). This is an assemblage of many small clans and bands speaking a number of similar dialects (Tindale 1974; MacDonald 1983; Horton 1994). It should be noted that there is no consistent agreement on the boundaries Wiradjuri Country. The majority of the studies performed on this have been done through a European perspective and do not adequately explain the complexities of connection to Country.

The Wiradjuri language group was the largest in NSW prior to European settlement. However, the borders were not static and would expand and contract over time to the movements of smaller family or clan groups. Boundaries ebbed and flowed through contact with neighbours, the seasons, and periods of drought and abundance.

It was the small family group that was at the core of Aboriginal society and the basis for their hunting and gathering life. The immediate family camped, sourced food, made shelter, and performed daily rituals together. The archaeological manifestations of these activities are likely to be small campsites, characterised by small artefact scatters and hearths across the landscape. Places that were visited more frequently would develop into larger site complexes with higher numbers of artefacts and possibly more diverse archaeological evidence.

These small family units formed part of the larger band that comprised of several families. These bands would move within an area defined by their religious sites (MacDonald 1983). Such groups would come together on special occasions such as pre-ordained times for ceremonies, rituals, or when they would cross paths with one another. They may have also joined together at different times of the year at different locations where resources were known to be abundant. The archaeological legacy of these gatherings would be larger sites rather than small family camps. They may include large hearth or oven complexes, contain a number of grinding implements and a larger range of stone tools and raw materials.

Identification and differentiation of such sites are difficult in the field. A family group and their antecedents and descendants occupying a particular campsite repeatedly over a long period of time may leave a similar pattern of archaeological signatures as a large group camped over a shorter period.

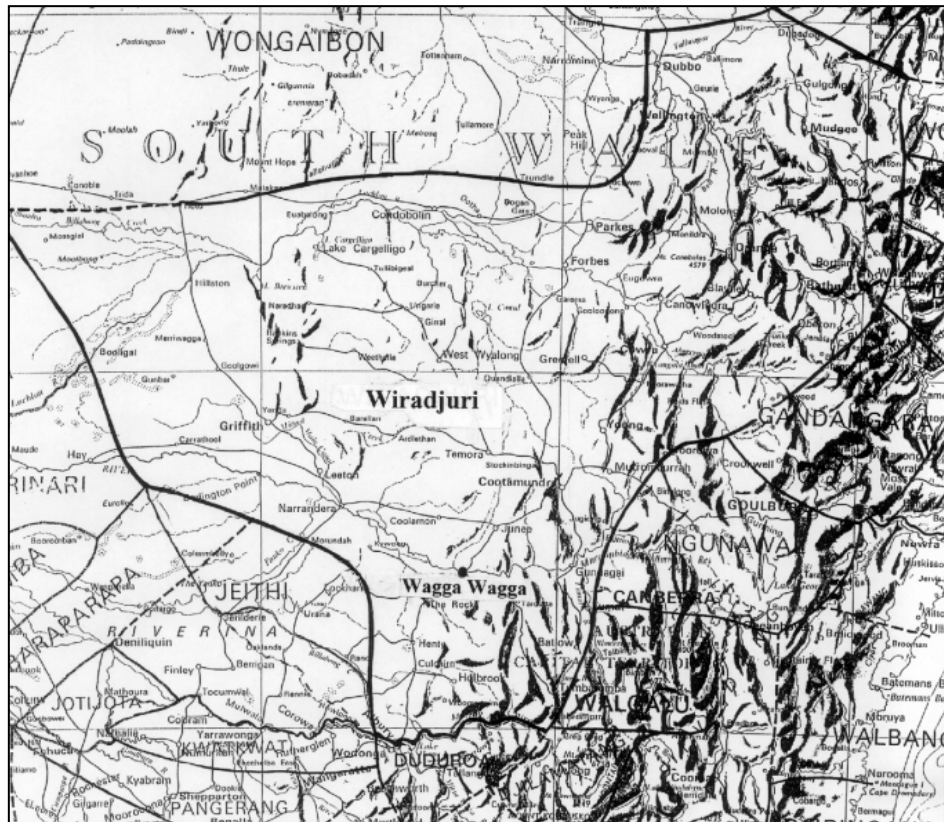


Figure 3-1 Aboriginal Tribes of Australia (Tindale 1974).

In 1824, the explorers Hume and Hovell were the first Europeans to mention Aboriginal people in the Wagga Wagga area as they noted fires and footprints as they explored the rivers of what would come to be known as the Riverina. European settlers started arriving in the district in the 1830s after Captain Charles Sturt passed through the region in 1829 (NGH Environmental 2013, p.5). The ethnohistory of Wagga Wagga compiled by Green (2002) notes that between the 5th and 8th of December 1829, two Wiradjuri men guided Charles Sturt's expedition from Wantabadgery past the future site of Wagga Wagga to Mount Arthur (Go Green Services 2002; Montgomery 2011).

Soon after European arrival in the area the Aboriginal population began to decline due to diseases such as smallpox and influenza. This decrease in the local Aboriginal population was made apparent to the European settlers when the numbers of Aboriginal people in attendance at the annual blanket distributions suddenly dropped. This event – where blankets were distributed each year by the government to the Aboriginal community as part of the commemoration of Queen Victoria's birthday – would bring large groups to Wagga Wagga to receive and distribute the blankets throughout the community. This event would eventually become part of the traditional ceremonial practices of the Wiradjuri in the Wagga Wagga region (Kabaila 2011, as cited in Montgomery 2011). In combination with the drop of population via disease, violence, land dispossession, and European settlement further compounded social stresses on the Aboriginal community.

Dispossession from traditional lands and acts of violence against the Aboriginal community caused significant social upheaval and partial disintegration of the traditional way of life. This meant that access to traditional resource gathering and hunting areas, religious life, marriage links, and access to sacred ceremonial sites were disrupted via European land practices (i.e., fencing of private property) or were outright destroyed. However, despite these disruptions Aboriginal people continued to maintain their connections to sites and

the land in the early days of European settlement. Where Aboriginal people were taken to places like Warangesda, a mission established near Darlington Point in 1880, or Brungle Reserve between Gundagai and Tumut, people were able to maintain at least some form of association with Country and maintain traditional stories. As the proliferation of agricultural livestock occurred, traditional food resources quickly diminished, leading to many Aboriginal people relocating onto properties to exchange labour for goods and resources (Kabaila 2011, as cited in Montgomery 2011). By 1900, Green (2002, p.105) suggests that there were as few as 20 local Aboriginal people who remained in the Wagga Wagga LGA.

Early European settlers who wrote about the Wiradjuri people and customs differentiated between the origin of some groups, referring to people as the Lachlan, Murrumbidgee, or Levels tribes for those between the two major rivers (Woolrych 1890). The extent of the Wiradjuri group means that there were many different environments that were exploited for natural resources and food. Like everywhere in Australia, the Wiradjuri people were adept at identifying and utilising resources either on a seasonal basis or all year round.

3.1.3 Material culture, food and resources

Seasonal food availability was often predicted by Wiradjuri astronomy. The recognition of movement and star patterns were interpreted to predict flora and faunal movements, nesting and offspring fluctuations with availability indication of Bogong moth seasons, emu egg availability and tuber procurement read from the stars (Matthews 1905, as cited in Go Green Services 2002).

Terrestrial animals such as the possum were noted by many early observers as a prime food source and the skins were made into fine cloaks that evidently were very warm (Evans 1815; Oxley 1820; Mitchell 1839). Kangaroos were also eaten, and their skins made into cloaks as well. A range of reptiles and other mammals were food sources. Fish and mussels would have been prevalent from the rivers and creeks and insects were also a common food type, in particular grubs and ants and ant eggs (Pearson 1981; Fraser 1892). Birds including emus were common as a food source, often being caught in nets made from fibres of various plants such as flax, rushes and kurrajong trees. Bird hunts were also often undertaken as group activities, with emus, ducks and other birds targeted through groups of people flushing them out and driving them into prearranged nets with many Wiradjuri able to mimic bird calls (Ramson 1983; Go Green Services 2002).

Plant foods were equally as important and mostly consisted of roots and tubers, such as Typha or Cumbungi whose tubers were eaten in late summer and the shoots in early spring. Other edible plants from the Wiradjuri region include the Yam Daisy or Murnong, eaten in summer and autumn, the Kurrajong seeds and roots, Acacia seeds and other rushes (Gott 1982).

Some of the early settlers such as pastoralists, surveyors, explorers, administrators, and others observed traditional Aboriginal activities, including their ceremonies, burial practices, and general ways of living, and recorded these in letters, journals, and books. These early records of Aboriginal lifestyle and society within the region assist in understanding parts of the traditional Aboriginal way of life, albeit already heavily disrupted at the time of the observations and through the eyes of largely ignorant and uninformed observers.

The early observations also note that some weapons and tools were carried, some made from wood such as spears, spear throwers, clubs, shields, boomerangs, digging sticks, bark vessels, and canoes. Other materials were observed in use such as stone axes, shell and stone scrapers, and bone needles.

In an archaeological context few of these items would survive, particularly in an open site context. Any item made from bark, timber and animal skins would decay quickly in an open environment. However, other items – in particular those made of stone – would survive where they were made, placed, or dropped. Shell material may also survive in an archaeological context. Sources of raw materials, such as the extraction of wood or bark leave scars on the trees that are archaeologically visible, although few trees of sufficient age survive in the modern context. Outcropping stone sources also provide clues to their utilisation through flaking, although pebble beds may also provide sources of stone which leave no archaeological trace.

3.2 AHIMS search

The Aboriginal Heritage Information Management System (AHIMS) provides a database of previously recorded Aboriginal heritage sites in NSW. A search provides basic information about any sites previously identified within a search area. However, a register search is not conclusive evidence of the presence or absence of Aboriginal heritage sites, as it requires that an area has been inspected and details of any sites located have been provided to add to the register. As a starting point, the search will indicate whether any sites are known within or adjacent to the investigation area.

On the 19th December 2023, a search of the AHIMS database was undertaken over an area from:

- From: Latitude: -35.1078; Longitude: 147.3576.
- To: Latitude: -35.0412; Longitude: 147.4812.

The AHIMS Client Service ID was 850350. There were 91 Aboriginal sites recorded within the search area and three declared Aboriginal Places; two of the Aboriginal sites—AHIMS# 56-1-0109 and # 56-1-0111—are duplicates of the same site. The duplicated sites are of Bomen Isolated Find 1, and while AHIMS# 56-1-0111 is marked as 'deleted' on the AHIMS register it still comes up within the search results. NGH do not consider that the duplication of site affects the search result significantly. The Aboriginal Places are the Bomen Axe Quarry, Bomen Lagoon, and Wiradjuri Reserve & Gobba Beach, which are – respectively – 650 m north, 2270 m south west, and 4225 m south west. It should be noted that a further two places – the Wollundry Lagoon & Tony Ireland Reserve and Flowerdale Lagoon – are located outside of the AHIMS search area but within the township of Wagga Wagga. While none of the Aboriginal Places will be directly impacted by the proposed works – given that the Project Area does not intersect with any of their boundaries – the proximity of the Bomen Axe Quarry to the Project Area suggests that the Project Area may be of a higher overall sensitivity due to its close geographical association with the Aboriginal Place. A more detailed description of the Aboriginal Places is provided in Section 3.5 below.

On the 14th February 2025, a new AHIMS extensive search—over the exact same area as described above—was performed due to the expiration of the previous search (AHIMS Client Service ID was 975659). The results of this search established that there were 92 Aboriginal sites within the search area, indicating that a single additional Aboriginal site was registered on AHIMS between the 19 December 2023 and the 14 February 2025. The additional site, AHIMS# 56-1-0775, is not within the current Project Area and therefore will not be subject to the proposed works as assessed by this report.

The results of the AHIMS search area are shown in Figure 3-2. Search results are summarised in Table 3-1 below.

Table 3-1 Breakdown of previously recorded Aboriginal sites in the region.

Site Type	Number
Artefact	68
Modified Tree	21
Stone Quarry, Artefact	2
Stone Quarry	1
Total	92

While no previously recorded Aboriginal sites or Aboriginal Places are located within the Project Area, a total of 9 registered AHIMS sites and a single Aboriginal Place are located within 1 km. These sites are shown in Figure 3-3 below and the registered AHIMS sites are summarised in Table 3-2 below.

Table 3-2 AHIMS sites within 1 km of the Project Area.

Site Number	Site Name	Site Type	Distance to project (m)	Site Status on AHIMS	Description
56-1-0775	Bavin Rd Scar Tree 1	Modified Tree (Carved or Scarred)	Approximately 490 m west of the Project Area	Valid	Recorded as a modified tree with two scars into an old yellow box tree
56-1-0552	BSF-IA6-18	Artefact	Approximately 588 m north east of the Project Area	Destroyed	A single surface quartz flake
56-1-0533	Bomen 539070	Artefact	Approximately 600 m north east of the Project Area	Valid	Surface artefact scatter of six artefacts within a 1 m x 1 m scatter
56-1-0532	Bomen 539085	Artefact	Approximately 600 m north east of the Project Area	Valid	A single quartz core
56-1-0044	EAST BOMEN IF2	Artefact	Approximately 617 m north east of the Project Area	Valid	A single surface milky quartz bipolar flake.
56-1-0538	Bomen 539071	Artefact	Approximately 639 m north east of the Project Area	Valid	Surface artefact scatter of four artefacts within a 1 m x 1 m scatter
56-1-0043	EAST BOMEN 1	Stone Quarry, Artefact	Approximately 825 m north of the Project Area	Valid	An Aboriginal surficial hardstone quarry and axe manufacturing site
56-1-0601	Wagga Wagga SF AFT 5	Artefact	Approximately 864 m north east of the Project Area	Partially Destroyed	Subsurface artefact scatter containing at least six artefacts within an 18 m x 10 m area
56-1-0534	Bomen 538732	Artefact	Approximately 876 m north east of the Project Area	Valid	A single volcanic core
56-1-0045	EAST BOMEN IF1	Artefact	Approximately 972 m north east of the Project Area	Valid	A single surface black micro-crystalline banded chert broken flake

3.3 Additional searches

Other heritage register searches were also undertaken to identify any items or places in proximity to the Project Area, with a focus on the Project Area and surrounding landscape. The following resources were used as part of this assessment:

- The NSW State Heritage Inventory (SHI), this includes items on the State Heritage Register and items listed by state agencies and local Government, to identify any items currently listed within or adjacent to the proposal site.
- The Australian Heritage Database, this includes items on the National and Commonwealth Heritage Lists, to identify any items that are currently listed within or adjacent to the proposal site.

The results of the NSW SHI database search indicated there are no items listed for Historic or Aboriginal values within the Project Area. However, the Bomen Railway Station (including the Bomen Stationmasters Residence) – which is located 525 m north of the Project Area – is registered on the State Heritage Register (SHR ID: 01093), the Section 170 register, and within the Wagga Wagga Local Environmental Plan (LEP) (LEP ID: I8 – Bomen Railway Station; LEP ID: I9 – Bomen Stationmasters Residence). None of these listings will be impacted by the proposed works.

The results of the Australian Heritage Database search indicated that there are no items listed within the Project Area or Bomen suburb.

No other known previously recorded heritage sites are located within or adjacent to the Project Area.

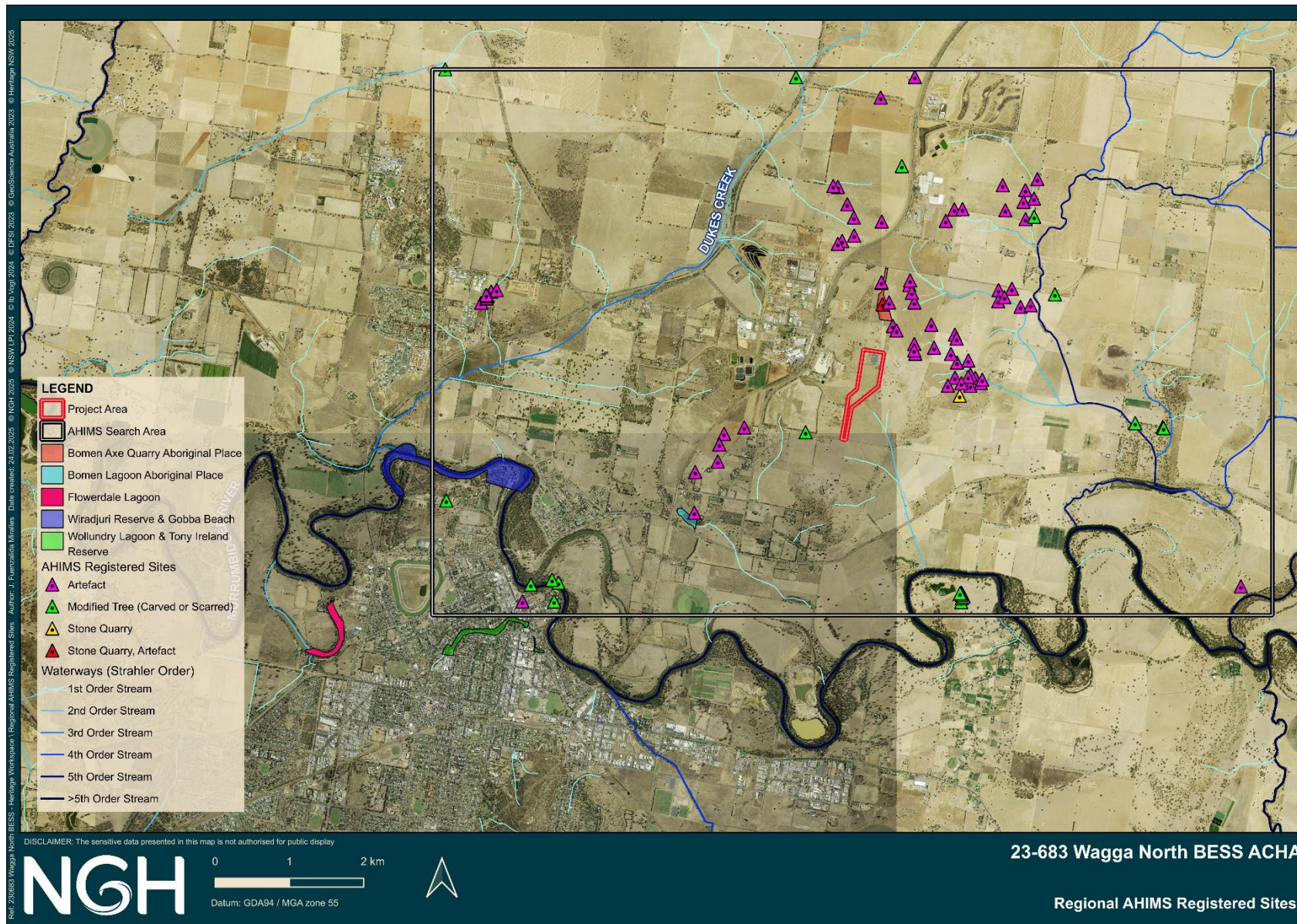


Figure 3-2 AHIMS sites within the search area.

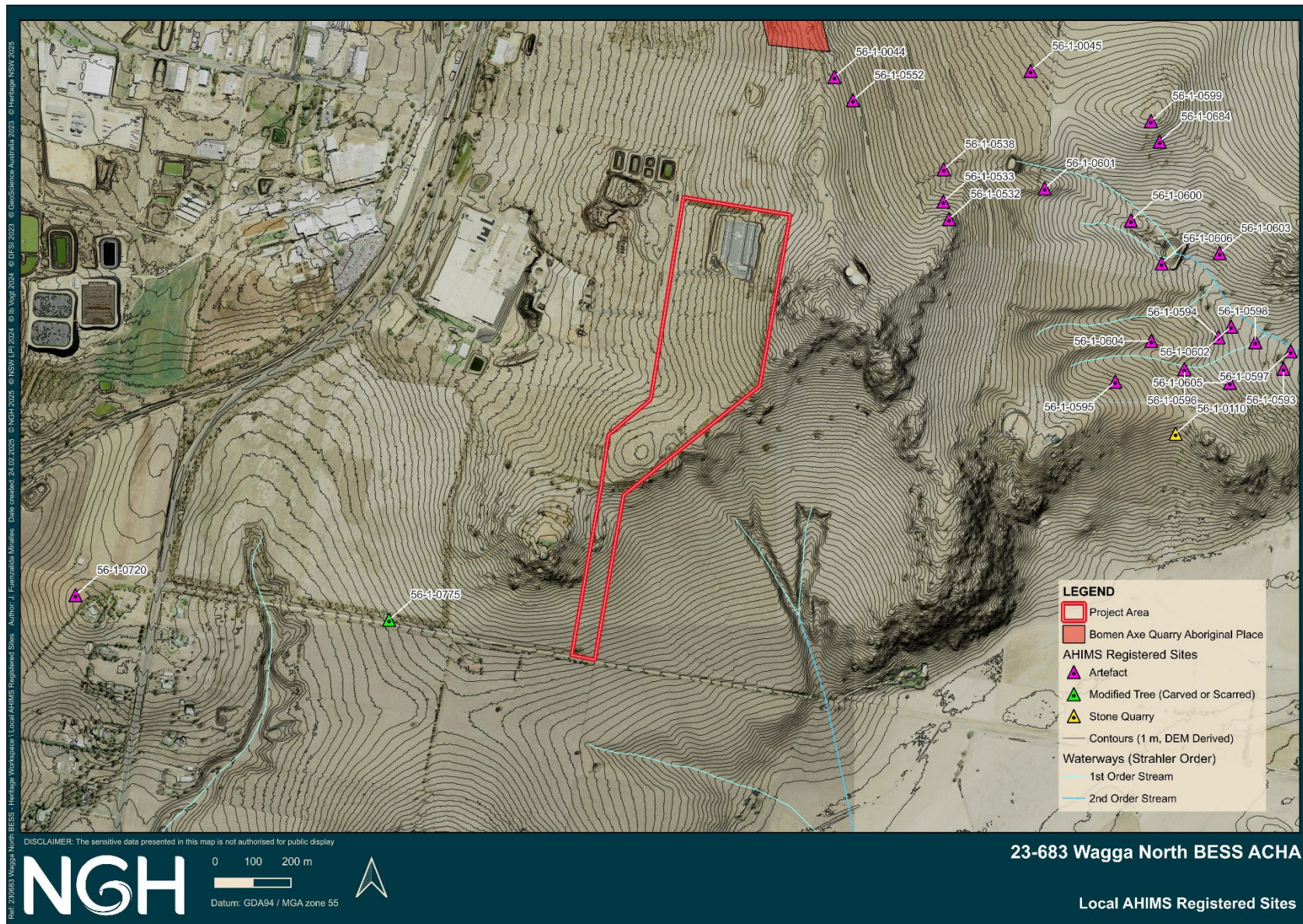


Figure 3-3 AHIMS sites close to Project Area.

3.4 Regional archaeological studies

Aboriginal people have occupied what we now know as the Australian continent for at least 40,000 years and perhaps 60,000 years before present (BP) and beyond. There have been no known dated excavations in the Wagga Wagga region, however archaeological excavations within the wider region have yielded dateable material.

- Between 690 BP ($\pm$ 100 years) and 3,445 BP ($\pm$ 130 years) using radiocarbon (C14) dating at the Mudgegonga 2 rockshelter (Godfrey et al. 1999); approximately 142 km south of Wagga Wagga.
- 590 BP ($\pm$ 60 years) using C14 dating at the Mooroopna Common 4 midden near Shepparton (Godfrey et al. 1999); approximately 232 km south west of Wagga Wagga.
- Between 8,000 BP ($\pm$ 420 years) and 10,000 BP ($\pm$ 250 years) using C14 dating at Kow Swamp near Gunbower (Thorne & Macumber 1972); approximately 300 km south west of Wagga Wagga.

The following are summaries of archaeological survey reports that have been completed in the region, these have been primarily driven by development and infrastructure requirements. The purpose of reviewing and summarising relevant local and regional archaeological studies is to establish an understanding of the archaeological context of the Project Area. This includes understanding the type, extent, and possible distribution of sites which may be located within the Project Area.

Silcox (1987) conducted a series of test excavations using a backhoe on the northern side of the Murrumbidgee River at Gumly Gumly (approximately 10 km east of Wagga Wagga) based on the results of a survey for a water augmentation project. The Potential Archaeological Deposit (PAD) named GG1 was proposed for test excavation due to its proximity to a reliable water source and because it was situated on an elevated, well-drained flat surface suitable for camping; the absence of previous ground disturbance activities further suggested some archaeological potential may be present. Seventeen test pits at seven locations were excavated and 52 artefacts were recovered. All of the artefacts were of quartz and were confined to the top 25 centimetres (cm) of the soil deposit. Silcox also identified the presence of a thin layer of mussel shell within one trench. The results indicated that there a low-density scatter of artefacts was present in this area, similar to many other sites on within the lower Murrumbidgee floodplain.

Australia Archaeological Survey Consultants (1995) conducted a study about 12.5 km south east of the current Project Area for a proposed upgrade of the Sturt Highway. The majority of the survey area had been highly disturbed by activities associated with the previous construction of the highway. Despite good visibility, no sites were located and it was concluded this was an accurate reflection of the Aboriginal use of this steep hill slope area with limited water availability in the area.

Go Green (2002) compiled a comprehensive study of Wiradjuri heritage for the Wagga Wagga area. The study focused on Wiradjuri and non-indigenous heritage, oral histories, insight into the pre-European Wiradjuri culture, a timeline of Wiradjuri history and highlighted potential tourism, education and employment opportunities. Green also identified a number of plant and animal resources in the Wagga Wagga area that have been utilised by Wiradjuri people in the past; and continue to be used in the present. During the study, Green identified three scarred trees and an artefact scatter in association with either the Bomen Lagoon (approximately 2.25 km south of the Project Area) or Wollundry Lagoon (approximately 4.9 km south west of the Project Area).

Navin Officer Heritage Consultants (2002) conducted a survey for the Lloyd Neighbourhood Land Release Area; approximately 10 km south west of the current Project Area. A total of five Aboriginal sites were located during the survey, including three artefact scatters, one isolated artefact, and one probable culturally modified tree. The artefacts recorded were predominantly characterised by flaked quartz materials with occasional tuff/mudstone inclusions. The sites with artefacts were considered not to be rare or unusual and areas surrounding these sites were deemed unlikely to be associated with in situ subsurface deposits. Additionally, three PADs were identified during the survey and were considered the most likely locations

where subsurface archaeological material may be present. It was recommended that a limited archaeological subsurface testing programme be conducted in order to ascertain the true archaeological potential of these areas and to facilitate the development of informed management strategies for these areas.

Kelton (2005) conducted a primarily desktop study and brief field assessment within the Henwood property, between Coolamon Road the Olympic Highway and Sutherlands Road; approximately 3 km west of the current Project Area. While the survey visibility of the area was poor, a number of areas of archaeological sensitivity and PAD were identified. The PADs were primarily located along the western banks and adjacent terraces of Dukes Creek and its surrounding low hillslopes. Hill crest and ridge landforms in were also identified as archaeologically sensitive landforms in the area.

Austral Archaeology (2005) conducted a survey for the proposed Wagga Wagga Rail Bridge Replacement; approximately 4.5 km south west of the Project Area. A total of six areas of PAD were identified during the assessment. Areas of high potential were identified along the Murrumbidgee floodplain. These areas were relatively undisturbed and contained deep soil profiles and a high potential for in situ subsurface finds. Areas of moderate sensitivity were determined to be north of the Murrumbidgee River on the north-west side of the track – between the riverbank and the fence line – in a relatively flat to the undulating floodplain. Areas of low archaeological potential were determined to be south of the Murrumbidgee River on the south-east side of the track, between the riverbank and the fence line.

Umwelt (2014) performed excavations for the extensions to the Wagga Wagga Courthouse; approximately 4.9 km south west of the current Project Area. A total of 23 artefacts were recorded from 18 test pits during the excavations. The site – recorded as Wiradjuri 1 – consisted of flakes, broken flakes, and flaked pieces, all of which were manufactured from quartz. During the consultation process, it was noted that the local Aboriginal community associated the study area location with a burial ground, although no human remains were identified during excavations.

NGH (2016a) investigated an area for the extension of Brunslea Park estate, approximately 8.2 km south east of the Project Area. A total of 19 stone artefacts, a single piece of a mussel shell, pieces of burnt clay, and eight lithic fragments were recovered from 40 test pits with an additional 17 surface artefacts recorded across the area. The majority of the subsurface artefacts were recovered from between 5 cm -15 cm below the surface. Flakes or portions of flakes were the dominant artefact typology for both the surface and subsurface finds with only a single core recovered. Quartz was the common lithology with the exception of a fragment of volcanic material. A single surface finds flake was also recorded as having retouch, but it was not assigned a formal tool type, though it was noted to be similar in shape to a Tula adze. Following the subsurface testing programme the sites were recorded as sites Brunslea Park AS7 and Brunslea Park AS8, both of which were characterised by low-density artefact scatters on low gradient slopes and along the crest of a broad ridgeline. The average artefact density was 1.9 artefacts/m² with a peak of 28/m² in one test pit. While the sites were deemed to have a low scientific value it was considered that the development area as a whole was likely to contain Aboriginal heritage objects and an AHIP was recommended for the entire proposed development area. The excavation results in this area supported previous predictive models as the of areas of archaeological sensitivity in the Wagga Wagga area and that archaeological sensitivity in the area will increase in areas with a gentle slope or raised above regular flood levels.

NGH (2022) completed an ACHA and ATR for the proposed Riverina Water Solar Pilot Plant; approximately 4.1 km south west of the current Project Area. These assessments were completed as a follow-up to a previous Due Diligence assessment done by NGH. The archaeological survey relocated two areas of PAD identified during the original Due Diligence assessment as well as an additional PAD (PAD 7) and culturally modified tree (AHIMS# 56-1-0688). The assessment also involved subsurface archaeological test excavations within PAD 7, where 12 artefacts were recovered from five of the test pits. The subsurface results were determined to be characteristic of a discrete low-density cluster of artefacts. It was further argued that the results of the survey and subsurface testing supported the archaeological modelling for the region, where sites and artefacts are present throughout the landscape, especially within elevated areas adjacent to

waterways. The density of the surface and subsurface assemblage present suggests that short-term use of the area was likely as no long-term occupation sites were evident.

NGH (2022) undertook an Aboriginal Heritage Due Diligence assessment for the proposed decommissioning of the existing 45 megalitres open reservoir at Willans Hill; approximately 6.7 km south west of the current Project Area. A site inspection was undertaken, where two low-density artefact scatters and two isolated finds were recorded. The artefacts recorded were all manufactured from quartz, the dominant raw material for the Wagga Wagga region. The site – Willan's Hill AFT1 – was associated with fill material and was assumed to have been brought onto the site from an unknown location.

3.5 Local archaeological studies

The following are summaries of those archaeological survey reports that have been completed in the Bomen area which have been primarily driven by development and infrastructure requirements.

Smith (1992) completed a preliminary archaeological survey for the proposed Optus fibre optic cable route from Albury to Cootamundra and passing within 2.2 km of the current Project Area. The purpose of the preliminary survey was to identify areas of archaeological sensitivity along the entire proposed cable route and recommend areas for further heritage investigation. In the Wagga Wagga region, these included the flats, banks, terraces, and anabranches of the Murrumbidgee River and ephemeral creek lines. These areas have high potential to contain scarred trees, burials, artefact scatters and subsurface artefacts (Smith 1992, p.9). The recommendations resulting from the survey suggested avoiding all trees along the proposed route, a systematic foot survey of any areas of archaeological potential, subsurface testing of areas of alluvial deposit along creek banks, creek flats, and terraces, and the relocation of registered sites of Aboriginal cultural heritage.

Navin Officer Heritage Consultants (1996) performed a follow up cultural heritage assessment – the original assessment was performed two years earlier by Navin et al. (as cited in Navin Officer Heritage Consultants 1996) – of the Wodonga to Wagga Wagga natural gas pipeline; ending approximately 65 m south of the Project Area. After the surveys, a total of 65 Aboriginal sites – 38 artefact scatters, 19 isolated artefacts, and eight PADs – were identified to be present within proximity to the pipeline corridor. Based on the survey results it was reflected that artefact scatters are likely to be located in well drained contexts adjacent to water sources. A number of test pits were excavated within the PADs along the proposed route with quartz being the dominant raw material. It was concluded from the excavations that there were not sustained or repeated visits to particular areas within the pipeline corridor.

HLA Envirosciences (1997) undertook an assessment for a proposed expansion of effluent irrigation system for the Bomen Abattoir; approximately 1 km south west of the current Project Area. They examined the alignment of a proposed pipeline, the location of a proposed holding dam, and the proposed irrigated paddocks. It was noted that the surface visibility across the majority of the route was high, with little vegetation cover and few rocks visible on the surface. While a significant amount of quartz was observed across the survey route, none of it was recorded as artefactual. HLA argued that the flaws and impurities present in the quartz would have made its use in the production of stone tools difficult. Only a single isolated artefact, ISF BOM1 (AHIMS# 56-1-0033), was identified within the survey corridor. It was recorded as a piece of coarse silcrete that had evidence of grinding on one surface and was located within a spur/saddle landform. While only a single artefact was recorded, it should be noted that silcrete artefacts are rare in the Wagga Wagga archaeological landscape, with the overwhelming majority of identified stone artefacts being comprised of quartz. The silcrete artefact that was identified in this study had almost certainly been imported from elsewhere as no silcrete sources are known to be present in the immediate region.

Kelleher Nightingale Consultants (2008) completed an ACHA as part of the Wagga Wagga City Council's Local Environmental Study to implement the strategic planning of the Wagga Wagga Spatial Plan 2007. As part of this study, environmental assessments were undertaken for eight sites that were subject to rezoning.

These included Lloyd, Bomen, Estella West, Edison Road, Hammond Avenue, Copland Street, Boorooma East, and Moorong Street; the current Project Area is partially located in the south of the Bomen study area. Kelleher Nightingale Consultants noted that the surface visibility conditions during the site visit were not conducive to the identification of Aboriginal objects across the entire assessed area. Furthermore, they observed that a significant level of landscape modification had taken place in association with the existing industrial properties in the area and along the road and railway corridors present. However, a significant portion of the area – especially where gently undulating terrain along waterways or higher terrain is present – contained moderate to high levels of archaeological sensitivity, including sections of the current Project Area. Despite the poor ground surface visibility encountered during the survey, an isolated find (Bomen IF 1, AHIMS# 56-1-0109) was recorded within proximity to an ephemeral waterway within a gully landform. It was recorded as a mid-reddish brown mudstone flake with a flaked platform, feather termination, several dorsal flake scars, and approximately 10% dorsal cortex. The isolated find was further noted to be located within an area of high surface visibility and moderate exposure visibility. While only a single artefact was identified during the survey, the results and observations of the landscape were used to prepare an archaeological sensitivity model for the Bomen area. This model, which was prepared according to the knowledge available in 2008, is presented in Figure 3-4 and .

Table 3-3 below.

Table 3-3 Archaeological sensitivity model for Bomen prepared by Kelleher Nightingale Consultants (2008).

Landform	Archaeological Sensitivity	Sensitivity Description	New Sites
Granite Outcrop along Upper Hillslope/Crest	High	Increased sensitivity where potential artefact raw material present, such as quartz	1 quarry
Undulating Flat/Colluvial Deposits	Moderate to High	Increased sensitivity in association with drainage lines/terraces	n/a
Drainage Line and Associated Alluvial/Colluvial Deposits	Moderate to High	Increased sensitivity where gentle slopes or raised above regular floods	Isolated Find
Ridgeline Crest	Moderate	Less exposed to prevailing winds, increased sensitivity with proximity to drainage/open drainage/terraces	n/a
Lower Hillslope	Low to Moderate	Increased sensitivity in association with alluvial/colluvial deposits associated with drainage lines	n/a
Upper/Mid Hillslope	Low	Less possibility of intact archaeological deposits, increased sensitivity with gentler slopes and proximity to open drainage lines/terraces	n/a

The predictive model prepared by Kelleher Nightingale Consultants places emphasis on landforms that contained known archaeological sites in 2008, including what is now known as the Bomen Axe Quarry Aboriginal Place. As a result, it is a relatively limited model as it relies on the assessment performed by Kelleher Nightingale Consultants and the assessments performed on the Bomen Axe Quarry, both of which did not conduct a 100% coverage of the Bomen area. However, since 2008 several large assessments have been conducted in the area, all of which can be used in conjunction with the landscape context of the Project Area to refine the initial model prepared by Kelleher Nightingale Consultants.

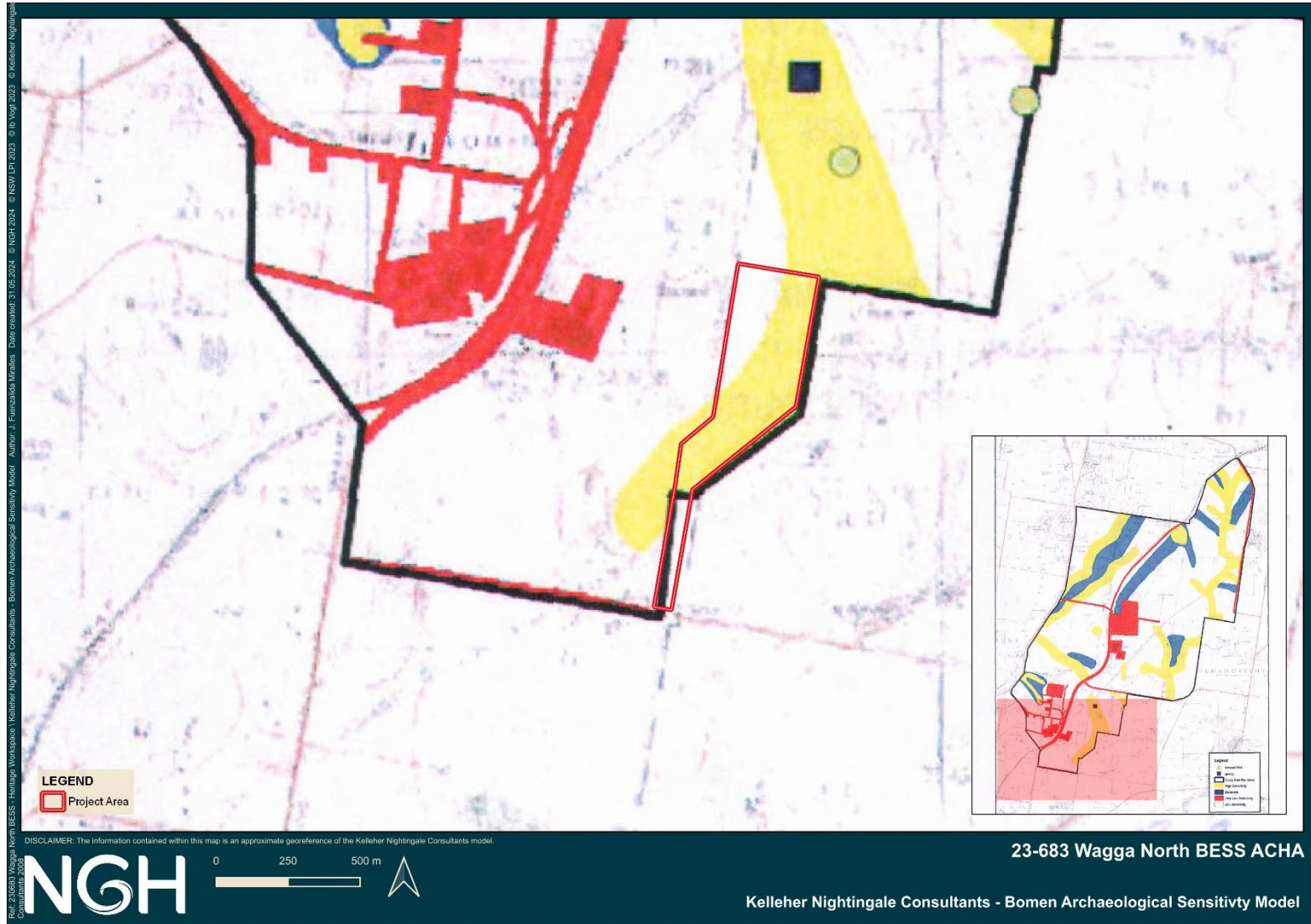


Figure 3-4 Project Area within the Kelleher Nightingale Consultants (2008, p.17) Bomen archaeological sensitivity model. Note the areas of yellow, blue, and red signify areas of high, moderate, and very low sensitivity respectively.

NGH was engaged to perform an Aboriginal Heritage Due Diligence assessment (2015) and several ACHAs (NGH Environmental 2016b, 2018; NGH Pty Ltd 2020) for Stages 1, 2, and 3 of the proposed Riverina Intermodal Freight and Logistics (RIFL) Hub at Bomen Park; beginning approximately 500 m north of the current project Area. The initial Due Diligence assessment of the Stage 1 area resulted in the identification of three isolated artefacts within disturbed contexts – Bomen RIFL IF1, Bome RIFL IF2, and Bomen RIFL IF3 – as well as two areas of archaeological sensitivity that were not identified during the Kelleher Nightingale Consultants (2008) study. The report concluded that an ACHA would be required to further assess the Aboriginal heritage within the RIFL area and to use as supporting documentation in the application for an AHIP. The subsequent ACHA assessment (NGH Environmental 2016b) continued the assessment based on the recommendations of the Due Diligence and included a select part of Stage 2 for the construction of the rail infrastructure; this included both survey and subsurface test excavations. The surface and subsurface investigations resulted in the identification of an additional surface isolated find (Bomen RIFL IF4), a subsurface isolated find (Bomen RIFL IF5), four artefact scatters with subsurface deposits (Bomen RIFL AS1, Bomen RIFL AS2, Bomen RIFL AS3, and Bomen RIFL AS4), and a scarred tree (Bomen RIFL ST1). Observations of the remainder of the landscape during the survey suggested that the majority of the area contained a negligible archaeological potential. However, the two areas of archaeological sensitivity that were identified by the Kelleher Nightingale Consultants (2008) were included in the subsurface test excavation programme. A total of 73 test pits were excavated across eight areas of the Stage 1 and Stage 2 study area, with 28 artefacts being recovered from 14 of those test pits. NGH argued that the results of this assessment were characteristic of other assemblages in the area, as the majority of artefacts were comprised of quartz raw material and no retouched artefacts were identified.

The Stage 1 and Stage 2 assessments (NGH Environmental 2015, 2016b) for the Bomen RIFL Hub only resulted in the identification of discrete low-density artefact scatters or isolated finds. NGH argued that the results of the assessments suggest that the regional site distribution was not restricted to any particular landform, as sites were both absent and present across the predicted ‘sensitive’ landforms that were subject to survey and subsurface test excavations. Although it should be noted that the results of the assessment did indicate that Aboriginal sites were more likely to be present along ridgeline crests and the upper/mid slopes in proximity to drainage depressions. NGH argued that the Aboriginal sites identified show that the area was frequented by small groups of Aboriginal people in the past, but that no large sites would be present within the RIFL Hub area. NGH further argued that the Kelleher Nightingale Consultants (2008) sensitivity model should be revised based on the results of the RIFL Hub assessments. The Kelleher Nightingale Consultants model attributed high sensitivity to landforms based on their proximity to water. NGH argued that this was inaccurate as many of the broad, open depressions that were identified for their potential to hold water do not frequently hold water and therefore should not influence the overall sensitivity of adjacent landforms. Furthermore, the test excavations did not identify any large, stratified sites within the landforms adjacent to these drainage depressions. As a result, NGH concluded that the drainage depressions should only be considered as part of the wider undulating landscape, and not as an indicator of higher archaeological sensitivity. They also argued that generally level crests and low gradient upper hillslopes should have a moderate archaeological sensitivity instead of the moderate to low archaeological sensitivity predicted by Kelleher Nightingale Consultants (2008).

In their final assessment for the RIFL Hub, NGH (2020) performed an ACHA for Stage 3 of the precinct. The survey for the assessment did not result in the identification of any new Aboriginal sites due to the low ground surface visibility that was encountered. However, a single area of PAD – named Dukes Creek PAD 1 – was identified on an elevated flat landform on western side of Dukes Creek near the Olympic Highway. No test excavations occurred within Dukes Creek PAD 1 as the proposed works were not going to impact the PAD area. NGH concluded that no further test excavations were required within the Bomen RIFL Hub area so long as the proposed works did not change.

AECOM Australia (2018) conducted an Aboriginal and historic archaeological assessment for the proposed Bomen Solar Farm; approximately 210 m north of the Project Area. A total of nine sites – six isolated finds,

two artefact scatters, and one potential scarred tree – were recorded by AECOM during the field survey. RAP representatives recorded a further eight artefact scatters after the survey. All of the AECOM recorded artefacts were made from quartz and were either cores (unidirectional, multidirectional), flakes (proximal or complete), or angular fragments/flaked pieces. No typological information is available for the artefacts recorded by the RAP representatives, however the majority of that assemblage appears to be quartz from site images. AECOM noted that the majority of the sites they identified were located on lower (n=17, 47.2%) or upper slopes (n=12, 33.3%), with the remainder on either lower slopes (n=17, 16.7%) or a crest (n=1, 2.8%). Following the survey, AECOM identified areas of archaeological sensitivity by categorising the proposed Solar Farm into areas of nil, low and high sensitivity (see Table 3-4).

Table 3-4 Archaeological sensitivity model developed by AECOM for the Bomen Solar Farm (adapted from AECOM Australia Pty Ltd 2018, pp.60–61).

Sensitivity Rating	Sensitivity Description
Nil	Areas of damming, built structures, and roads have been identified as having no potential for subsurface deposits.
Low	The majority of the Bomen Solar Farm area has been assessed as being of low archaeological sensitivity due to slope and historic disturbances such as ploughing.
High	Areas of high archaeological sensitivity have been linked to crests and creek line flats within the Bomen Solar Farm area.

Subsequently, two test excavation programmes took place across two areas of the solar farm which had been identified as containing high archaeological sensitivity. The first area – located approximately 930 m north of East Bomen Road – was located within lower slopes in association with a 1st order waterway. A total of 20 test pits were excavated across this area and the soil were described as consistent with the East Bomen soil landscape described by Chen and McKane (1996). Across these test pits, 29 stone artefacts were identified during the test excavations; all of which were from test pits on the western side of the creek. Quartz was the most common raw material type, with two pieces of fine-grain siliceous being identified. Typological (and in descending order), the assemblage was represented by angular shatter, flake shatter, proximal flaks, complete flakes, and a multidirectional core. No retouched tools were identified within the assemblage and cortex poorly represented. Modern archaeological material (glass, ceramic fragments, etc.) were also recovered within the upper deposits in seven of the 20 test pits.

After the conclusion of the first test excavation programme, a second programme was required to investigate the subsurface potential of the solar farm area south of East Bomen Road; terminating approximately 210 m north east of the current Project Area. During the second test excavation programme, 58 test pits were excavated in a linear transect following the proposed transmission line as it passed through areas of low and high archaeological sensitivity. No stone artefacts were identified during the second test excavation programme, although a significant amount of fractured quartz gravels was noted within most test pits. The presence of fractured quartz gravels was likely determined by the presence of the Collingullie Granite geological formation. AECOM argued that none of the quartz gravels identified satisfied the technical criteria to be recorded as stone artefacts.

The two test excavation programmes across the Bomen Solar Farm – as well as the surface sites identified – are representative of a background scatter resulting from the periodic use of the area by small groups of Aboriginal people in the past. No large, stratified archaeological sites were identified within the Bomen Solar Farm area and the results of the assessment show that there is a low potential for any to be present. The results further support the conclusion of other recent local archaeological studies, showing that the archaeological record in the Bomen region is characterised by low-density surface and subsurface artefact scatters on lower and upper slopes as well as ridgelines and hill crests.

Access Archaeology and Heritage (2018) undertook an ACHA for the proposed Wagga Wagga Solar Farm development in Bomen; beginning approximately 75 m north of the Project Area and with the main area located approximately 950 m north east. During the course of the archaeological survey two artefact scatters and two isolated artefacts were identified, with a total of 103 individual stone artefacts across the four sites. Furthermore, two areas of PAD were also identified. The assemblage was predominantly characterised by quartz material (~86%) with a second major material comprising metamorphized sedimentary stone (~5.8%). The subsurface testing focused on the two PAD areas (WWSF-PAD1 and WWSF-PAD2) and areas of sensitivity associated with an extensive artefact scatter along the creek line (WWSF-1), isolated find (WWSF-3), and a drainage line. A total of 55 test pits were manually excavated across these four areas, with 45 subsurface finds being recovered. Most of the subsurface material was recovered from spit 1 (n=15) or spit 2 (n=22), although small amounts of material were identified in both spit 3 (n=5) and spit 4 (n=3). Quartz was the dominant lithology within the subsurface assemblage, with one fine-grained volcanic artefact recovered. Moderate revisions to the modelling prepared by Kelleher Nightingale Consultants (2008) were proposed based on these results. Higher archaeological sensitivity was identified in association with the higher order water courses and raised, level and well-drained landforms on the boundary of the northern Murrumbidgee floodplain. This sensitivity was again increased if these areas coincided with the junction of one or more creek or drainage lines. Areas of lower sensitivity were found further away from these water sources. Level terraces, spurs, and rises closer to low order drainage lines were assigned low to moderate archaeological sensitivity.

NGH (2019) completed an ACHA for the proposed Wagga Wagga Solar Farm South at Bomen; approximately 525 m east of the current Project Area. Despite the variable visibility encountered across the area during the survey, a total of four artefact scatter and five isolated finds were recorded. The three areas of PAD that were identified during the original Due Diligence assessment were also reinspected and refined. The PADs were located within several landforms, including an east to west running spurline (PAD 1) and within elevated flats adjacent to a drainage line (PAD 2 and PAD 3). A further three PADs were identified during the test excavations. As a result, the test excavation programme was extended to cover all six PADs identified. A total of 49 test pits were excavated, with 34 artefacts recorded within 19 of the test pits. The artefacts identified within each test pit ranged from zero to eight; except in PAD 6, where no subsurface archaeological material was identified. The entire identified artefact assemblage was comprised of quartz. The surface artefact assemblage comprised of cores, flakes, proximal fragments, a broken flake, and a hammerstone. Meanwhile, the subsurface artefact assemblage was comprised of flakes, proximal fragments, distal fragments, and flaked pieces. An average density of 2.75 artefacts/m² was recorded across the site. The results of the assessment show that the area was represented by the characteristic low-density artefact clusters that are commonplace in the Wagga Wagga region. NGH suggested that the sites are representative of a short-term or transient occupation of the region – especially in association with level or gently sloping low elevations near waterways – instead of long-term occupation, supporting the generally accepted archaeological site modelling for the region. It was further argued that longer-term occupation sites were more likely associated with spurlines and resources areas, such as that identified at the Bomen Axe Quarry.

3.5.1 Archaeological Assessments of the Bomen Axe Quarry Aboriginal Place

Navin Officer Heritage Consultants (1998) surveyed an area for a proposed power plant site at Bomen; approximately 225 m north of the current Project Area. The survey resulted in the identification of three Aboriginal sites, the axe manufacturing and quarry site East Bomen 1 (AHIMS# 56-1-0043) – also known as the Bomen Axe Quarry – as well as East Bomen IF1 (AHIMS# 56-1-0045) and East Bomen IF2 (AHIMS# 56-1-0044). The Bomen Axe Quarry is situated on the crest of a ridge line that consists of exposures of granite and basalt. The basalt material was utilised for the manufacture of axe blanks, which were then most likely carried off-site for final production. It was argued that the site contained distinct working areas, with primary flaking areas close to the basalt outcrop and secondary working areas located a further away. An estimated 500 stone artefacts were recorded within a scatter measuring 150 m x 70 m. The overwhelming majority of

the artefacts were comprised of the naturally occurring basalt found at the quarry, with hammerstones, cores, primary flakes, and secondary flakes being identified within the assemblage. The general spatial distribution of artefacts is shown in Figure 3-5 below. While the two isolated finds were considered to have low archaeological significance, the Bomen Axe Quarry was identified as highly significant to the local Aboriginal community and of high archaeological significance. The area has now been declared an Aboriginal Place under the NPW Act.

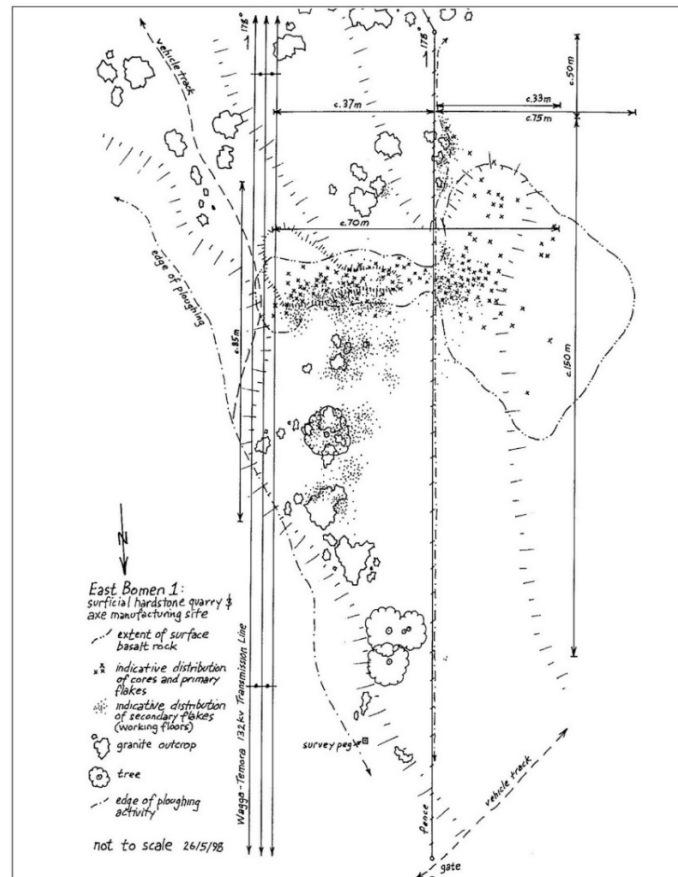


Figure 3-5 Archaeological mud map of the Bomen Axe Quarry site, note that the map is not to scale (Navin Officer Heritage Consultants 1998, p.20).

Go Green Services (2011) completed an assessment report for the Aboriginal Place Nomination for the Bomen Axe Quarry and Manufacturing Site; approximately 2.2 km north east of the current Project Area. The report assessed the significance of the axe quarry based on the nomination made by the Waagan Waagan Project Group. The Bomen Axe Quarry was identified in 1998 during an archaeological survey for a proposed power plant site (Navin Officer 1998, as cited in Go Green Services 2011). Go Green argued that the site was a rare example of a surface hard rock quarry and axe manufacturing site and had a high scientific significance as well as very high education and cultural significance to the local and Aboriginal community. The numerous high values of the Bomen Axe Quarry led to its declaration as an Aboriginal Place. While the reassessment of the site by Go Green Services did not necessarily provide further information about the Bomen Axe Quarry, it clearly explained the high significance of the area to the community for cultural, scientific, and educational purposes.

Go Green Services (2013) completed an assessment report for the Aboriginal Place Nomination for the Bomen Lagoon; approximately 350 m south of the current Project Area. The report assessed the significance of the lagoon based on the nomination made by the Waagan Waagan Project Group. The Bomen Lagoon was noted to be a valuable fishing resource place. Furthermore, during the earliest European exploration of the area by Captain Charles Sturt, the lagoon was the site of the first contact made between the expedition party and the Wiradjuri inhabitants of the area. In recent times, the lagoon has been valued by the local Aboriginal

community as a recreation and learning place, particularly in relation to native birdlife, cultural and aesthetic values. The Bomen Lagoon is also located on part of the Bomen Travelling Stock Reserve. The lagoon contains an artefact scatter (AHIMS# 56-1-0011), recorded in 2002, on the original foreshore that would have existed during Wiradjuri occupation. The site contains mostly quartz flakes on the southern edge of the lagoon where a flood plain drainage channel intersects. The area also contains traditional Wiradjuri medicinal and food resource plants, including old man weed and the bush plant nardoo. The presence of these plants suggests that short term campsites would have existed on the fringes of the lagoon. Evidence of Aboriginal occupation in the low sandhills near the lagoon and the nearby Eunonyhareenyha homestead also demonstrate the Aboriginal occupation of this area, including former cooking oven sites, which remained present until at least the 1960s. The sandhills would have also been ideal for camping, meeting and burial sites.

3.5.2 Previous Archaeological Assessment Within the Project Area

Only a single previous archaeological assessment is known to have taken place within the current Project Area. It is described below.

AECOM Australia (2010) conducted the Aboriginal and historic heritage study for Stage 1 of a 61 km pipeline project from Bethungra to Wagga Wagga; terminating within the western section of the current Project Area. The survey methodology was designed to only target specific portions of landscapes where archaeological evidence was most likely to be found, resulting in 18 transects being surveyed. A total of 36 Aboriginal sites – 30 artefact scatters and 6 isolated artefacts – were identified along the proposed pipeline route, including 24 previously unrecorded sites. The majority of sites recorded during the survey were associated with or in close proximity to an ephemeral water source with over two-thirds of sites located within 50 m of a water source.

3.6 Summary of archaeological context and site location model

The AHIMS database is a record of those places that have been identified and had site cards submitted to AHIMS. It is not a comprehensive list of all places in NSW as site identification relies on an area being surveyed and on the submission of site forms to AHIMS. There are likely to be many areas within the region and wider NSW that have yet to be surveyed and therefore will have no registered AHIMS sites. However, this does not mean that no Aboriginal sites are present in those areas.

The results of these previous archaeological surveys in the Bomen and Wagga Wagga region show there are Aboriginal sites present in a range of landforms and that these sites are generally low to moderate density artefact scatters, isolated artefacts, and modified trees (carved or scarred). Generally speaking, these sites strongly correlate to the presence of potential resources for Aboriginal use, especially when located close to raw material sources or waterways. They are also commonly associated with certain landforms such as well-drained elevated flats, spurs, hill crests, and saddles. The common characteristic of all sites that have been subject to subsurface testing is that the density of sites is generally relatively low and they are typically confined to the upper levels of soil deposits. No high-density sites have been identified within proximity to the Project Area.

The Aboriginal land use of the Wagga Wagga area is little understood, as few in-depth studies have been completed and no sites have been dated. However, it is possible to ascertain that proximity to raw materials and resources was a key factor in the location of Aboriginal sites. It is also reasonable to expect that Aboriginal people ventured away from more permanent habitation areas to utilise the broader landscape, especially considering that there are known resource areas to the north (Bomen Lagoon) and south (Bomen Lagoon and Murrumbidgee River) of the current Project Area. There appears to be a preference for elevated and well-drained landforms in association with water or resource areas as they would have been safer areas or easier to traverse when the Murrumbidgee River and plain flooded.

4. Landscape context

Understanding the landscape context of the Project Area may assist us to better understand the archaeological modelling of the area and assist in identifying local resources which may have been used by Aboriginal people in the past. This information can then potentially be used to predict the nature of Aboriginal occupation across the landscapes within the Project Area.

Factors that are typically used to inform the archaeological potential of landscapes include the presence or absence of resources that would have been used by Aboriginal people including water, animal and plant foods, stone, and other resources. The environmental context is equally important in terms of the taphonomic process, erosion or other factors that may influence the detectability of Aboriginal heritage sites.

The landscape context assessment for the Project Area is based on a number of classifications that have been made at national, regional and local levels to help us better understand the archaeological modelling of the area based on the geology, topography, hydrology, flora and fauna, and past land disturbances within and adjacent to the Project Area.

The landscape context of the Project Area is further based on a number of classifications that include the National Interim Biogeographic Regionalisation for Australia (IBRA) system, Mitchell landscapes, NSW soil landscapes, digital elevation models (DEM), and geological maps. The combination of these differing resolutions of landform data provides a comprehensive and multi scaled understanding of the landscape within the Project Area and its immediate surroundings.

4.1 Interim Biogeographic Regionalisation for Australia

The national IBRA system identifies the Project Area as being located in the South Western Slopes Bioregion (DPIE 2016). The South Western Slopes Bioregion is in the central and southern section of NSW and extends into Victoria. The NSW portion of the bioregion is bordered by the Riverina and Cobar Peneplain bioregions to the west, Darling Riverine Plains and Brigalow Belt South bioregions to the north, Sydney Basin to the northeast, and the South Eastern Highlands Bioregion running along much of the eastern boundary. The bioregion includes the towns of Albury in the south to Dunedoo in the northeast. Towns located in the bioregion include Wagga Wagga, Mudgee, Cootamundra, Narrandera, Parkes, Gundagai and Young. Griffith lies just outside the western boundary and Crookwell lies just outside the eastern boundary of the bioregion. Parts of the Murray, Murrumbidgee, Lachlan and Macquarie River catchments are also located within the bioregion.

The South Western Slopes area is characterised by a sub-humid climate, characterised by hot summers and no dry season. The mean maximum temperature is between 24.6 and 33.5°C while the mean minimum is between -0.5 and 3.2°C. The mean annual rainfall ranges from 360 mm to 1266 mm.

The South Western Slopes Bioregion is wholly located within the eastern part of the Lachlan Fold Belt which consists of a complex series of north to north-westerly trending folded bodies of Cambrian to Early Carboniferous sedimentary and volcanic rocks. Granites are common and mostly located in large scale upfolded bodies of rock. Granite landscapes occur either as central basins surrounded by steep hills formed on contact metamorphic rocks, or as high blocky plateau features with rock outcrops and tors. Hilly landscapes developed on the sedimentary and volcanic rocks are controlled by structural features (bedding and faults) and typically form lines of hills extended along the strike of more resistant rocks such as quartzite. The valleys between ranges are either in granite or generally softer rocks such as shale, phyllite or slate.

The South Western Slopes Bioregion contains two subregions: Upper Slopes and Lower Slopes. The Project Area is located solely within the Lower Slopes. A brief description of this Bioregion is provided in Table 4-1 below and is shown in Figure 4-1.

Table 4-1 Upper and Lower Slopes subregions of the South Western Slopes Bioregion (DPIE 2016).

Subregion	Geology	Landforms	Soils
Lower Slopes (South Western Slopes)	Same as the Upper Slopes but with larger areas of Tertiary and Quaternary alluvium.	Undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans	Similar to the Upper Slopes but with more extensive red-brown earths on undulating plains and more extensive grey clays on alluvium.

4.2 Mitchell Landscapes

Further landscape mapping as part of the Mitchell landscapes system (DECC 2002) notes that the Project Area is located entirely within the Junee Hills and Slopes landscape. This landscape is described in Table 4-2 below and is shown in Figure 4-2.

Table 4-2 Mitchell Soil Landscape Descriptions.

Soil Landscape	Description
Junee Hills and Slopes	Rolling hills, low ranges and undulating plain on Silurian-Devonian massive granite and granodiorite, general elevation 300 m to 450 m, local relief 60 m. Coarse siliceous sands amongst rock outcrop and tors, thin gritty red and yellow texture-contrast soils on slopes with harsh blocky subsoil. Woodland of Dwyer's red gum (<i>Eucalyptus dwyeri</i>) and red ironbark (<i>Eucalyptus sideroxylon</i>) on high rocky areas. On slopes open forest of; grey box (<i>Eucalyptus microcarpa</i>), red stringybark (<i>Eucalyptus macrorhyncha</i>) with patches of black cypress pine (<i>Callitris endlicheri</i>) in rocky outcrops. River red gum (<i>Eucalyptus camaldulensis</i>) and river oak (<i>Casuarina cunninghamiana</i>) along streams.

In general, the soil profiles within the Project Area are expected to be predominantly made up of shallow silty or sandy soils as A soil horizons with harder clays below. As a result, there are only relatively shallow layers that may contain potential for subsurface archaeological material. Although this will depend on other factors such as topography and hydrology.

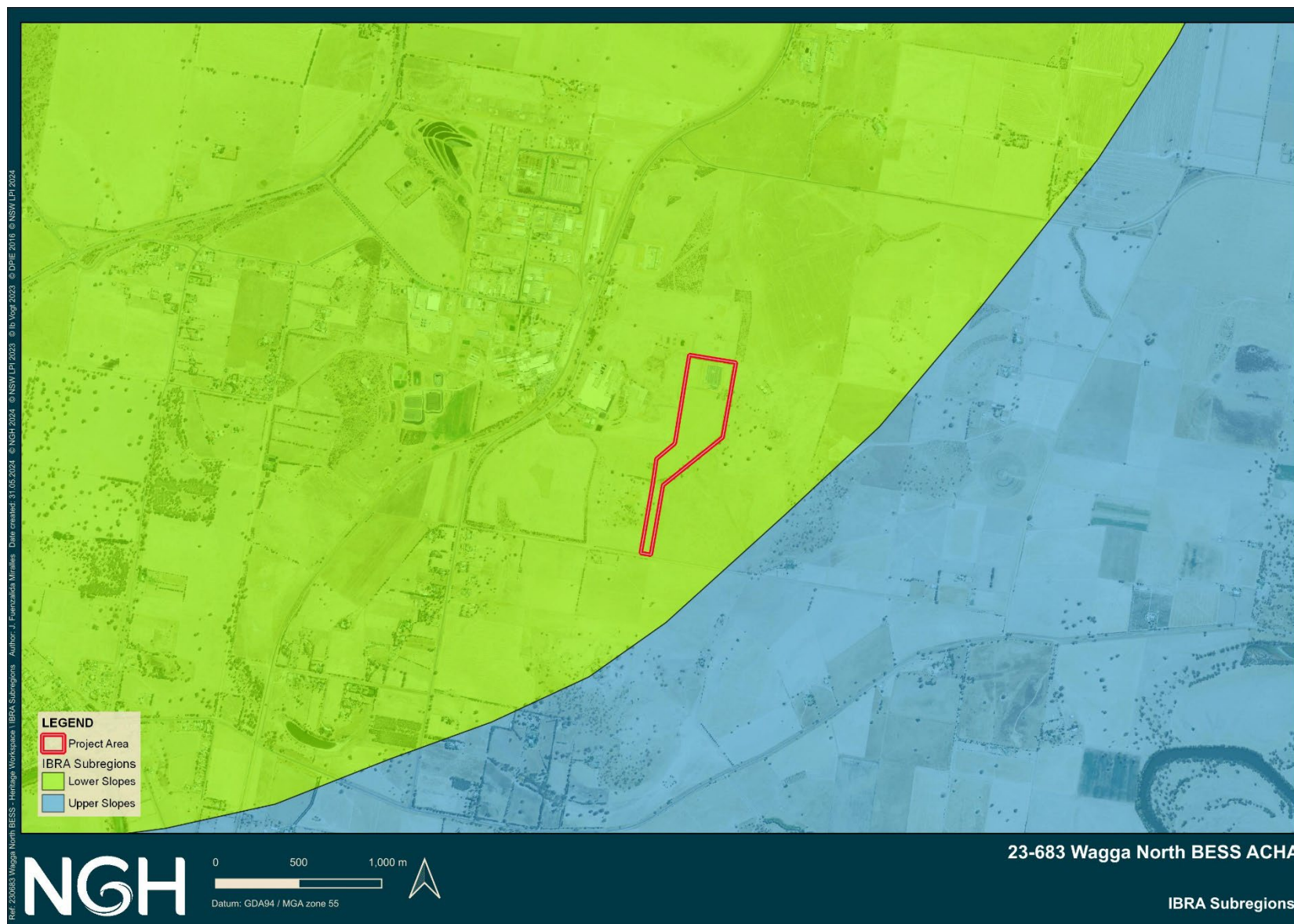


Figure 4-1 IBRA Subregions within the Project Area and surrounding region.

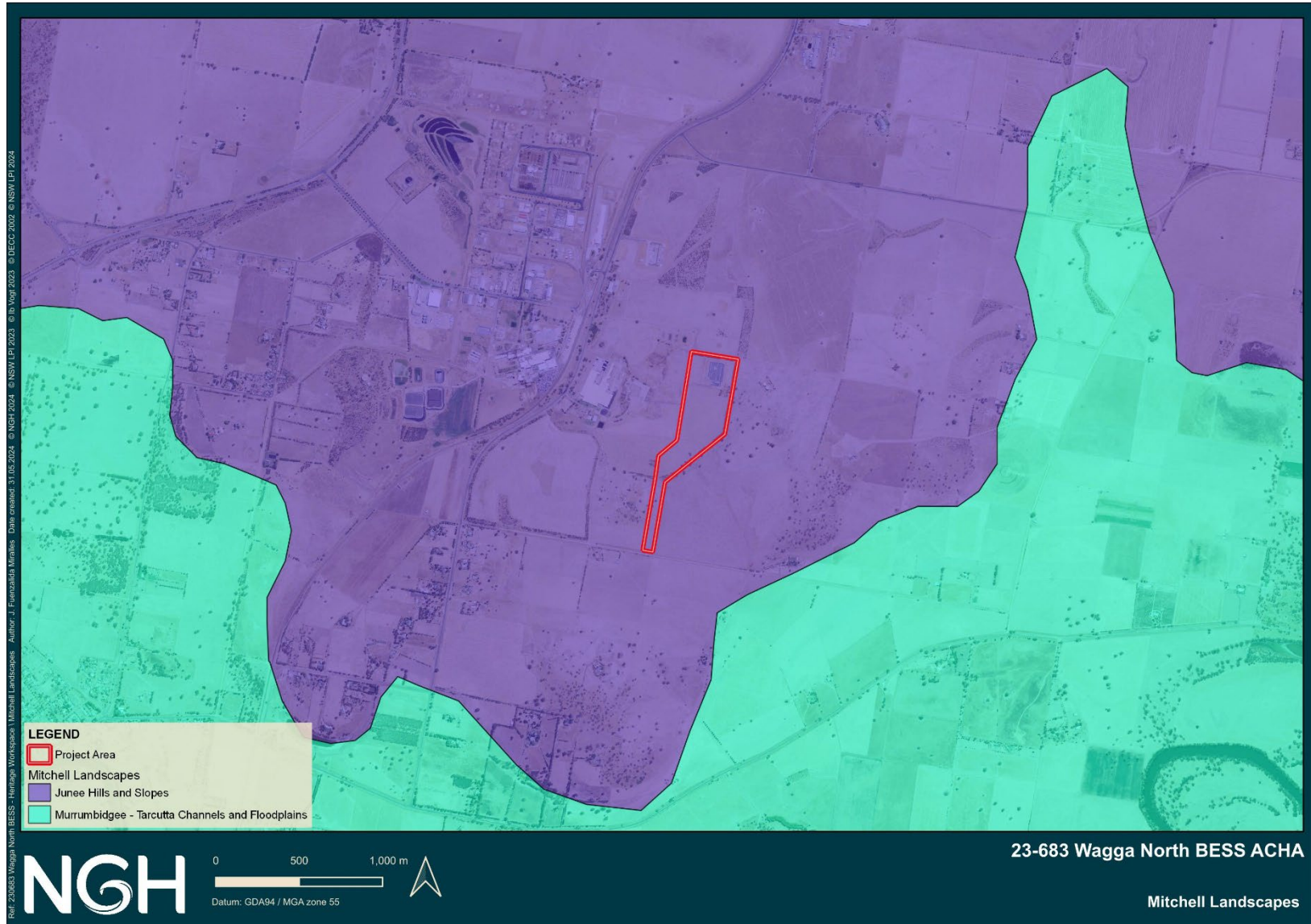


Figure 4-2 Mitchell Landscapes within the Project Area and surrounding region.

4.3 Geology

The Project Area is primarily comprised of two different geological formations – with a small portion of a third in the southern section – as mapped by Colquhoun et al. (2021). The dominant formation is the Colluvium of the Cenozoic Sedimentary Province with sections of the Wantabadgery Granite formation straddling the eastern and south eastern boundaries; a small section of Residual Deposits is located in the southern section of the Project Area. All three geological formations are described in Table 4-3 below and are shown in Figure 4-3. It should also be noted that dataset provided by Colquhoun et al. (2021) describes the presence of three metamorphic facies in the region, the Benambran, Tabberabberan, and Kanimblan-Tablelands formations. These metamorphic facies are primarily comprised of greenschist or sub-greenschist, which are metamorphic rocks that contain a variety of minerals, including quartz.

Table 4-3 Geological formations within the Project Area (Colquhoun et al. 2021).

Geological Formation	Description
Residual Deposits (Cenozoic Sedimentary Province)	Characterised by a weakly-consolidated regolithic residuum such as soil or saprolite mostly developed in-situ as a result of advanced weathering and/or pedogenesis.
Colluvium (Cenozoic Sedimentary Province)	Characterised by poorly sorted, weakly cemented to unconsolidated colluvial lenses of polymictic conglomerate with medium- to very coarse-grained sand matrix; interspersed with unconsolidated clayey and silty red-brown (aeolian) sand layers, modified by pedogenesis.
Wantabadgery Granite	Grey, medium-to-coarse-grained, biotite/muscovite/cordierite granite to granodiorite; equi to inequi-granular; rare feldspar megacrysts. Foliated margins. Microgranitoid and surmicaceous enclaves. Rare layered pegmatite and leucocratic granite dykes.

While the residual deposits and colluvium geological formations are not known for their rich deposits of raw material suitable for the production of stone tools, pebbles of quartz are known to appear in these formations. On the other hand, the description of the Wantabadgery Granite formation shows that it contains a suitable material for stone tool production, notably the variety of granitic rocks that are known to have been used for axe heads in the region. It should be noted that the Bomen Axe Quarry – a declared Aboriginal Place of high significance – is located within a pocket of the Wantabadgery Granite formation further north east (as shown in Figure 4-3 below). However, Go Green (2011, p.16) states that a sample of the rock from the quarry was analysed and identified as

“a hydrothermally altered alkali basalt, high in sodium (Na) and potassium (K). The rock is likely to be a hypabyssal basalt, which has formed a small dike or sill within the surrounding mid-Silurian age Wantabadgery Granite.”

As a result – and considering that the Wantabadgery Granite formation extends along the eastern and south eastern boundaries of the Project Area – there is some potential for the dike/sill of hypabyssal basalt to continue in these areas.

It is well known that stone resources were traded long distances and therefore material that is not locally present would have been imported from elsewhere. The variety in recorded lithic material culture within the previous archaeological studies in the region supports the suggestion that Aboriginal people had a variety of stone resources available to them; although the main local focus was on the basalt that was available in this small geographical area. As a result, due to the potential abundance of locally available stone resources and knowledge of lithic variety in previous archaeological studies, it is highly likely that stone artefacts will be identified within surface or subsurface deposits within the Project Area. However, it is considered unlikely that these artefacts will be identified in dense concentrations.

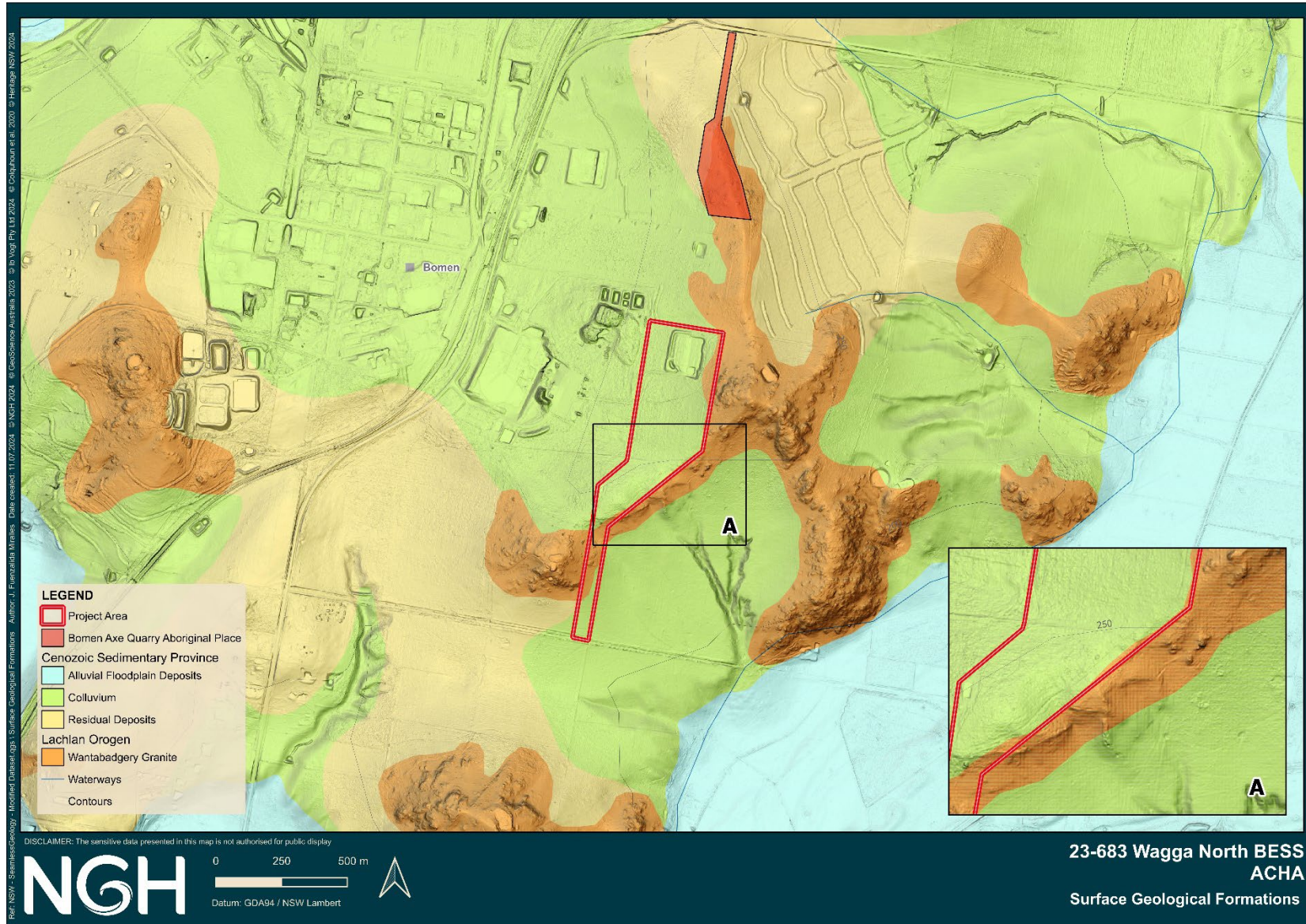


Figure 4-3 Surface geological formations present within the Project Area and surrounding region.

4.4 Topography

It is important to consider the topography of the Project Area as well as the wider region in order to understand how it facilitated the movement of Aboriginal people through the area and which areas were more likely to have been frequented. The Project Area is located in a landscape that has transitioned from the floodplain associated with the Murrumbidgee and its tributaries to the undulating hills that form a part of the Junee Hills and Foothills Mitchell landscape. The Project Area itself is mainly comprised of mid to upper slopes, with a single spur, several open depressions, and disturbed landforms. The area (in Ha) of each landform is shown in Table 4-4 below. A regional topographical view is provided in Figure 4-5 below while the local topographical view can be seen in Figure 4-6. The landforms identified during the desktop assessment are also displayed in Figure 5-1.

Table 4-4 Area of each landform within the Project Area.

Landform	Area (Ha)
Upper Slopes	7.27
Mid Slopes	6.71
Disturbed	3.33
Spur	2.79
Open Depression	1.55
TOTAL	21.65

4.5 Hydrology

In order to evaluate the hydrological resources available directly within – or in proximity to – the Project Area, the Strahler Stream ordering system must be used. This is a classification system that gives a waterway an order that is determined by the number of tributaries associated with the waterway (Strahler 1952). The Strahler Stream ordering system is illustrated in Figure 4-4 below.

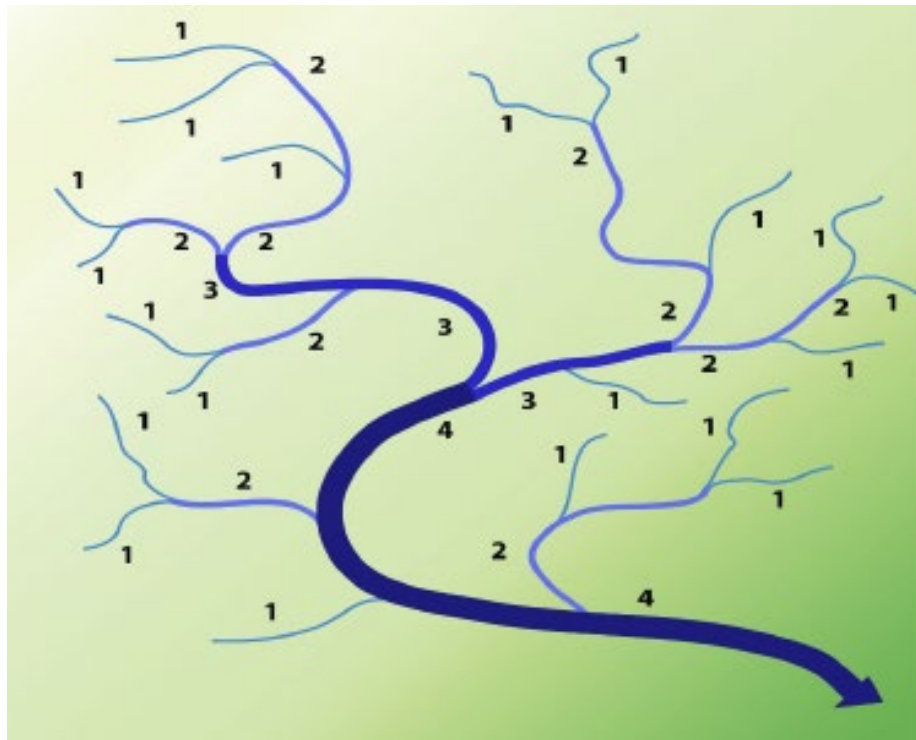


Figure 4-4 The Strahler Stream ordering system illustrated (DPIE 2020, p.79).

No waterways or waterbodies are located within the Project Area. The closest mapped waterway is an unnamed ephemeral stream (1st order) approximately 230 m south east of the Project Area. The closest named waterways are Dukes Creek (approximately 2 km north west; 3rd order), the Murrumbidgee River (approximately 2 km south east; 9th order), and Wheel of Fortune Creek (approximately 3 km south east by east; 5th order). It should also be noted that the Bomen Lagoon Aboriginal Place is located approximately 2.1 km south west of the Project Area. While these major regional waterways are some distance from the Project Area, the topography transitions to a floodplain less than 600 m south east of the Project Area, suggesting that these waterways – especially the Murrumbidgee River to the south east – were easily accessible.

Previous archaeological studies show the importance of these water resources would have provided valuable food resources in the form of fish and yabbies to Aboriginal communities as well as bark the native trees that would have been abundant along the banks of the waterways and lagoons. The plentiful water would have also attracted native fauna such as Kangaroos and Possums which in turn are likely to have been hunted for their resources. As no waterways are located within the Project Area – and because the higher order waterways are at least 2 km away – it is highly unlikely that certain Aboriginal sites (i.e., midden, hearths) are unlikely to be identified within the Project Area as the focus for these activities is more likely to have taken place within proximity to these water sources.

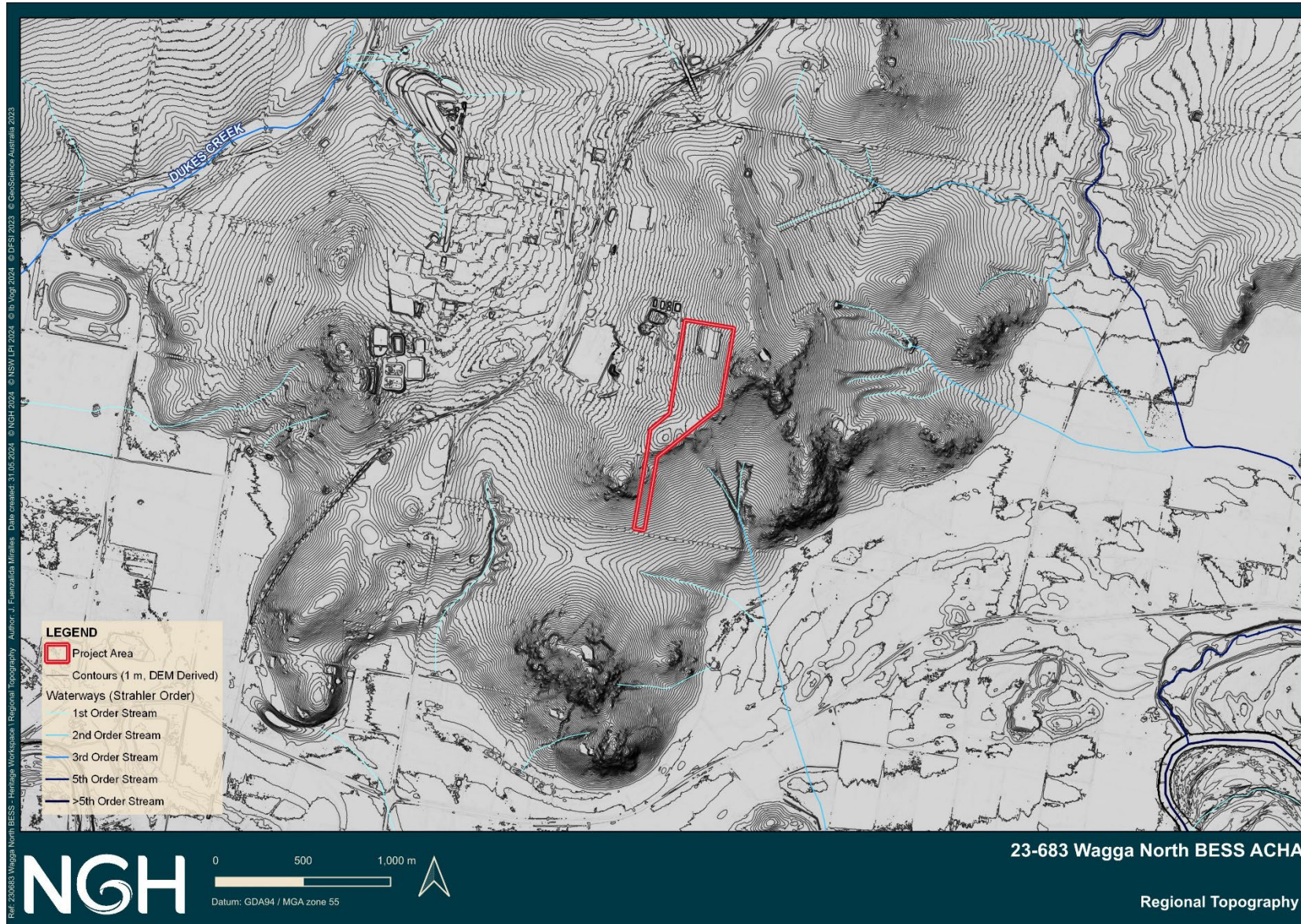


Figure 4-5 Regional topography surrounding the Project Area.

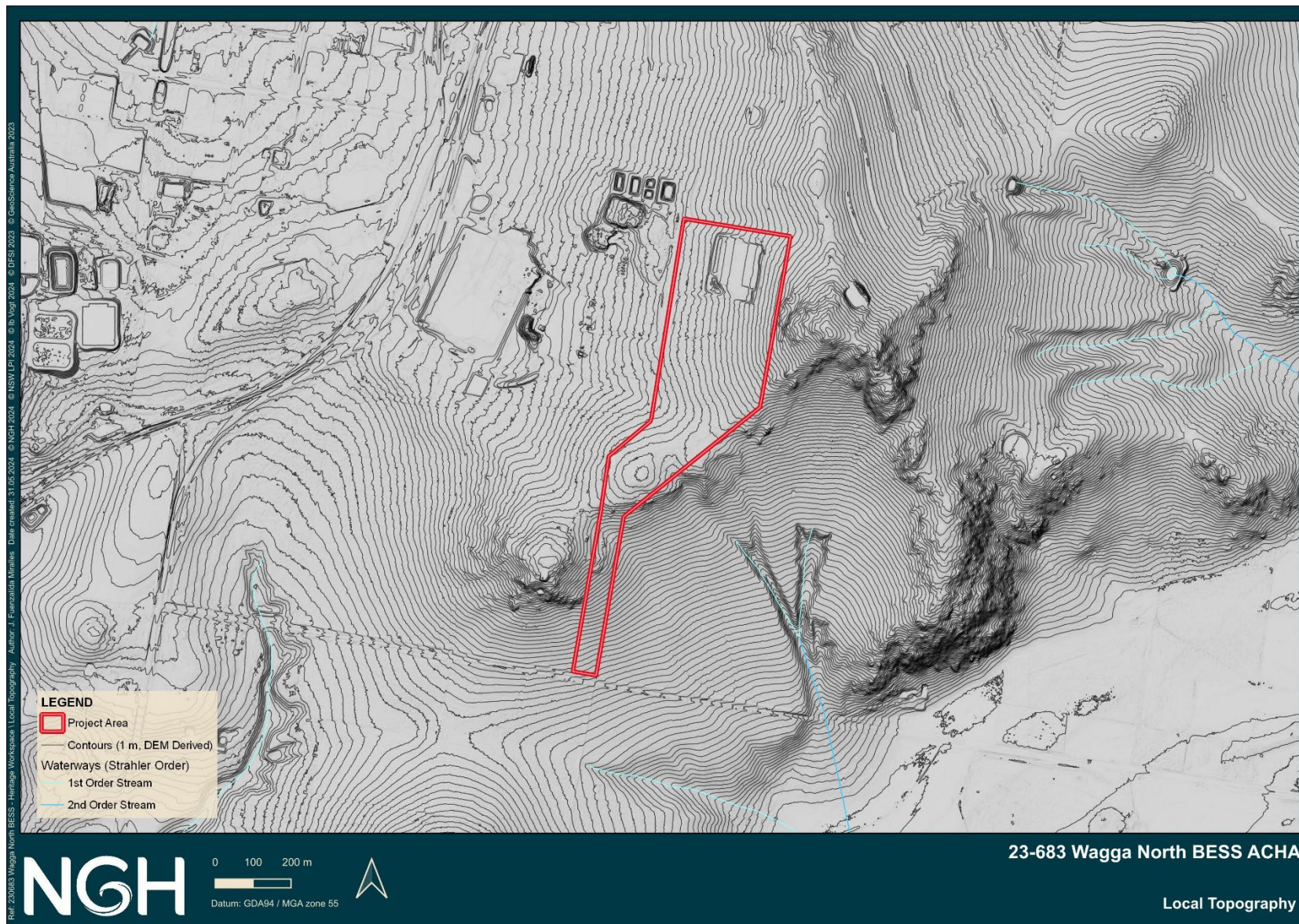


Figure 4-6 Topography of the Project Area and adjacent landscape.

4.6 Soil Landscapes

The Project Area is located across two different soil landscapes – the East Bomen and Glenmornon landscapes – as mapped by Chen and McKane (1996, pp.44–48; 131–136). Both of these landscapes are described in Table 4-5 below while a stratigraphic view of the horizons within the two landscapes can be seen from Figure 4-7 to Figure 4-8 below. The topographical distribution of the landscapes can also be seen in Figure 4-9.

Table 4-5 Description of the soil landscapes present within the Project Area and their dominant soil materials and qualities (adapted from Chen & McKane 1996, pp.44–38; 131–136).

Soil Profile	Description
East Bomen	Eb1 – Dull loam (topsoil – A1 horizon): Dark to dull, sandy loam to clay loam. Field pH 5.0 to 5.5 (moderately to slightly acidic). Eb2 – Reddish light clay (subsoil – B1 horizon): Reddish brown light clay. Field pH 6.0 to 6.5 (slightly acidic). Eb3 – Reddish brown light clay (subsoil – B horizon): Bright reddish brown to reddish brown light clay to light medium clay. Field pH 6.0 to 7.5 (slightly acidic to neutral). Eb4 – Yellowish light medium clay (subsoil – B22 horizon): Dull yellow orange to yellowish brown light medium clay. Field pH 6.0 to 7.0 (slightly acidic to neutral). Eb5 – Bright sandy light clay (subsoil – BC horizon): Orange to bright yellowish brown coarse sandy light clay to light clay. Field pH 6.0 to 8.0 (slightly acidic to neutral to slightly alkaline).
Glenmornon	GI1 – Dark sandy clay loam (topsoil – A1 horizon): Dark brown to dark reddish brown coarse sandy clay loam to coarse sandy loam. Field pH 5.5 to 6.0 (slightly acidic). GI2 – Brown sandy clay loam (topsoil – A2 horizon): Reddish brown to dull brown coarse sandy clay loam to coarse sandy loam. Field pH 5.0 to 5.5 (moderately to slightly acidic). GI3 – Reddish brown clay (subsoil – B horizon): Dark reddish brown light medium clay. Field pH 5.0 to 6.5 (moderately to slightly acidic). GI4 – Reddish brown clay loam (subsoil – B horizon): Reddish brown clay loam. Field pH 5.5 to 6.5 (slightly acidic). GI5 – Yellowish sandy clay (subsoil – BC horizon): Yellowish brown to bright brown light sandy clay to medium sandy clay. Field pH 5.5 to 6.5 (slightly acidic).

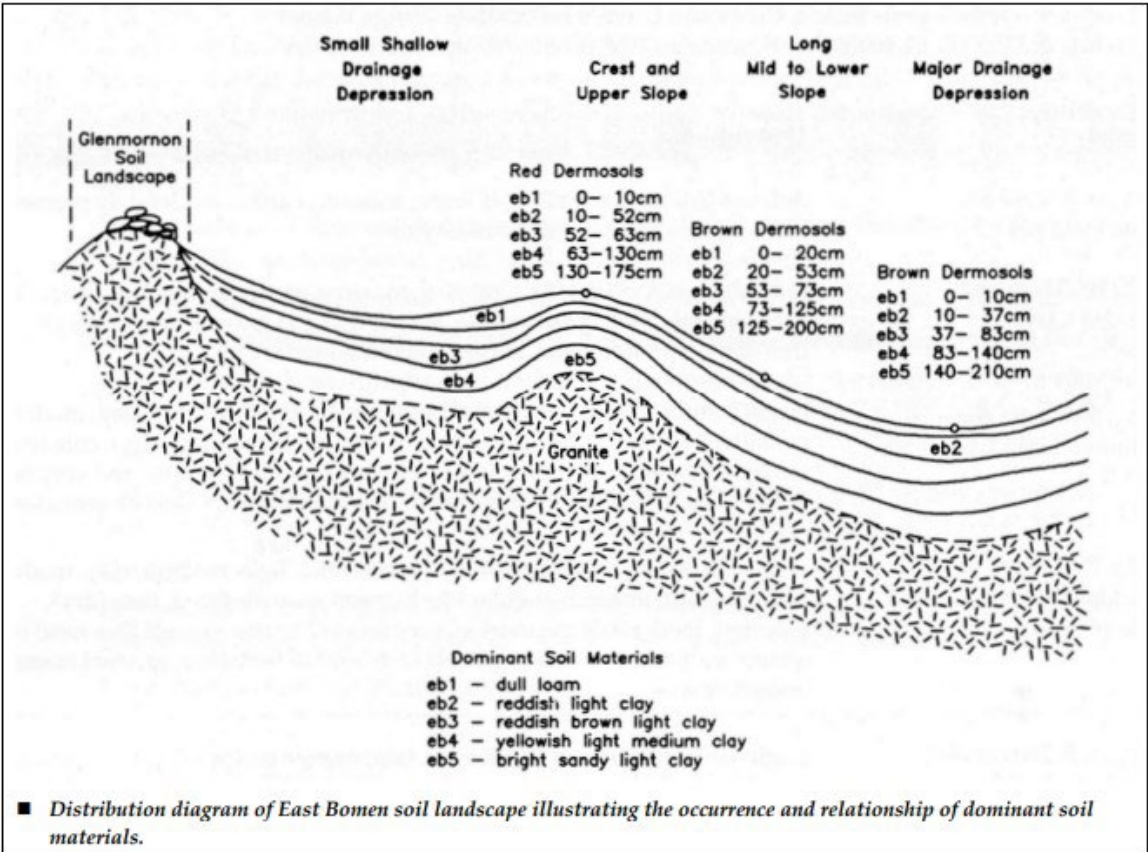


Figure 4-7 Stratigraphic view of the soil horizons present within the East Bomen soil landscape (Chen & McKane 1996, p.136).

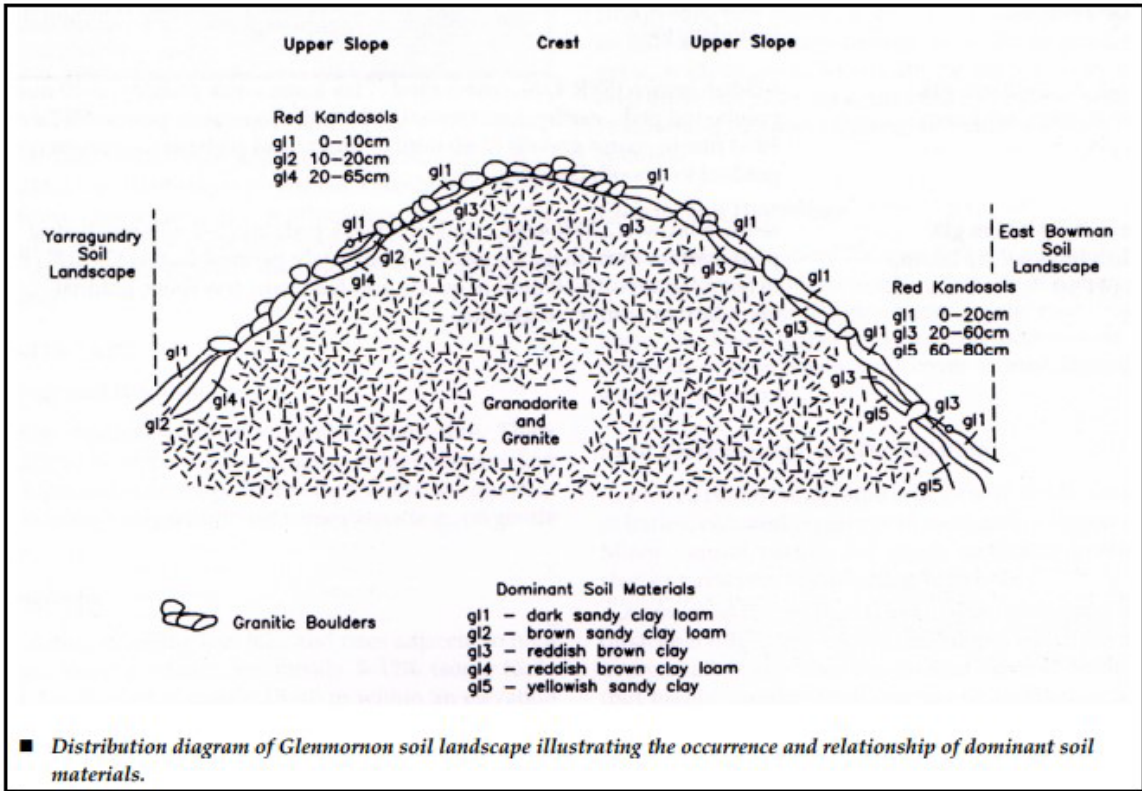


Figure 4-8 Stratigraphic view of the soil horizons present within the Glenmornon soil landscape (Chen & McKane 1996, p.48).

The description of the two soil landscapes suggest that the Project Area is characterised by a variety of soil profiles with a clay base (i.e., either sandy or loamy clays). Both of these landscapes are comprised of loams, clay loam, light clays, sandy clays, or normal clays with the field pH ranging from 5.0 to 8.0 (moderately acidic to slightly alkaline). Therefore, it can be expected that any PADs are likely to be shallow due to their clayey soils. It should also be noted that previous archaeological excavations on PADs in the area suggest that the subsurface artefact bearing deposits are generally confined to the top 30 cm of soil deposit. The variable pH level across the soil landscapes further suggests that any PADs will not be comprised of organic material due to the relatively acidic nature of the soils. Therefore, should any PADs be identified within the Project Area it is expected that they will consist of stone artefacts, which preserve well in acidic soils, and will be confined to the upper soil horizons.

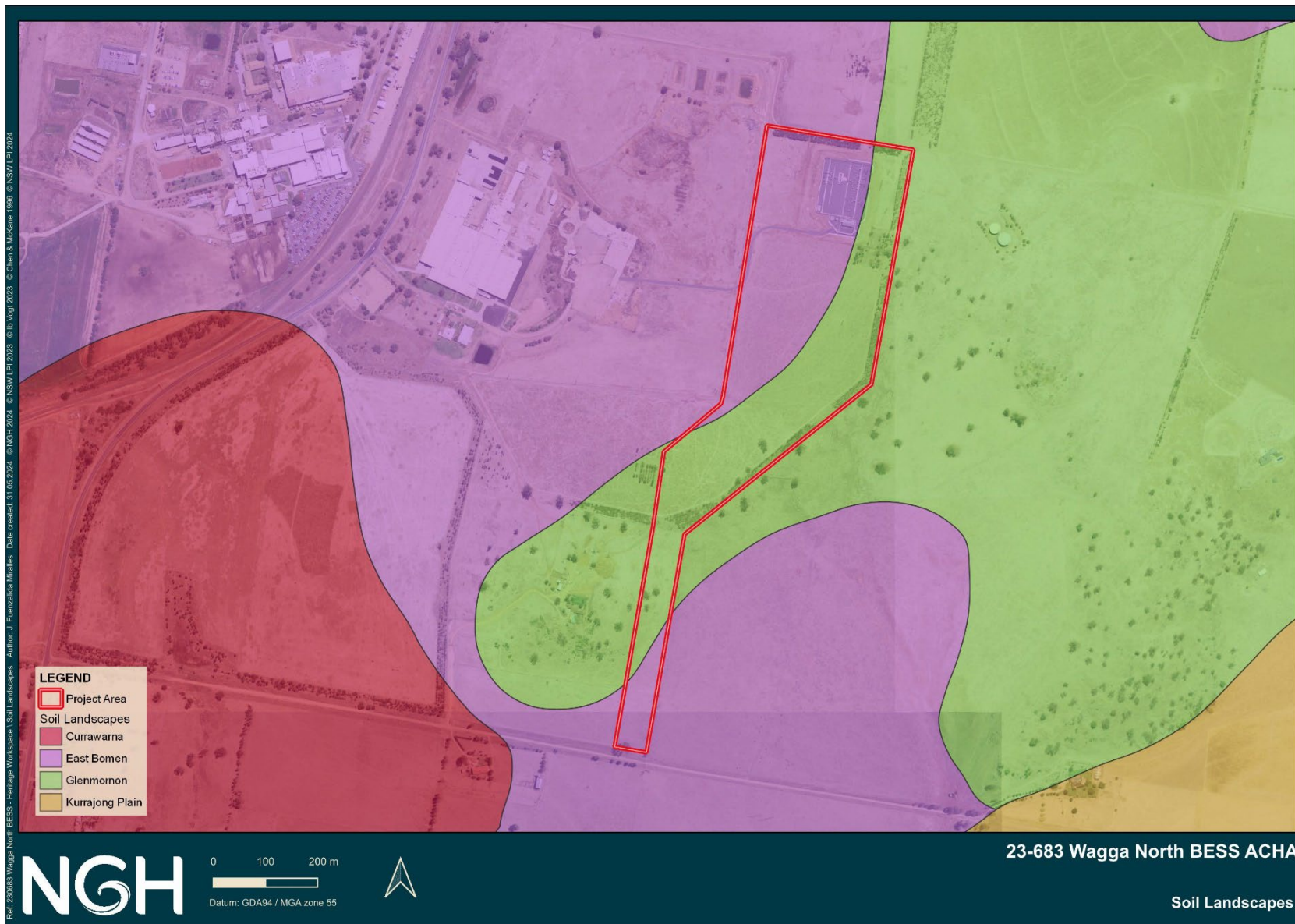


Figure 4-9 Soil landscapes within the Project Area and surrounding region.

4.7 Vegetation

The Project Area is largely cleared of all native vegetation except for a handful of pockets of the Western Slopes Grassy Woodlands and Upper Riverina Dry Sclerophyll Forests (as described by Keith 2004, p.96). While the Project Area is currently cleared it is likely that these two would have characterised the overwhelming majority of the vegetation within the Project Area prior to European land clearances in the area. Therefore, it is possible to suggest what type of resources would have been available to Aboriginal people in the past. A description of both vegetation classes' provided by Keith (2004) are shown in Table 4-6 below.

Table 4-6 Vegetation classes currently present within or directly adjacent to the Project Area (Keith 2004).

Vegetation Class	Description
Western Slopes Grassy Woodlands	Once ubiquitous on fertile soils throughout the western slopes of the Great Dividing Range. The tree canopy is typically up to 20 m tall with well-spaced crowns. Tussock grasses dominate the understorey and are interspersed with a variety of herbs and a sparse layer of emergent shrubs. While it was originally the most extensive class of grassy woodlands in the state, it is now largely reduced to small fragments degraded by overgrazing and weed invasion.
Upper Riverina Dry Sclerophyll Forests	The western fall of the southern tablelands and the parts of the Snowy River gorge support a suite of dry eucalypt forests that grow up to 20 m tall and have an open sclerophyllous shrub stratum and a patchy ground cover of grasses. These forests grow in areas with soils of moderate fertility derived from granites and metamorphosed siltstones, on terrain that ranges from steep to flat, between 300 m and 800 m elevation. Their main area of distribution is between Burrinjuck and Albury, though they extend a short distance into Victoria. They also occur in the Snowy River gorge in a rain shadow on the eastern side of the Main Range.

These species would have provided a wide variety of resources for the manufacturing of wooden implements, medicine and food, as well as habitats for animals that were also used for food and materials. If any mature native trees remain, there is a possibility that modified trees may be present as they were used for the extraction of bark for use as canoes, shields, and containers by Aboriginal people. The presence of other modified trees (carved or scarred) in the area suggests that there is potential for unrecorded modified trees to be present.

4.8 Land Use and Historical Disturbances

The lands surrounding the Project Area are currently used for roads, manufacturing and industrial, grazing and modified pastures, cropping, utilities (electricity substation and transmission), and managed resource protection (Biodiversity). Prior to these land uses, it is highly likely that the area was used for agricultural practices since the initial European settlement of the Wagga Wagga region. Historically imagery from 1966 shows that the Project Area had been almost entirely cleared of native vegetation, with very few trees remaining; otherwise, the land use appears consistent with grazing or cropping land practices. Imagery from 1971 shows that no discernible changes in land use took place in the intervening five years. This trend would continue until 1980, when some development began to take place within or adjacent to the western sections of the Project Area. By 1990, significant development had taken place within the western section of the Project Area. These developments are expected to have wholly destroyed any potential Aboriginal objects in these areas due to the destructive nature of the works (i.e., landscaping, road/yard sealing). However, the majority of the Project Area continued to be used for grazing or cropping land practices, with the only major alterations coming from the various 'farm tracks' that were used. Since 1990, more development has occurred within the Project Area, the substation that exists within the northeastern section was constructed around 2006 (according to Google Earth historical imagery).

Through analysis of DEM data, it is clear that the area surrounding the substation was modified extensively during its construction and is likely to have destroyed any Aboriginal objects present within the substation area. More recently, current satellite imagery shows that a concrete rectangular pad has been installed in the central section of the Project Area. It is unknown whether any further construction has taken place near this area, but the establishment of the concrete pad is again expected to have caused significant disturbance to any Aboriginal objects potentially present in that area.

Overall, the historical imagery shows that the land use of the Project Area has been varied over the last 60 years, with an increasing emphasis on more intensive developments. This land use has resulted in the large-scale clearance of vegetation within the Project Area, leaving few patches of native mature vegetation and potentially removing modified trees. The prolonged use of the area is also likely to have caused superficial surface disturbances from stock movement/low-intensity agriculture. This has a dual effect in that it may impact the integrity of shallow PADs or the upper layers of soil deposits as well as remove subsurface in situ artefacts, bringing them into a disturbed surface context. Where more intensive development has taken place, these areas are expected to be in a very disturbed context and therefore hold very little scientific value, if Aboriginal objects remain. However, it should be noted that stone artefacts are known to survive these kinds of disturbances – both from superficial cropping/pastoralism and from more intensive developments – and still hold significant cultural value to the local Aboriginal community. Furthermore, PADs can still be present in areas where superficial surface disturbances have taken place, albeit in various stages of disturbance.

Although there has been variable land use since Europeans arrived, there is also traditional Aboriginal land use of the region over thousands of years. This may have included such things as managing fire and conducting deliberate burns, and the potential for farming type activities or manipulation of plant and environments to provide food, although these activities have not been identified in the archaeological record of the Project Area.

5. Summary of contextual information

Most archaeological surveys are conducted in situations where there is topographic variation, and this can lead to differences in the assessment of archaeological potential and site modelling for the location of Aboriginal objects. The Project Area is located within an undulating hills landscape that overlooks the floodplains associated with the Murrumbidgee River to the south and west. The Project Area is primarily located across the mid and upper slopes of a hill crest/ridgeline to the east. The spur landform within the Project Area is also connected to the same ridgeline. The local elevation ranges from approximately 216 m ASL to 270 m ASL.

Analysis of historic aerial imagery for the Project Area shows that it has been almost entirely cleared of native vegetation since the late 1960s. Since then, the Project Area has been subject to increasingly intensive land use and development. It is likely that the Project Area was partially ploughed for agriculture for an unknown period of time. While the historical land use shown in the imagery suggests a reduced overall potential for Aboriginal objects, there is a potential that this disturbance is superficial and limited to the surface or top 30 cm to 40 cm of soil. These activities may have unintentionally brought Aboriginal objects to the surface—especially stone artefacts—where they remain in a disturbed context. Furthermore, as the Project Area is partially located along the same spur/ridgeline as the Bomen Axe Quarry Aboriginal Place to the north, there is some potential for the same hypabyssal basalt to be identified.

The landforms within the Project Area have been determined based on topographic identification through the inspection of contour data and DEM data. Three landforms were identified within the Project Area, which are shown in Figure 5-1 and listed below:

- Upper Slopes
- Mid Slopes
- Spur
- Open Depression
- Disturbed.



Figure 5-1 Landforms within the Project Area

6. Predictive model

A brief description of the potential for Aboriginal sites within the Project Area is shown in Table 6-1 below.

No AHIMS registered sites are located within the Project Area, however a total of nine AHIMS sites and one Aboriginal Place have been recorded within 1 km of the Project Area. While no registered sites have been recorded in close proximity to the Project Area this does not necessarily reflect a lack of potential for Aboriginal cultural material to be present; the presence of the Bomen Axe Quarry in the broader area reflects this potential. It is likely that a lack of systematic archaeological survey of the Bomen area and poor ground surface visibility that is often encountered during archaeological assessments has created this outcome and not the lack of potential for Aboriginal cultural material to be present.

The previous archaeological assessments in the region strongly suggest that the Bomen region is characterised by a collection of low-density Aboriginal sites across the landscape. While it is considered more likely for these sites to be present on certain landforms (i.e., spurs, hill crests, elevated flat landforms adjacent to waterways), they have been recorded across the entire landscape. The registered AHIMS sites and previous archaeological investigations in the Bomen region suggest the most likely site type would be artefact scatters, isolated finds, or culturally modified trees (where old growth trees remain). It is also likely that potential archaeological deposit (PAD) will be identified within the Project Area.

Based upon the data and assessments above, it appears that there is moderate to high potential for sites of Aboriginal cultural heritage to occur within the Project Area given the presence of the archaeologically sensitive spur landform. There is minimal potential for scarred trees to be identified due to previous extensive tree clearance across the reserve; however, any isolated remnant old growth native trees present have the potential to contain evidence of Aboriginal cultural modification. Furthermore, it is well known that stone resources were traded long distances and therefore material that is not locally present would have been imported from elsewhere. The variety in recorded lithic material during previous archaeological studies in the region supports the suggestion that Aboriginal people had a variety of stone resources available to them; although the main local focus was on the localised basalt. As a result, due to the potential abundance of locally available stone resources and knowledge of lithic variety in previous archaeological studies, it is likely that stone artefacts will be identified within surface or subsurface deposits within the Project Area. However, it is likely that these artefacts will be identified in low-density or isolated contexts.

Table 6-1 Aboriginal site prediction statements.

Site Type	Site Description	Potential
Stone artefact scatters and isolated artefacts	Artefact sites can range from high-density scatter concentrations through to isolated finds.	Moderate potential to occur in low densities within the Project Area.
Modified trees	Trees that have undergone cultural modification.	Low potential to occur within the Project Area due to extensive vegetation clearance. However, there is always potential where remnant mature native trees are present.
PAD	Potential archaeological deposit containing high density in situ cultural material.	High potential to occur within the spur landform. Low potential to occur across other landforms.

7. Investigation strategy and methodology

7.1 Fieldwork aims

The objectives of the fieldwork were to:

- Comply with current NSW legislation and heritage guidelines;
- Undertake survey and subsequent subsurface testing (if determined to be required) to identify any archaeological material; and;
- To record all Aboriginal cultural heritage objects and places within the Project Area.

Broadly, the aims of the fieldwork were to:

- Identify the presence or absence of Aboriginal cultural material within the Project Area;
- Assess the likely extent and nature of any such cultural material, and.
- Undertake a basic analysis of any cultural material recovered or identified.

Methods used for the fieldwork were in line with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* and employed as relevant to the Project Area, aims of the assessment, project requirements and in accordance with the methodology proposed for the archaeological assessment of the Project.

7.2 Survey strategy

The survey strategy was to cover as much of the Project Area as possible on foot. Consequently, the survey strategy was devised to walk a series of transects across the Project Area in a systematic way to achieve maximum coverage and visually inspect the landform, as well as focusing on any areas of higher ground surface visibility and the locations of the previously recorded site within the Project Area, and those sites located directly adjacent to the southern boundary of the Project Area. The survey aimed to provide enough surface coverage to be confident of assessing the Project Area for the presence of Aboriginal objects.

The survey fieldwork, as assessed in this report, was undertaken by the team on foot via pedestrian survey over a single day on the 7th May 2024. The survey team consisted of NGH Heritage Consultants Brendan Fisher and Peta Rice, with two Aboriginal community representatives. The Aboriginal community representatives who participated in the survey were Jordan and Benjamin Ingram representing Bidya Marra Consultants. During the survey, notes were made about visibility, photographs were taken, and any possible Aboriginal objects or features were inspected and assessed. Where possible, the survey team walked transects walking in parallel line spread apart at 25 m to 30 m. At the end of each transect within the Project Area, the team would reposition along a new transect line at the same spacing and walk back on the same compass bearing. The nature of the Project Area made this an ideal survey strategy allowing for maximum survey coverage and an opportunity to identify any heritage objects.

Any mature, native trees within and/or directly adjacent to the Project Area were also inspected for any evidence of Aboriginal scarring or carving (c.f. Long 2005). The possible continuation of the prominent ridgeline east of the Project Area was also inspected, however, the Project Area predominantly consisted of medium slopes between two major spur crests as seen clearly in Figure 5-1

NGH believes that the survey strategy was comprehensive and the most effective way to identify the presence of Aboriginal heritage objects within the Project Area. Discussions were held in the field during and after the survey between the archaeologists and Aboriginal community representatives to ensure that all were satisfied and agreed with the methodology implemented during the survey of the Project Area.

NGH archaeologists were equipped with a Samsung Tablet using a non-differential GPS loaded onto a QField program with spatial data of the Project Area—including the location of AHIMS registered sites as well as

high resolution aerial and topographic maps. All GPS recordings were made using the GDA 94 Zone 55 coordinate system.

7.3 Subsurface test excavation methodology

Whilst undertaking the background research and assessing the site modelling for the Project Area, it was apparent that there were landforms present that may be considered as having some potential for stone artefacts to be present. It was also noted that that visibility was likely to be poor and identification of surface archaeological material, in the form of stone artefacts, was likely to be difficult. It was proposed therefore that subsurface testing was a mechanism to be used in the event the surface survey confirmed the above considerations.

The purpose of the subsurface test excavation programme within the Project Area was to provide further insight into the potential absence or presence (including extent) of subsurface cultural material within the Project Area that may be impacted by the proposed works. All subsurface excavation of areas considered to have potential for *in situ* subsurface deposits within the Project Area was to be undertaken following the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*. As such, the basic parameters of the investigation were limited to the methodology outlined in the Code. The following provides details of the methodology used in the strategy for the subsurface test excavation programme within the Project Area.

Test pits were to be numbered in sequential order as they were excavated. The location of the test pits was recorded in the field using a GPS enabled Samsung Tablet, running QField. The location and spacing of the pits excavated was discussed onsite with the Aboriginals community representatives present. Excavation was performed in line with the requirements of the Code and employed as relevant to the archaeological test excavation programme of works for the Project. The subsurface test excavation programme was sufficiently comprehensive to allow the characterisation of any Aboriginal sites present without having a significant impact on the archaeological value of the area.

The subsurface testing involved the following elements:

- Hand excavation using shovels, trowels, and other hand tools.
- Test excavation pits were 50 cm x 50 cm in area. These test excavation pits/units may be combined and excavated as necessary to understand the subsurface potential and distribution of recovered archaeology. Note that under the Code, the maximum continuous surface area of a combined test excavation will be no greater than 3 m².
- The maximum surface area of all test excavation units will be no greater than 0.5% of the total area of the identified PAD or area being investigated.
- Removal of deposit in 5 cm levels or 'spits' from one test pit at each PAD or landform with subsequent test pits at 10 cm unless features are found requiring a different excavation strategy.
- Placement of excavated deposit in buckets for each separate spit and test square.
- All excavated material from each spit will be sieved through 5 mm mesh.
- Removal of any possible cultural material from sieves which will be bagged and labelled for later recording and analysis in the lab.
- Excavation continued to the base of the identified archaeological deposit and below, if possible, to confirm that the underlying deposit is /are culturally sterile, or further hand excavation is unable to occur due to pit depth.
- The test excavation ceased when enough information was recovered to adequately characterise any archaeological deposits or Aboriginal objects present at each site with regard to their nature and significance.
- Photography of excavated sections and the excavation work in progress were taken.

- Descriptions of soil and any other features to be noted on standardised recording sheets.
- At completion of excavation, backfill test pits with the excavated deposit.

The recording and analysis of any artefacts recovered from the test excavations was to be undertaken at the NGH office in Canberra. A range of variables and technological attributes were to be recorded, if applicable, including the following:

- Provenance (pit number, spit number);
- Raw material;
- Technological category;
- Dimensions;
- Platform details;
- Cortex (type and %);
- Scar count and location;
- Usewear/retouch type and location; and
- General comments.

The aim of the test excavation was to examine the extent, if any, of the subsurface potential of the Project Area. NGH undertook the testing with the following steps subject to discussion in the field with the RAP representatives. Establish an appropriate baseline transect and layout test pits at 20 m to 30 m intervals across the two areas of development footprint. It was proposed that if determined to be warranted a range of 10 to 15 test pits would be sufficient to test the sensitivity of the Project Area—however some flexibility to the number of test pits and the placement of test pits would be required.

The subsurface testing was undertaken by the team over three days between the 7th to 9th May 2024. The excavation team consisted of NGH Heritage Consultants Brendan Fisher and Peta Rice, with two Aboriginal community representatives. The Aboriginal community representatives who participated in the subsurface test excavations were Jordan and Benjamin Ingram representing Bidya Marra Consultants.

8. Archaeological results

8.1 Survey coverage

The Project Area is primarily comprised of cleared land that has historically been utilised for crop agriculture—at present it is used for pastoral grazing practices. The north eastern corner of the Project Area is currently used as a substation and was not accessible during the survey. The central portion of the Project Area is predominantly a medium slope that has been subject to slope wash erosion and agricultural practices. An ecological corridor is also present along the majority of the eastern boundary of the Project Area.

Survey transects were undertaken by foot and traversed the entire Project Area.

The survey was impeded by poor overall ground surface visibility due to the dense grass cover present across the Project Area. Despite this, some exposures were still present in all landforms across the Project Area—namely in areas associated with internal tracks, fence line, and slope wash erosion. The effective ground surface visibility ranged from upwards of 40% within the few exposures to less than 1%; overall the average ground surface visibility across the Project Area was considered to be 5%. Between the survey participants approximately 14.2 km of transects were walked across the Project Area by the survey team during the field survey for this ACHA. Allowing for an effective view width for each of the four survey participants and given the variability in ground surface visibility across the Project Area, the overall survey effectively examined 0.56% of the Project Area.

It is considered by NGH that the survey of the Project Area during this investigation had sufficient survey coverage. Table 8-1 below shows the calculations of effective survey coverage for the survey; Plate 8-1 to Plate 8-8 show examples of the transect landforms and visibility across the Project Area.



Plate 8-1 View to the north in the southern portion of the Project Area showing the upper slopes landform that dominated the Project Area.



Plate 8-2 View to the south in the southern portion of the Project Area showing evidence of slope wash erosion along the proposed access track for the BESS site.



Plate 8-3 View to the west in the southern portion of the Project Area showing an isolated zone of outcropping granite.



Plate 8-4 View to the north west in the southern portion of the study area showing multiple stockpiles of imported material from the landholder.



Plate 8-5 View to the west in the central portion of the Project Area showing the mid slopes from the upper slopes



Plate 8-6 View to the north east in the northern portion of the Project Area showing the existing substation.



Plate 8-7 View of the poor GSV within the central portion of the Project Area on the medium slope at the proposed BESS site location.



Plate 8-8 View to the south in the central portion of the Project Area showing the medium slope at the proposed BESS site location.

Table 8-1 Table of effective survey coverage for the Wagga Wagga North BESS Project Area

Landform	Number of Survey Transects	Exposure type	Survey Unit Area ha	Surveyed area (length m x width m)	Surveyed Area m ²	Visibility (average %)	Effective coverage (area x visibility) m ²	Survey unit surveyed (ha)	Percentage of survey unit effectively surveyed	Survey result
Spur	3	Farm tracks and areas of erosion	2.79	665 x 20	13,300	5	665	0.06	2.15	None
Mid slopes	7	Farm tracks and areas of erosion	6.71	945 x 20	18,900	1	189	0.02	0.3	None
Upper slopes	6	Farm tracks and areas of erosion	7.27	1,313 x 20	26,260	1	262.6	0.03	0.41	None
Open Depression	5	Farm tracks and areas of erosion	1.55	200 x 20	4,000	1	40	0.004	0.26	None
Disturbed	3	Disturbed areas	3.33	80 x 20	1,600	5	80	0.008	0.24	None
Total	24	N/A	21.65	3203 x 20	64,060	N/A	1236.6	0.122	0.56	None

8.2 Survey results

No new Aboriginal objects were identified during the survey and therefore no new AHIMS sites were registered. No previously recorded AHIMS sites were located within the Project Area. While some native vegetation was present within the Project Area—especially in the ecological corridor on the eastern boundary—none of the trees present contained any signs of Aboriginal modification consistent with archaeological identification techniques (see Long 2005). It should be noted that the visual observations during the survey confirmed that the desktop landform identification was accurate. Therefore, no updates were made to the boundaries of landforms within the Project Area.

8.2.1 Consideration for subsurface archaeological potential

There was a general lack of visibility during the field survey, which necessitated the use of landscape analysis and archaeological landscape modelling to accurately assess the subsurface archaeological potential of the Project Area.

As part of this assessment the following factors have been considered to inform the predictive modelling developed to assess the likelihood of *in situ* subsurface Aboriginal objects within the Project Area:

- An assessment of contour and DEM data;
- Consideration of the potential relationship between the Project Area and the Bomen Axe Quarry Aboriginal Place (approximately 400 m north);
- Land use history and degree of disturbance
- Archaeological modelling and an assessment of the landforms present
- Results (including site condition notes) of the visual inspection of the Project Area by NGH; and
- Comments from the RAPs who participated in the survey.

A desktop archaeological predictive model had already been prepared for the purposes of the methodology that was sent out to the RAPs. This document explained that NGH only predicted the spur landform to contain high archaeological sensitivity, but that there was potential for stone artefacts to occur within the Project Area. While NGH had always intended to perform a limited null hypothesis test excavation programme—due to the proximity of the Bomen Axe Quarry Aboriginal Place—flexibility was designed into the assessment methodology to allow for field observations and discussions within the RAPs in attendance to modify the predictive model. The full description of the consideration of potential for subsurface material within the landforms of the Project Area—after the completion of the survey—is provided below.

Areas of Moderate Archaeological Potential – Spur landform: the areas of moderate archaeological potential were only determined to be within the spur landform. Previously this landform was predicted to contain high sensitivity due to the fact that it is located on a spur the leads to a ridgeline that connects it with the Bomen Axe Quarry Aboriginal Place. The identification of outcropping stone on aerial imagery further added to the potential of a site being present as the conditions were similar to those encountered at the Bomen Axe Quarry Aboriginal Place.

However, the survey of the Project Area provided additional information that reduced the potential of the spur landform to moderate. This was primarily driven by the lack of any identified Aboriginal objects or PADs within the landform. Further observations of the outcropping showed that it is characterised by a shallow soil deposit before transitioning to degrading granites with naturally occurring quartz veins. These conditions are different from those at the Bomen Axe Quarry Aboriginal Place, which is located on a pocket of outcropping basalt.

After the completion of the survey and conversation with the RAPs in attendance, it was decided that a total of 4 test pits would be placed at 10 m intervals at the southern tip of the landform where it intersects with the

proposed development footprint. Due to the potential for the remainder of the landform to contain Aboriginal objects, it was excised from the development footprint early on in the planning process.

Areas of Low Archaeological Potential – Mid Slopes, Upper Slopes, and Open Depression landforms:

although the areas of low archaeological potential were ground-truthed during the survey, they were found to have generally poor visibility. The landforms were unexceptional, containing very little remnant native vegetation or any defining features that would increase their archaeological potential.

While these landforms held generally low potential for subsurface material, the NGH archaeologists and RAPs in attendance decided that to confirm whether stone artefacts may yet be present, a total of 8 test pits should be placed across the Mid Slopes and Upper Slopes landforms and directly within the proposed BESS area. By excavating these eight test pits, NGH aimed to dispel any concerns that the area may contain unregistered Aboriginal objects due to its proximity to the Bomen Axe Quarry Aboriginal Place.

Areas of Negligible Archaeological Potential – Disturbed landforms: the areas of negligible archaeological potential were verified during the survey. The disturbance within these areas was significant and is primarily associated with the electrical substation that is present within the northern section of the Project Area. It was decided that no test pits were warranted within these areas and that instead focus should be placed on the landforms containing low to moderate potential.

8.3 Subsurface test excavation results

The subsurface test excavation programme was carried out in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. A total of 12 test pits were excavated across three landforms—the spur, mid slopes, and upper slopes—where they intersected with the development footprint. Transect 1—comprised of four test pits—was placed from the mid slope landform into and across the spur landform as it was considered to contain a moderate potential for subsurface deposits. This transect was adjacent to the informal track which may be formalised as an access route for the construction and maintenance of the BESS. Transect 2 and Transect 3—comprising a total of eight test pits—were placed across the mid slopes and extending into the upper slopes. Transect 2 and 3 were placed within the proposed area of highest disturbance from the development within the area of the proposed BESS. The test pits were numbered sequentially as they were excavated. A total of 3 m² was excavated during the subsurface test excavations, with a total of 0.77 m³ of soil being excavated and sieved. The test pits ranged in depth from 18 cm to 30 cm. An overview of the test pits is given in Table 8-2. An overview of the transects is shown in Plate 8-9 to Plate 8-12 and test pit locations is shown in Figure 8-1 below.

Table 8-2 Excavated test pits.

Transect	Test Pit	Landform	Depth (cm)	Artefact count
1	1	Mid slope	20	0
1	2	Spur	20	0
1	3	Spur	18	0
1	4	Spur	26	0
2	5	Mid slope	30	0
2	6	Mid slope	30	0
2	7	Mid slope	30	0
2	8	Mid slope	30	0
3	9	Upper slope	19	0
3	10	Mid slope	25	0
3	11	Mid slope	27	0
3	12	Mid slope	20	0



Plate 8-9 View north along transect 1 from test pit 1 in area adjacent to existing access track.



Plate 8-10 View south along transect 1 from test pit 4.

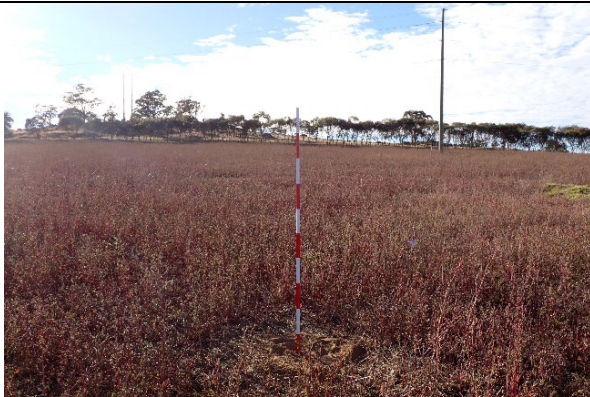


Plate 8-11 View east along transect 2 within proposed BESS area.

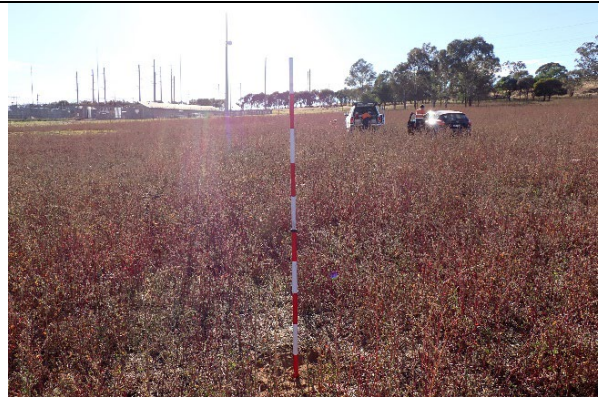


Plate 8-12 View north east along transect 3 within proposed BESS area.

No Aboriginal objects were identified during the test excavations. The excavation suggests that the Project Area is comprised of a relatively similar soil profile (see below for more detail). The results of the test excavations are within expectations based on the desktop predictive models that were prepared prior to the assessment.

8.4 Deposit Characteristics

The test excavation transects covered three landforms within the Project Area:

- Spur (test pits 2-4);
- Mid slope (test pits 1, 5-8 and 10-12); and
- Upper slope (test pit 9)

The deposit across all three landforms was shallow and primarily consisted of a brown compacted silt overlying red-orange clay between 15-30cm depth (see Plate 8-13). Within transect 1, granite cobbles were encountered at the base of the excavation (see Plate 8-14). For a full description of the test pits see Appendix A.



Plate 8-13 Test pit 6 typical soil profile.



Plate 8-14 Test Pit 2 at end of excavation
showing granite at base of test pit.



Figure 8-1 Test pit locations. No Aboriginal objects were identified during the excavation.

9. Analysis and discussion

Based on the site modelling and previous archaeological studies undertaken within and in proximity to the Project Area, it was generally predicted that the most common evidence of past Aboriginal occupation that would be identified within the Project Area would be stone artefacts in either scatters or as isolated finds. Regionally, these sites are most frequent in association with elevated landforms adjacent to waterways—spurs, ridgelines, and saddles are also known to hold varying degrees of sensitivity. The topography and landscape features within the Project Area suggested that the area would have been part of the Wiradjuri landscape and had a possibility of providing an archaeological signature due to its proximity to the Bomen Axe Quarry Aboriginal Place.

The results of previous archaeological surveys within the North Wagga Wagga and Bomen area show that there are sites and artefacts present across the landscape. These sites were recorded in a variety of contexts, from highly disturbed to relatively *in situ*—although the overwhelming majority are located in a disturbed context. The lack of sites identified within the Project Area is not unexpected given the current and previous land use and the overall poor surface visibility. It is also likely to be reflective of the sparse and dispersed potential for stone artefacts within the local area. As a result, the Project Area contains no scientific historic, aesthetic, or other representative values.

The Project Area is located in an area that contains moderate superficial surface disturbances from previous and current land use—the majority is also located on landforms with a moderate to steep slope. The only relatively level sections of the Project Area are within the central sections of the spur landform, an area outside of the development footprint and therefore not subject to test excavations. The soil profiles across the development footprint were very consistent, demonstrating that there is effectively no topsoil present, and that hard clays or degrading granite boulders are encountered rapidly. The regional archaeological record suggests that any subsurface archaeological deposits are typically confined to the upper 20 cm of soil deposits. The lack of any topsoil suggests that if these archaeological deposits were here in the past, they have since washed away downslope. While visibility potentially hampered the identification of surface artefacts during the field survey, the level of previous disturbance and the slope of the Project Area suggests that it is unlikely for surface artefacts to be present within the Project Area. There is also a negligible potential for any *in situ* subsurface archaeological deposits to be present within the remainder of the development footprint and therefore no further test excavations are considered warranted.

Based on the results of this investigation and the land use history of the Project Area, there is a negligible potential for unregistered Aboriginal heritage to be impacted by the proposed works within the development footprint of the Wagga North BESS.

10. Cultural heritage values and Statement of Significance

10.1 Assessment criteria

The assessment of the significance of Aboriginal archaeological sites is currently undertaken largely with reference to criteria outlined in the ICOMOS Burra Charter (Australian ICOMOS 2013). Criteria used for assessment are:

- **Social or Cultural Value:** In the context of an Aboriginal heritage assessment, this value refers to the significance placed on a site or place by the local Aboriginal community – either in a contemporary or traditional setting.
- **Scientific Value:** Scientific value is the term employed to describe the potential of a site or place to answer research questions. In making an assessment of scientific value issues such as representativeness, rarity and integrity are addressed. All archaeological places possess a degree of scientific value in that they contribute to understanding the distribution of evidence of past activities of people in the landscape. In the case of flaked stone artefact scatters, larger sites or those with more complex assemblages are more likely to be able to address questions about past economy and technology, giving them greater significance than smaller, less complex sites. Sites with stratified and potentially in situ sub-surface deposits, such as those found within rock shelters or depositional open environments, could address questions about the sequence and timing of past Aboriginal activity, and will be more significant than disturbed or deflated sites. Groups or complexes of sites that can be related to each other spatially or through time are generally of higher value than single sites.
- **Aesthetic Value:** Aesthetic values include those related to sensory perception and are not commonly identified as a principal value contributing to management priorities for Aboriginal archaeological sites, except for art sites.
- **Historic Value:** Historic value refers to a site or place's ability to contribute information on an important historic event, phase or person.
- **Other Values:** The Burra Charter makes allowance for the incorporation of other values into an assessment where such values are not covered by those listed above. Such values might include Educational Value.

All sites or places have some degree of value, but some have more than others. In addition, where a site is deemed to be significant, it may be so on different levels or contexts ranging from local to regional to national, or in very rare cases, international. Further, sites may either be assessed individually, or where they occur in association with other sites the value of the complex should be considered.

10.2 Significance assessment

10.2.1 Social or cultural value

While the true cultural and social value of Aboriginal sites can only be determined by local Aboriginal people, as a general concept, all sites hold cultural value to the local Aboriginal community. An opportunity to identify cultural and social value was provided to the Aboriginal representatives for this proposal through the consultation process which included providing comments on the methodology, participating in fieldwork and draft reporting process.

Conversations with RAPs during the field component of this assessment demonstrated that the local Aboriginal community view the area surrounding the Bomen Axe Quarry Aboriginal Place as containing a very high cultural value, a value which is shared to some extent with the surrounding areas. Furthermore,

RAPs noted that a spur crest east of the Project Area would hold more value than anything that was observed within the Project Area.

No further social or cultural values were raised by the RAPs during the fieldwork or review of the ACHA assessment.

10.2.2 Scientific (archaeological) value

As described in this report, no new Aboriginal sites or PADs were identified by this assessment. Furthermore, no previously recorded AHIMS sites are located within the Project Area. As a result, the Project Area—as assessed in this report—is considered to contain a negligible scientific value as it is highly unlikely that there is any information regarding past Aboriginal land use within the Project Area. This is due to the previous and current land use of Project Area as well as the sloping landforms and stripped topsoils, which are likely to have removed any Aboriginal sites or PADs from the Project Area. These conditions have reduced the scientific value of the Project Area to a negligible level.

10.2.3 Aesthetic value

There are no aesthetic values directly associated with the Project Area. Furthermore, the proposed works do not obstruct or impact the view between the Bomen Axe Quarry Aboriginal Place and Kengal Aboriginal Place.

10.2.4 Historic value

There are no historic values directly associated with the Project Area.

10.2.5 Other values

There are no other known heritage values associated with the subject area.

11. Impact assessment

11.1 Proposed development activity

As noted above in Section 2, the proposed works involve the construction and operation of a BESS. The development proposal involves:

- Approximately 126 battery containers, housing battery cells in modules and associated cooling systems.
- Approximately 42 associated Power Conversion Systems (PCS) comprising of;
 - The inverters, which convert direct current (DC) to alternating current (AC);
 - The medium-voltage transformer, which converts the inverter output voltage to the medium-voltage of the system (33 kilovolt); and
 - The medium voltage switchgear, which contains the medium voltage circuit breakers and disconnectors for the PCS
- A control room, which will contain battery-monitoring equipment and allows operators to control the plant remotely.
- A short underground transmission line which would connect the BESS to the adjacent TransGrid Wagga North substation at its western side. The connection type is subject to TransGrid requirements and further detailed design.
- A switching substation, which collects all the individual medium voltage cables from the PCS units in one location, including:
 - 33kW switchgear.
 - One 33/132kV transformer.
 - A 132kV circuit including busbars, circuit breakers, disconnectors, isolators, surge arresters, etc.
 - A plant auxiliary transformer and diesel generator.
- A prefabricated Operations and Maintenance (O&M) building
- Staff amenities
- Water tanks for firefighting purposes
- Earthworks and stormwater management infrastructure (e.g. diversion banks, etc.)
- Perimeter security fencing.
- Temporary and/or permanent laydown area.
- Access track to connect with Bavin Road south of the BESS area.

The development will result in disturbance of approximately 4 ha of land. The development activities would require the use of heavy machinery and would cause significant ground disturbance. Any Aboriginal heritage objects that are within the development footprint would therefore likely be impacted.

11.2 Assessment of harm

As described in this report, no Aboriginal sites or PADs were identified during the assessment. Furthermore, no previously recorded AHIMS sites are located within the Project Area. As a result, the assessment of harm for the proposed works is nil.

11.3 Impacts to values

There are no values associated with the Project Area and therefore the proposed works within the development footprint will not impact any values. However, the remainder of the spur landform outside of the development footprint must be avoided as it may contain sensitivity due to its connection with the same ridgeline as the Bomen Axe Quarry Aboriginal Place.

12. Management and mitigation measures

12.1 Consideration of harm

No previously identified AHIMS sites are located within the Project Area and no new Aboriginal sites or PADs were identified during this assessment. In addition, there are no identified other cultural values attributed to the Project Area. As a result, no measures are required to avoid the harm of Aboriginal heritage.

12.2 Mitigation of harm

Mitigation of harm to cultural heritage sites generally involves some level of detailed recording to preserve the information contained within the site (or within the portion of the site to be impacted). Mitigation can be in the form of minimising harm, through slight changes in the development plan or through direct management measures of the artefacts. It is argued here that mitigation in the form of alteration or avoidance is neither feasible nor warranted in this situation due to the negligible scientific significance attributed to the Project Area and the negligible potential for *in situ* artefacts to be present within the development footprint.

As no Aboriginal heritage items or PADs are present within the Project Area, the proposed works within the development footprint—as assessed in the report—will avoid any impacts to physical Aboriginal heritage. Therefore, no further mitigation measures are required for the proposed Wagga North BESS. Due to the sensitivity of the remainder of the spur landform outside of the development footprint due to its connection with the same ridgeline as the Bomen Axe Quarry Aboriginal Place, this area must be by the proposed development.

13. Recommendations

The recommendations are based on the following information and considerations:

- Results of the current archaeological survey and subsurface test excavations within the Project Area;
- Consideration of results from other archaeological assessments which have occurred in the Project Area;
- Consideration of results from other regional archaeological studies;
- Results of consultation with the registered Aboriginal parties;
- The assessed significance of the sites;
- Appraisal of the proposed development; and
- Legislative context for the development proposal.

It is recommended that:

1. The proposed works within the development footprint can proceed with no further archaeological assessment.
 - a. Further archaeological assessment may be required if the proposed works extend outside of the Project Area as assessed in this report. This would include consultation with the Registered Aboriginal Parties and may include further field assessments.
2. All access to the site and laydown areas must be within the Project Area as assessed by this report.
3. Prior to the commencement of the proposed works for the project, Aboriginal Cultural Heritage Awareness training should be included as part of the Induction, and all site personnel who will work on the project must complete it. The Aboriginal Heritage Awareness training must be prepared in consultation with the Registered Aboriginal Parties for this project.
4. If any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop and Heritage NSW notified. The find will need to be assessed and if found to be an Aboriginal object, and Aboriginal Heritage Impact Permit (AHIP) may be required.
5. In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity; Heritage NSW and the police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. If the remains are deemed to be Aboriginal in origin, the Registered Aboriginal Parties should be advised of the find as directed by the appropriate heritage team within Heritage NSW. Heritage NSW would advise the Proponent on the appropriate actions required.
6. The remainder of the spur landform outside of the development footprint must be avoided as it may contain sensitivity due to its connection with the same ridgeline as the Bomen Axe Quarry Aboriginal Place.

Ib Vogt Development Australia Pty Ltd is reminded that it is an offence under the *National Parks and Wildlife Act 1974* to harm an Aboriginal object without a valid approval.

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Appendix A Excavation Data

A.1 Test Pit descriptions

Pit Number	Grid Reference	Spit Numbers	Depth (cm)	Soil Description
1	538186 E 6117778 N	Surface	0	Low grass
		1	0-5	Light brown fine silt with some grass rootlets. Quartz and degraded granites also noted throughout spit.
		2	5-10	Fine brown silt with significant quantities of quartz, degraded granite, and pyrite inclusions. Some granite cobbles also identified.
		3	10-15	As above.
		4	15-20	As above. Large granite cobbles encountered at base of spit.
2	538189 E 6117788 N	Surface	0	Low grass
		1	0-5	Mid brown loose friable silt with gravelly, sub-angular crystal quartz and quartz inclusions (<40%).
		2	5-10	As above.
		3	10-15	Transitions to a loose warm brown friable silt. Density of gravelly,

Pit Number	Grid Reference	Spit Numbers	Depth (cm)	Soil Description
				sub-angular quartz' increases (<50%).
		4	15-20	As above. Large granite rock encountered at base of spit.
3	538194 E 6117798 N	Surface	0	Dead grass
		1	0-10	Light brown fine silt with many inclusions consisting of quartz and degraded granite some pebble sizes.
		2	10-18	Brown orange silty clay with many inclusions. Red and orange dry clay at the base of the spit.
4	538197 E 6117807 N	Surface	0	Low grass
		1	0-10	Warm brown loose friable silt. Gravelly quartz and crystal quartz inclusions (<30%). Grass rootlets protruding into spit from surface.
		2	10-20	As above.
		3	20-26	Sharp transition to a reddish brown compact silty clay. Inclusions as above. Clay base encountered at bottom of spit.

Pit Number	Grid Reference	Spit Numbers	Depth (cm)	Soil Description
5	538392 E 6118173 N	Surface	0	Dead grass, waist high weeds.
		1	0-10	Light brown silt with some grass rootlets and bioturbation.
		2	10-20	Transition to an orange/brown silty clay with few gravel inclusions. Soil deposit increases in compaction with depth and clay content also increases with depth.
		3	20-30	Dense and compact orange red dry clay with few gravel inclusions.
6	538413 E 6118173 N	Surface	0	Dead grass, waist high weeds
		1	0-10	Light brown loose/friable silt. Grass surface with small grass root inclusions (<2%). Very minor sub-angular quartz inclusions (<2%). Some evidence of bioturbation and ant holes throughout spit.
		2	10-20	Very diffuse transition to a warmer brown loose/friable silt. Inclusions as above.
		3	20-30	Reddish orangey silty clay. Inclusions as above. Clay base reached at 30 cm on NW and NE corners

Pit Number	Grid Reference	Spit Numbers	Depth (cm)	Soil Description
				and at 23 cm on the SE and SW corners.
7	538432 E 6118172 N	Surface	0	Dead grass, thick weeds
		1	0-10	Light brown silt with some grass rootlets and bioturbation.
		2	10-20	Transition to an orange/brown silty clay with few gravel inclusions. Soil deposit increases in compaction with depth and clay content also increases with depth.
		3	20-30	Dense and compact orange red dry clay with few gravel inclusions.
8	538452 E 6118173 N	Surface	0	Low grass and weeds
		1	0-10	Light orangey brown friable compacted silt. Minor grass rootlets (<2%). Small quartz inclusions throughout (<5%) and very small charcoal flecks.
		2	10-20	As above.
		3	20-30	Very diffuse transition to a darker orangey brown compact silty clay. Inclusions are as above.

Pit Number	Grid Reference	Spit Numbers	Depth (cm)	Soil Description
9	538481 E 6118249 N	Surface	0	Grassy paddock with long weeds.
		1	0-10	Dark brown topsoil for top 1 cm before transitioning to a light brown friable compacted silt. Grass rootlets throughout upper 5 cm of spit. Minor angular quartz inclusions (<5%).
		2	10-19	Diffuse transition to a warm orangey brown very compact silt. Inclusions are as above minus the grass rootlets. Clay base reach between 15 to 19 cm.
10	538463 E 6118238 N	Surface	0	Dead grass and thick weed cover.
		1	0-10	Brown silt with grass rootlets. Bioturbation present across spit.
		2	10-20	Light brown orange silty gravelly clay. Many quartz and degraded granite inclusions. Stratigraphic layer is compact and required crowbar to excavate.
		3	20-25	Very compact orange clay.
11	538446 E 6118227 N	Surface	0	

Pit Number	Grid Reference	Spit Numbers	Depth (cm)	Soil Description
		1	0-10	Light brown silt with grass rootlets and bioturbation present. Gravel and pyrite inclusion throughout spit with a small amount of burnt wood.
		2	10-20	Transition to an orange brown gravelly silty clay. Compaction increases with depth. Gravel and pyrite continue,
		3	20-27	As above. Very compact. Clay base at 27 cm.
12	538429 E 6118215 N	Surface	0	Dead grass and thick weed cover
		1	0-10	Light brown silt with bioturbation. Many grass rootlets in first 3 cm. Gravel and pyrite inclusions throughout rest of spit.
		2	10-20	Orange brown gravelly silty clay. Compaction increases with depth as clay content increases. Some grass rootlets present at ~12 cm. Transitions to a very compact orange gravelly clay from 15 to 20 cm across spit.



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