ABORIGINAL CULTURAL HERITAGE ASSESSMENT

Wagga Wagga Solar Farm South

16 December 2019

Report Number: 19-088

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Document Verification

Project Title:	Wagga Wagga Solar Farm South
Project Number:	19-088
Project File Name:	19-088 Wagga Wagga Solar Farm ACHA Final 161219

Revision	Date	Prepared by	Reviewed by	Approved by
Final	23/10/2019	Amy Ziesing	Ali Byrne	Matthew Barber
Final	16/12/2019	Amy Ziesing	Tom Allen/David Walker	Tom Allen/ David Walker

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ACRONYMS AND ABBREVIATIONS

AASC	Australian Archaeological Survey Consultants
ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal heritage information management system
AHIP	Aboriginal Heritage Impact Permit
BCD	Biodiversity and Conservation Division of DPIE
BOM	Australian Bureau of Meteorology
CEMP	Construction environmental management plan
Cwth	Commonwealth
DECCW	Refer to OEH
DP&I	(NSW) Department of Planning and Infrastructure (now DPIE)
DPIE	(NSW) Department of Planning, Industry and Environment
EIA	Environmental impact assessment
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ha	hectares
Heritage Act	*Heritage Act 1977* (NSW)
km	kilometres
KNC	Kelleher Nightingale Consulting Pty Ltd
LALC	Local Aboriginal Land Council
m	Metres
NOHC	Navin Officer Heritage Consultants
NPW Act	*National Parks And Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PAD	Potential Archaeological Deposit
REF	Review of Environmental Factors

EXECUTIVE SUMMARY

INTRODUCTION

NGH Pty Ltd (NGH) was engaged by Terrain Solar to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for a proposed 18.7 megawatt (MW) solar farm (Wagga Wagga Solar Farm South) to be developed adjacent to the approved Wagga Wagga Solar Farm in Bomen, NSW. The works for the proposed Wagga Wagga Solar Farm South are located within Lot 15, DP1108978 and cover an area of approximately 47.7 hectares (ha) within the Wagga Wagga Local Government Area (LGA).

This assessment is in line with the recommendations provided in the due diligence assessment of the proposal area, which identified the presence of Aboriginal sites and areas of archaeological sensitivity that required further investigation. Terrain Solar are seeking to undertake work that would impact Aboriginal heritage sites as defined under the NSW *National Parks and Wildlife Act 1974*. In order to undertake the proposed development work for the Wagga Wagga Solar Farm South an Aboriginal Heritage Impact Permit (AHIP) will be required. This ACHAR would accompany the AHIP application and would provide the Office of Biodiversity and Conservation (BCD), with information about the nature, extent and significance of any Aboriginal sites and values and assess the impacts and management strategies that may mitigate any impact.

This ACHA Report was prepared in line with the following:

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW http://www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf
- Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRP) *http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf*

PROJECT PROPOSAL

The Wagga Wagga Solar Farm South proposal would comprise the installation of approximately 47.7 hectares of solar panels and associated infrastructure to the site. Wagga Wagga Solar Farm South would have a capacity of approximately 18 MW (AC). The power generated from the proposed Wagga Wagga Solar Farm South will be fed into the National Electricity Market (NEM) at the transmission level from the nearby Wagga Wagga Substation. The proposal would consist of the following components:

- Single axis tracker PV solar panels mounted on steel frames over most of the site.
- Electrical conduits and transformers.
- Invertor units.
- On-site or off-site substation.
- Site office, vehicle parking areas, internal access tracks and perimeter fencing.
- Overhead and underground electrical cable reticulation.
- 66 KV overhead cable run to connect the proposal to the Wagga Wagga substation.

ABORIGINAL CONSULTATION

The consultation with Aboriginal stakeholders was undertaken in accordance with clause 80C of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010* following the consultation steps outlined in the (ACHCRP) guide provided by OEH (now BCD).

The full list of consultation steps, including those groups and individuals that were contacted and undertaken and a consultation log is provided in Appendix A.

As a result of this process two groups and an individual registered their interest in the proposal as listed below.

- Bundyi Aboriginal Cultural Knowledge (BAC)- Mark Saddler;
- Bidya Marra Consultancy (Bidya Marra) – James Ingram; and
- Yalmambirra.

No other party registered their interest, including the entities and individuals recommended by BCD.

The fieldwork was organised, and two of the registered parties were asked to participate in the survey and subsurface testing fieldwork

A copy of the draft report was provided to all the registered parties for comment. No comments were received on the draft report, which was finalised in November 2019.

ARCHAEOLOGICAL CONTEXT

The assessment included a review of relevant information relating to the landscapes within the proposal area. Included in this was a search of the AHIMS database. There were no sites previously recorded within the AHIMS database within the proposal area however a due diligence inspection of the proposal area by NGH in April 2019 identified five Aboriginal sites and three areas of potential archaeological deposit (PAD) that were located within the current proposal area.

The Aboriginal Place the Bomen Axe Quarry (AHIMS# 56-1-0043) is also noted to be located 790 m north west of the proposal area. Five other registered artefact scatters (AHIMS# 56-1-0538, 56-1-0533, 56-1-0532, 56-1-0552 and 56-1-0044) are located 500 m north west, between the Bomen Axe Quarry and the proposal area. An additional stone quarry (AHIMS# 56-1-0110) is located 100 m south of the proposed solar farm area.

Previous investigations for the adjacent Wagga Wagga Solar Farm, which lies to the immediate north, identified four artefact scatters, four PAD areas and an isolated find. These were conducted in 2018 as an initial due diligence assessment, followed by an ACHA including a program of subsurface testing.

The results of previous archaeological surveys in the Bomen region demonstrate that there is a strong, complex and varied pattern of human use and movement through the landscape. This behaviour is recorded as a range of artefact and site types distributed and concentrated in specific landforms across the region. There appears to be a strong association between the presence of potential resources for Aboriginal use and the presence of archaeological sites. Areas directly associated with water and or elevated ground appear to have the greatest potential for identification of Aboriginal cultural material.

Based on previous archaeological investigations in the region and knowledge of Wiradjuri cultural practices and traditional activities the proposal area has a possibility of containing archaeological sites, especially given that Aboriginal people have lived in the region for tens of thousands of years. This would most likely be in the form of quartz lithic scatters, isolated artefacts and scarred trees in remnant old growth vegetation areas bordering the proposal area and/or as isolated paddock trees.

SURVEY AND SUBSURFACE TESTING RESULTS

The proposed solar farm area comprises primarily of cleared and cropped paddocks that have been subject to farming activities. Survey transects were undertaken on foot and traversed the entire proposal area. Visibility within the proposal area was variable however; as a whole it generally had visibility averaging 5% overall.

The effective visibility in the paddocks ranged from 30% in exposures and in grassed paddocks at the base of the rock outcropping to less than 5% in areas with a dense low crop cover. Between the survey participants, over the course of the field survey, approximately, 38 km of transects were walked across the proposal area.

Despite the variable visibility encountered during the survey, four artefact scatters and five isolated finds were recorded.

Three areas of potential archaeological deposit (PAD) were originally identified as part of the due diligence assessment. These PADs were identified in association with elevated flats adjacent to a south east to north west running drainage line (PAD 2 and PAD 3) and along an east to west running spurline (PAD 1). PAD 2 was initially mapped slightly north of the final location however discussions held with the RAPs during the ACHA survey resulted in this area of potential being adjusted.

High archaeological sensitivity was assigned to the spurline, moderate sensitivity to the drainage lines and basal slope associated with Wagga Wagga Solar AFT 1 and low to moderate sensitivity to the elevated flat in the central portion of the proposal area. The remainder of the area was assigned low archaeological sensitivity due to the presence of steep slopes which would not be conducive to camping activities

Following the ACHA survey of the proposal area and the commencement of the archaeological test excavation program, several additional areas of archaeological sensitivity had been identified (PADs 4 to 6). The RAPS and archaeologists agreed that these areas also warranted subsurface testing given the known sensitivity mapping of the Bomen area (KNC 2008: 15-17).

A total of six areas were identified as PADs, including the three which had initially been identified, and an additional three. The subsurface excavation of the six areas considered to have potential for *in situ* subsurface deposits was undertaken following the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. A total of 49 test pits were excavated across the six PADs during the subsurface testing program. Thirty-four stone artefacts were recovered from 19 pits. The artefact counts for each of the pits excavated ranged from nil to eight. Artefacts were recovered from all PADs except PAD 6. Then density of artefacts across all testing areas is 2.75 artefacts/$m^{2.}$

From the 49 test pits, a total of 3.71 m^3 of deposit was excavated and sieved. All the subsurface artefacts recovered were manufactured from quartz which is a common lithology for the Wagga Wagga and Bomen areas. The density of artefacts recovered from the testing program provides an indication of the variability of artefact numbers across the landforms investigated. Observing the pattern of artefact distribution and the gaps across the testing program the proposal area is characterised by discrete low-density clusters of artefacts interspersed with areas of very low or no artefactual material. The subsurface material recovered has been recorded as four additional subsurface artefact scatters.

The results of this survey and subsurface testing program support the modelling for the region that there are sites and artefacts present throughout the landscape but are most common on level or gently sloping low elevations which are near ephemeral watercourses or finite resources. The low density of the surface and subsurface artefacts across the proposal area indicates the low density use of the area with a focus on the spurlines and resource areas, such as the Axe Quarry and the creekline. No direct evidence of longer-term base camps was identified within the proposal area, which is not unusual given the minor nature of the drainage lines within the proposal area compared with the more permanent nature of the creekline assessed in the 2018 ACHA and subsurface testing investigations.

POTENTIAL IMPACTS

The proposal involves the construction of a solar farm and includes connection to the nearby substation. The development will result in disturbance of approximately 47.7 ha of the 55-ha proposal area.

A total of 13 stone artefact sites were identified during this assessment, of which seven are situated within the area of the proposed solar arrays, tracks and fencing and would be impacted by the proposed development. These sites include four artefact scatters (Wagga Wagga SF AFT3, Wagga Wagga SF AFT4, Wagga Wagga SF AFT5 and Wagga Wagga SF AFT8) and three isolated artefacts (Wagga Wagga SF IF1, Wagga Wagga SF IF3 and Wagga Wagga SF IF4). A further four artefact sites (Wagga Wagga SF AFT1, Wagga Wagga SF AFT2, Wagga Wagga SF AFT5 and Wagga Wagga SF AFT6) will be partially impacted by the location of the solar arrays. Wagga Wagga SF IF2 and Wagga Wagga SF AFT 7 will not be impacted by the proposed development.

The impact to the sites with stone artefacts is likely to be most extensive where earthworks occur, such as the installation of cabling, which may involve the removal, breakage or displacement of artefacts. This is considered a direct impact on the sites and the Aboriginal objects by the development in its present form.

While seven of the 13 stone artefact sites are rated as having total loss of scientific value it is argued that there are likely to be a number of similar sites in the local area and therefore the impact to the overall local archaeological record is considered to be low. The stone artefacts have little research value apart from what has already been gained from the information obtained during the present assessment.

This information relates more to the presence of the artefacts and in the development of Aboriginal site modelling, which has largely now been realised by the recording. No other values have been identified that would be affected by the development proposal.

RECOMMENDATIONS

It is recommended that:

1. A minimum 5 m buffer must be observed around the boundary extent of all sites prior to the achievement of the below recommendations.
2. The proponent applies to the Biodiversity and Conservation Division (BCD) within the Department of Planning, Industry and Environment (DPIE) and receives an Aboriginal Heritage Impact Permit (AHIP) to allow harm to the 11 Aboriginal archaeological sites that will be partially or completely impacted within the proposal area by the Wagga Wagga Solar Farm South. The AHIP should be sought for the entire proposal area for the Wagga Wagga Solar Farm South.
3. Should the proponent seek to apply for an AHIP, this report must accompany the application, as outlined in the BCD document: Applying for an Aboriginal Heritage Impact Permit: Guide for Applicants.
4. Once an AHIP has been issued the 11 impacted sites within the development footprint, as approved by the AHIP, must be salvaged prior to the proposed work commencing and moved to a safe area within the property that will not be subject to any ground disturbance.
5. The collection and relocation of the artefacts should be undertaken by an archaeologist with representatives from the registered Aboriginal parties and be consistent with Requirement 26 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. A site impact card will be submitted for each site salvaged and a new site card will need to be completed once the artefacts are buried to record their new location on the AHIMS database.
6. All artefacts recovered from the subsurface testing program currently in temporary care at NGH Wagga Wagga office must be reburied by an archaeologist with representatives from the registered Aboriginal parties and be consistent with Requirement 26 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. A new site card will need to be completed once the artefacts are reburied to record their new location on the AHIMS database.
7. No further archaeological investigation or salvage excavation program is warranted or required for the proposal area assessed in this report.
8. If any objects suspected of being Aboriginal in origin are located in areas outside a valid AHIP, work must stop, and the BCD notified.
9. The proponent must prepare a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction work. The CHMP would outline an unexpected finds protocol to deal with construction activity. Preparation of the CHMP must be undertaken in consultation with the registered Aboriginal parties.

10. In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity. BCD and the local police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. Should the remain be identified to be Aboriginal in origin BCD would advise the proponent and/or archaeologist on the appropriate Aboriginal parties to contact.
11. Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation. This would include consultation with the registered Aboriginal parties and may include further field survey.
12. The proponent is reminded that it is an offence under the *National Parks and Wildlife Act* to harm an Aboriginal object without a valid AHIP.

1. INTRODUCTION

NGH Pty Ltd (NGH) was engaged by Terrain Solar to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the Wagga Wagga Solar Farm South development in Bomen, NSW. The study area is located within the Wagga Wagga Local Government Area (LGA) and is bounded by Windmill Road to the east, Byrnes Road to the west, Bavin Road to the south and East Bomen Road to the north (the study area) (Figure 1). These works are contained within a proposal area of approximately 55 hectares (ha) on Lot 15 DP1108978 (Figure 2). The proposal involves the construction of a ground-mounted photovoltaic solar array generating approximately 18 megawatts (MW) of renewable energy. The development footprint for the adjacent Wagga Wagga Solar Farm area is shown in Figure 3, while the proposed development footprint for the Wagga Wagga Solar Farm South extends over approximately 47.7 ha of the proposal area, as shown in Figure 4.

This assessment is in line with the recommendations provided in the 2019 Due diligence assessment of the Wagga Wagga Solar Farm South that identified the presence of Aboriginal sites and areas of archaeological sensitivity that required further investigation. Terrain Solar are seeking to undertake work that will impact Aboriginal heritage sites as defined under the NSW *National Parks and Wildlife Act 1974*. In order to undertake the proposed development work for the Wagga Wagga Solar Farm South an Aboriginal Heritage Impact Permit (AHIP) will be required. This ACHAR would accompany the AHIP application and would provide the Biodiversity and Conservation Division (BCD), with information about the nature, extent and significance of any Aboriginal sites and values and assess the impacts and management strategies that may mitigate any impact.

The proposed Wagga Wagga Solar Farm South would involve ground disturbance that has the potential to impact on Aboriginal heritage sites and objects located within the proposal area. Aboriginal objects are protected under the NSW *National Parks and Wildlife Act 1974* (NPW Act). The purpose of an ACHA report is to investigate the presence of any Aboriginal sites and to assess the impacts and provide management strategies that may mitigate any impact.

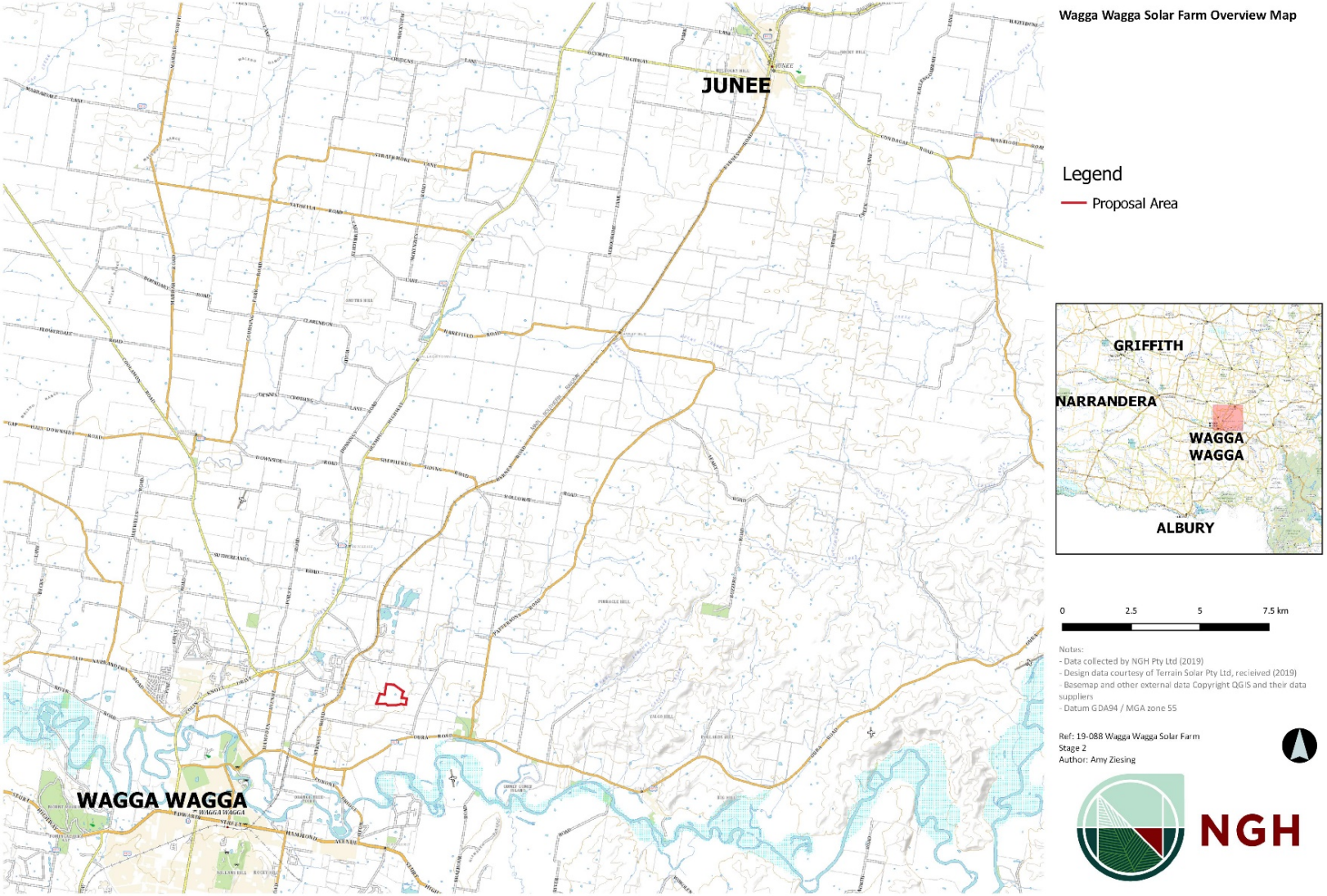


Figure 1 Overview Map of the Wagga Wagga Solar Farm South Proposal Area.

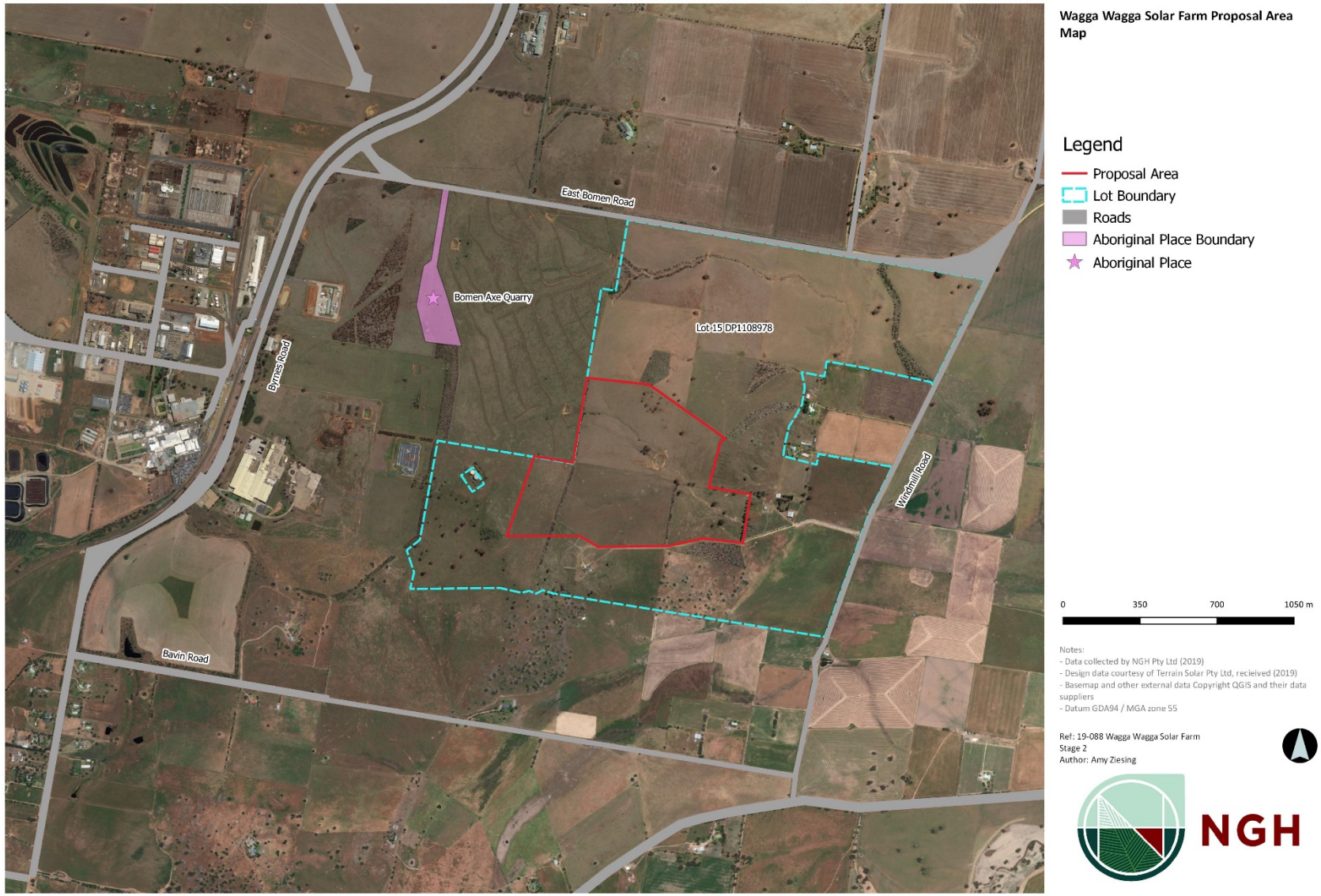


Figure 2 Wagga Wagga Solar Farm South Proposal Area Map.

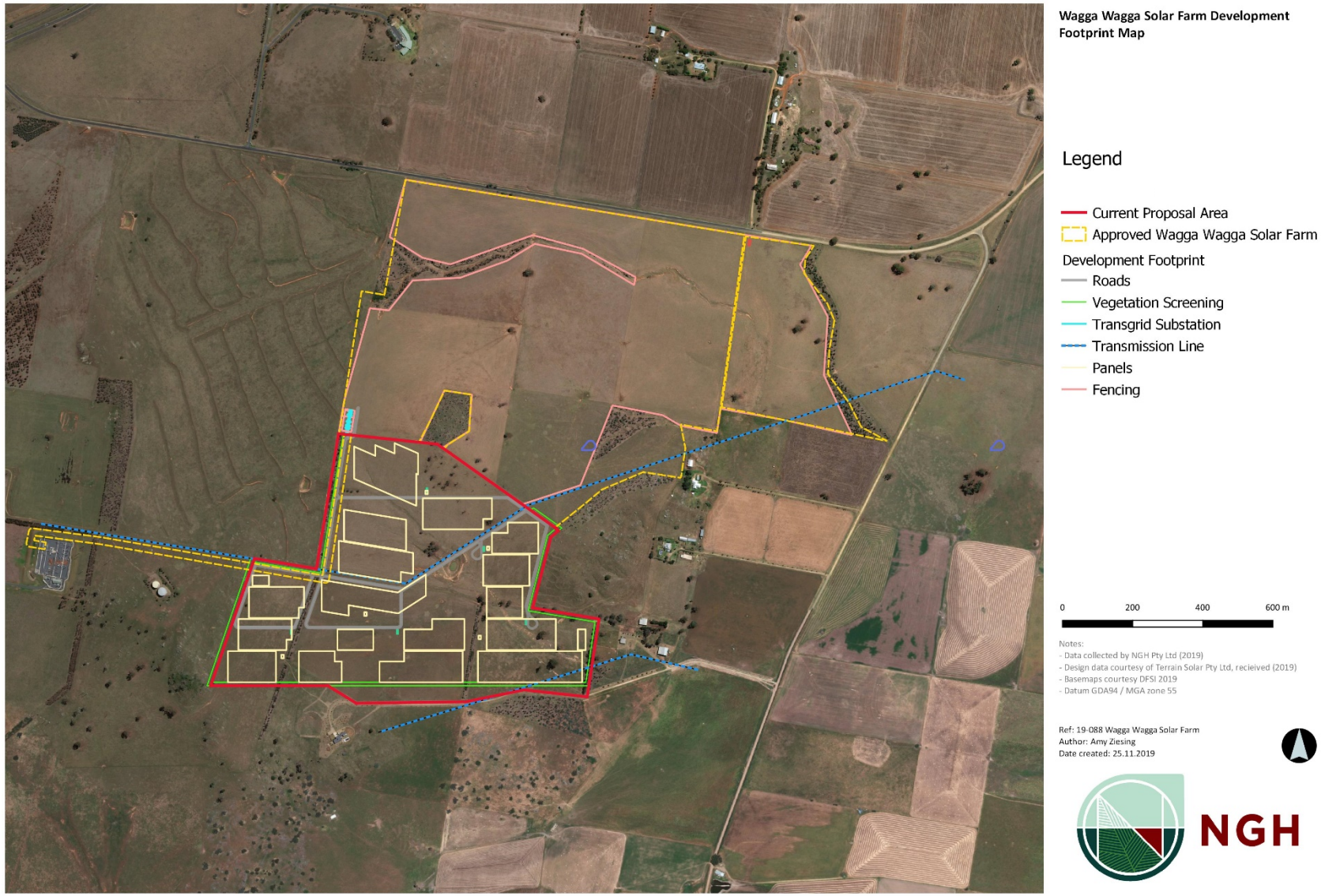


Figure 3 Development Footprint for the approved Wagga Wagga Solar Farm and the proposed Wagga Wagga Solar Farm South.

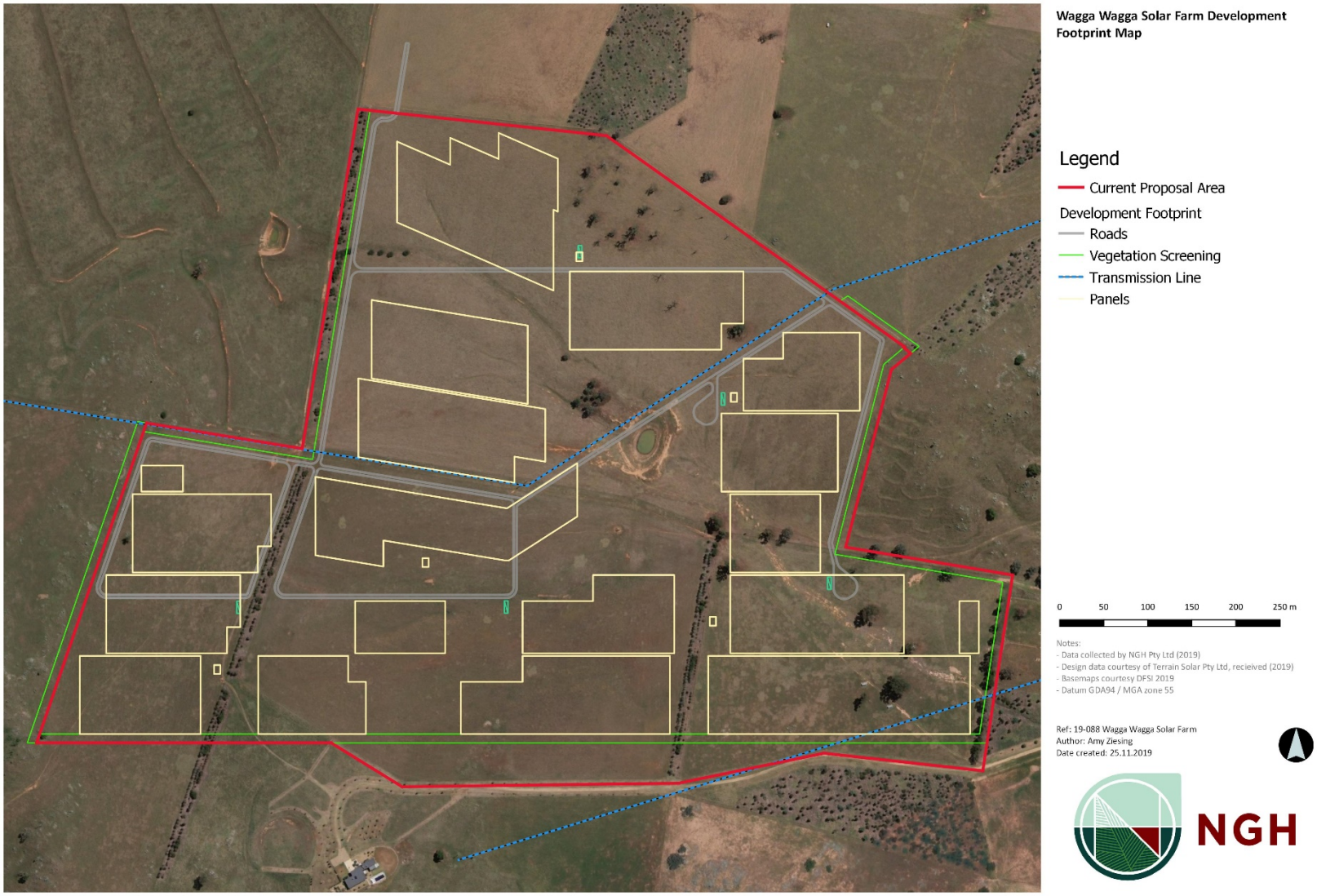


Figure 4 Development Footprint for the Wagga Wagga Solar Farm South Proposal Area.

1.1. DEVELOPMENT CONTEXT

The development of renewable energy projects is one of the most effective ways to achieve the commitments of Australia and a large number of other nations under the Paris Agreement to reduce greenhouse gas emissions. The Wagga Wagga Solar Farm would provide the following benefits:

- Reduction in greenhouse gas emissions from energy generation (when compared with fossil fuel generating sources).
- Provision of embedded electricity generation to supply into the Australian grid close to a main consumption centre.
- Provision of social and economic benefits through the provision of direct employment opportunities.

The establishment of the Wagga Wagga Solar Farm would therefore have both local, National and International benefits.

The Development Application (DA17/0679) for the 30 megawatt Wagga Wagga Solar Farm on the adjacent land to the north was initially refused however this decision was later overturned in the NSW Land and Environment Court, resulting in the area assessed in 2018 as being referred to as the "approved" solar farm.

The current assessment is in line with the recommendations provided in the 2019 due diligence assessment of the Wagga Wagga Solar Farm South that identified the presence of Aboriginal sites and areas of archaeological sensitivity that required further investigation. Terrain Solar are seeking to undertake work that will impact Aboriginal heritage sites as defined under the NSW *National Parks and Wildlife Act 1974*. In order to undertake the proposed development work for the Wagga Wagga Solar Farm South an Aboriginal Heritage Impact Permit (AHIP) will be required. This ACHAR would accompany the AHIP application and would provide the Biodiversity and Conservation Division (BCD), with information about the nature, extent and significance of any Aboriginal sites and values and assess the impacts and management strategies that may mitigate any impact.

For the purposes of this assessment the proposal area as shown in Figure 4 was assessed.

1.2. PROJECT BACKGROUND

An Aboriginal heritage due diligence assessment was completed by NGH Environmental in April 2019 that investigated the potential impacts of proposed solar farm works on Aboriginal objects at the proposed Wagga Wagga Solar Farm South area. The assessment was completed in accordance with the NSW Office of Environment and Heritage's *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH 2010b).

The aims of the field inspection were as follows:

- Investigate the proposal areas to identify any Aboriginal heritage sites or areas of archaeological potential;
- Record any Aboriginal heritage sites; and
- Provide an appraisal of the possible impacts of proposed development on any identified Aboriginal sites or areas of archaeological potential.

During the initial survey of the proposal area, undertaken in April 2019, several sites and archaeologically sensitive landforms were identified.

Fifteen surface artefacts were identified across the proposal area, representing two artefact scatters (Wagga Wagga Solar AFT 1 and Wagga Wagga Solar AFT 2) and three isolated finds (Wagga Wagga Solar IF 1 to Wagga Wagga Solar IF 3). Three areas of potential archaeological deposit (PAD) were also identified in association with elevated flats along a south east to north west running drainage line (PAD 2 and PAD 3) and an east to west running spurline (PAD 1). PAD 2 was initially recorded slightly to the north of the final location

however discussions held with the RAPS during the subsequent ACHA survey resulted in adjustment of the location.

High archaeological sensitivity was assigned to the spurline, moderate sensitivity to the drainage lines and basal slope associated with Wagga Wagga Solar AFT 1 and low to moderate sensitivity to the elevated flat in the central portion of the proposal area. The remainder of the area was assigned low archaeological sensitivity due to the presence of steep slopes which would not be conducive to camping activities. As a result of these initial findings, an ACHA was recommended.

1.3. PROJECT PROPOSAL

The Wagga Wagga Solar Farm South proposal area is in Wagga Wagga LGA approximately 4.3 kilometres north east of the township of Wagga Wagga. The Wagga Wagga Solar Farm South proposal area comprises 55 ha on Lot 15 DP1108978. The proposed development footprint comprises of approximately 47.7 ha as shown in Figure 3.

The host lot is bound by East Bomen Road to the north, Windmill Road to the east, Bavin Road to the south and Byrnes Road to the west. The development site does not directly front any of the listed roads.

The solar farm would have a total installed capacity of up to 18.7 MW (AC), and would include:

- Single axis tracker PV solar panels mounted on steel frames over most of the site.
- Electrical conduits and transformers.
- Invertor units.
- On-site or off-site substation.
- Site office, vehicle parking areas, internal access tracks and perimeter fencing.
- Overhead and underground electrical cable reticulation.
- 66 KV overhead cable run to connect the proposal to the Wagga Wagga substation.

The existing TransGrid Wagga Wagga 66 kV transmission line bisects the development footprint in a south west to north east direction, forming part of the electricity distribution network that originates at TransGrid's Wagga Wagga Substation. The proposed solar farm will connect directly to the transmission line where it crosses the site, with a substation required near this location within the proposal area.

The existing approved solar farm features approved construction and operational access locations, and it is expected these would be adopted for the purposes of the proposed development.

The proposed Wagga Wagga Solar Farm South is expected to operate for at least 30 years.

The construction phase of the proposal is expected to take 9 to 12 months. After the initial operating phase, the solar farm would either be decommissioned, removing all above ground infrastructure and returning the site to its existing land capability, or upgraded with new photo voltaic equipment.

1.4. PROJECT PERSONNEL

The assessment was undertaken by NGH archaeologist Amy Ziesing, including research, Aboriginal community consultation, field survey, artefact analysis, GIS mapping and report preparation. Kirsten Bradley also participated in the fieldwork. Ali Byrne and Matthew Barber reviewed the report.

Consultation with the Aboriginal community was undertaken following the process outlined in the *Aboriginal cultural heritage consultation requirements for proponents 2010.* Two Aboriginal groups and one individual registered their interest in the proposal.

These registered Aboriginal parties were:

- Bundyi Aboriginal Cultural Knowledge (BAC);
- Yalmambirra; and
- Bidya Marra Consultancy (Bidya Marra).

Representatives who participated in the survey and subsurface testing fieldwork were:

- Mark Saddler (Representing BAC);
- Dylan Ingram (Representing Bidya Marra Consultancy); and
- Jordan Ingram (Representing Bidya Marra Consultancy).

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

1.5. REPORT FORMAT

For the purposes of this assessment of the Wagga Wagga Solar Farm South, we have prepared the report in line with the following:

- 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 2010* (ACHCRP) (OEH 2010b) produced by the NSW OEH.

The purpose of this ACHA Report is therefore to provide an assessment of the Aboriginal cultural values associated with the study area and to assess the cultural and scientific significance of any Aboriginal heritage sites.

The objectives of the assessment were to:

- Conduct Aboriginal consultation as specified in clause 80c of the *National Parks and Wildlife Regulation 2009*, using the consultation process outlined in the ACHCRP*;*
- Undertake a field survey program of the proposal area to identify and record any Aboriginal heritage objects;
- Undertake subsurface testing of the areas with potential archaeological deposits to identify the nature of archaeological material;
- Undertake an assessment of the archaeological and cultural values of the proposal area and any Aboriginal sites therein;
- Assess the cultural and scientific significance of any archaeological material, and
- Provide management recommendations for any objects found.

2. ABORIGINAL CONSULTATION PROCESS

The consultation with Aboriginal stakeholders was undertaken in accordance with clause *80C of the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010* following the consultation steps outlined in the ACHCRP guide provided by BCD. 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 undertaken has been documented in a consultation log, which is provided in Appendix A, along with copies of relevant correspondence with organisations and individuals.

A summary of actions taken in accordance with the ACHCRP guideline is provided below.

Stage 1. Letters outlining the development proposal and the need to carry out an ACHA were sent to the Wagga Wagga LALC and various statutory authorities including BCD (formerly OEH), as identified under the ACHCRP. An advertisement was placed in the local newspaper, the *Daily Advertiser* on the 17th of May 2019, seeking registrations of interest from Aboriginal people and organisations. A further series of letters were sent to other organisations identified by OEH in correspondence to NGH. In each instance, the closing date for submission was 14 days from receipt of the letter.

As a result of this process, three Aboriginal groups registered their interest in the proposal.

These registered Aboriginal parties were:

- Bundyi Aboriginal Cultural Knowledge (BAC);
- Yalmambirra; and
- Bidya Marra Consultancy (Bidya Marra).

No other party registered their interest.

Stage 2. On the 4th of June 2019, an Assessment Methodology document for the project was sent to the three registered Aboriginal parties as listed above. This document provided details of the background to the proposal, a summary of previous archaeological surveys and the proposed heritage assessment and subsurface testing methodology. The document invited comments regarding the proposed methodology and sought any information relating to known Aboriginal cultural significance values associated with the subject area and/or any Aboriginal objects contained therein. A minimum of 28 days was allowed for a response to the document.

BAC commented by email that they would like the subsurface testing program to include an additional PAD area around the drainage lines associated with the man-made farm dam. NGH responded to this by email saying that the final PAD areas would be finalised and refined during the ACHA survey and that this area would be taken into consideration based on these results. BAC was satisfied with this approach.

No other comments were received on the methodology from the other two registered parties and BAC and Bidya Marra expressed an 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 study area. It was noted that sensitive information would be treated as confidential. Responses regarding cultural information were received from both groups participating in the fieldwork. This information is provided below.

At this stage, the fieldwork was organised, and Bundyi Aboriginal Cultural Knowledge and Bidya Marra were asked to participate in the fieldwork. including archaeological survey and test excavation, which was from 22nd to 30th July 2019 by two NGH archaeologists with local Aboriginal representatives.

Representatives who participated in the survey and subsurface testing fieldwork were:

- Mark Saddler (Representing BAC 23rd,29th and 30th of July 2019);
- Dylan Ingram (Representing Bidya Marra Consultancy 22nd, 23rd, to 26th, 29th and 30th of July 2019); and
- Jordan Ingram (Representing Bidya Marra Consultancy 22nd, 24th to 26th of July 2019).

Stage 4. In September 2019 a draft version of this *Aboriginal Cultural Heritage Assessment Report* for the proposal (this document) was forwarded to the RAPs inviting comment on the results, the significance assessment and the recommendations. A minimum of 28 days was allowed for responses to the document.

2.1. ABORIGINAL COMMUNITY FEEDBACK

2.1.1. Cultural Information Received During Fieldwork

During the fieldwork, both registered Aboriginal parties provided cultural information on the wider area and the proposal area itself, which had served as an emu sanctuary. The high cultural significance of the area was also emphasised on several occasions, due to the proximity to both the Bomen Axe Quarry and the Bomen Lagoon. Both registered Aboriginal Places are outside the current assessment area provide understanding of the use of the wider local landscape and the important cultural connection of specific landforms surrounding the project area. This kind of cultural info provides an understanding of the cultural connection to the landscape and is also information not captured in previous studies, that was provided openly by the two RAPs groups who participated in the fieldwork.

2.1.2. Fieldwork feedback

Community consultation occurred throughout the project. Following the completion of the fieldwork in July 2019, Mark Saddler (BAC) provided a report on his participation in the subsurface testing which included any additional comments on the proposal. The comments provided are summarised below and a copy the report is included in Appendix A.

- *No major Aboriginal sites or places were located, however with the closeness of the Bomen Axe Quarry, which is a protected site, I would encourage that care is taken during the process of building and infrastructure in and around this area.*
- *Any major soil removal or disturbance of the ground or area should be done in the presence of a RAP or local Wiradjuri Elder or community member. This work would also be a paid position.*
- *With regards to the actual Solar Farm project I would also ask that an 8% target be sought and met with regards to Aboriginal employment and training both while the plant is being built and also for the continuing maintenance of the site.*
- *Also any salvage of any artefacts will be done with a RAP or Wiradjuri community member or Elder and once again these people are to be paid for their time and expertise.*
- *I would also ask that native vegetation and trees be planted in the area so as to repair this place as well as offer habitat for local animals.*

A summary of how the comments have been addressed by NGH is provided below and a copy of the letter response to Mark Saddler is provided in Appendix A.

NGH recommends the avoidance of any Aboriginal heritage sites identified in this assessment and if avoidance of these sites cannot be achieved then mitigation through the form of surface salvage collection is recommended. This surface salvage of any impacted sites should be conducted in association with the registered Aboriginal Parties.

Monitoring of ground disturbance by the RAPS is deemed not to be warranted in this instance given the low density of surface and subsurface material identified. Despite this, NGH recommend an Unexpected Finds

Procedure be put in place to ensure that the appropriate actions are taken if unexpected items of Aboriginal Cultural Heritage are uncovered during the proposed works.

The employment and monitoring issues raised are not related to this archaeological assessment and the issues would be dealt with separately by Terrain Solar. NGH are unable to comment further on these particular matters.

NGH have incorporated the feedback received in the Cultural Report (Appendix A) where deemed appropriate such as noting the proximity of the registered Aboriginal Place in Section 3.3. NGH have further recommended the salvage of impacted Aboriginal Heritage sites identified in this assessment in association with the RAPs. In regard to the request for native vegetation to be planted in the area, NGH have provided a biodiversity assessment separate to this report detailing a list of appropriate vegetation to be planted in the vegetation screening barriers.

Some of these plants include:

- Blakely's Red Gum (*Eucalyptus blakelyi*)
- Yellow Box (Eucalyptus melliodora)
- Apple Box (Eucalyptus bridgesiana)
- White Box (Eucalyptus albens)
- Western Grey Box (Eucalyptus macrocarpa)
- Red Box (Eucalyptus polyanthemos)
- Kurrajong (Brachychiton populneus subsp. Populneus)
- Silver Wattle (*Acacia dealbata*)
- Hoary Guinea Flower (*Hibbertia obtusifolia*)
- Western Silver Wattle (*Acacia decora*)
- Hickory Wattle (*Acacia implexa*)
- Green Wattle (*Acacia deanei*)
- Early Wattle (Acacia genistifolia)
- Box-leaved Wattle (*Acacia buxifolia*)
- Kangaroo Thorn (*Acacia paradoxa*)
- Wedge-leaf hop-bush (Dodonaea viscosa subsp. Cuneate)
- Blackthorn (Bursaria spinosa subsp. Spinosa)

2.1.3. Draft ACHA feedback

Community consultation occurred throughout the project. The draft report was provided to each of the RAPs and feedback was sought on the recommendations, the assessment and any other issues that arose.

No comments were received on the draft report, which was finalised on 22nd of November 2019.

3. BACKGROUND INFORMATION

3.1. REVIEW OF LANDSCAPE CONTEXT

3.1.1. Geology, Topography and Climate

The landscape context assessment is based on a number of classifications that have been made at national and regional level for Australia. The national Interim Biogeographic Regionalisation for Australia (IBRA) system identifies the proposal area as located within the NSW South Western Slopes of south eastern Australia (DE&E 2016).

The NSW South Western Slopes Bioregion is an extensive area of foothills and isolated ranges comprising the lower inland slopes of the Great Dividing Range extending from north of Cowra through southern NSW into western Victoria with an area of 8,657,426 hectares. About 8,070,608 hectares or 93.22 per cent of this bioregion occurs in NSW, with the remainder in Victoria. The NSW portion of the bioregion occupies about 10.1 per cent of the state.

The bioregion is bounded by 6 other bioregions: 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 extends from 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.

The bioregion includes parts of the Murray, Murrumbidgee, Lachlan and Macquarie River catchments.

The geology is comprised 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 proposal area sits within two Mitchell landscapes: Junee Hills and Slopes (Jhs) and the Murrumbidgee – Tarcutta Channels and Floodplains (Mtc) (DECC 2002). These Mitchell Landscape descriptions are provided in Table 1 below. The topography recorded for the Bomen region is a large area of foothills and ranges. (eSpade v.02: Lloyd soil landscape).

Interim Biogeographic Regionalisation for Australia

The national IBRA system identifies the proposal area as being located in the South Western Slopes Complex (NSS) which is split into two subregions, the Upper Slopes (NSS01) and Lower Slopes (NSS02), outlined in Table 1 (DEE 2016). The proposal area is located across the barrier of the two subregions.

The NSW South Western Slopes Bioregion is an extensive area of foothills and isolated ranges comprising the lower inland slopes of the Great Dividing Range, extending from Albury in the south to Dunedoo in the north east, with an area of 8,657,462 ha. Inland streams pass across the slopes in confined valleys with terraces and local areas of sedimentation. Soils and vegetation are complex and diverse but typified by texture contrast soils and a variety of eucalypt woodlands, making this bioregion the southern equivalent of the Nandewar Bioregion.

Table 1 South Western Slopes complex subregions after Morgan and Terry (1992).

Bioregion - Subregion	*Geology*	*Landforms*	*Soils*
South Western Slopes - Upper Slopes	Ordovician to Devonian folded and faulted sedimentary sequences with inter-bedded volcanic rocks and large areas of intrusive granites.	Steep, hilly and undulating ranges and granite basins. Occasional basalt caps, confined river valleys with terrace remnants.	Shallow stony soils on steep slopes, texture contrast soils grading from red subsoils on upper slopes to yellow subsoils on lower slopes. Alluvial sands, loams and clays.
South Western Slopes - Lower Slopes	As for 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.

Mitchell Landscapes

The Mitchell landscape (2002) mapping of the proposal area is covered by only one landscape type (see Figure 5). This landscape is the Junee Hills and Slopes (Jhs). A description of this landscape and the neighbouring landscape, Murrumbidgee – Tarcutta Channels and Floodplains (Mtc), which sits 160 m to the east of the current assessment area, has been provided in Table 2 below. The Mitchell landscapes provide more specific landform, soil and vegetation profiles for these two landscape areas.

Table 2 Description of the Mitchell Landscapes within 200 m of the proposal area (DECC 2002).

Mitchell Landscape	*Landforms*	*Soils*	*Vegetation*
Junee Hills and Slopes **Landscape Code: Jhs** **Ecosystem Meso grouping: NSS Lower Slopes Granites**	Rolling hills, low ranges and undulating plain on Silurian-Devonian massive granite and granodiorite, general elevation 300 to 450m, local relief 60m.	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 (Eucalyptus dwyeri) and red ironbark (Eucalyptus sideroxylon) on high rocky areas. On slopes open forest of; grey box (Eucalyptus microcarpa), red stringybark (Eucalyptus macrorhyncha) with patches of black cypress pine (Callitris endlicheri) in rocky outcrops. River red gum (Eucalyptus camaldulensis) and river oak (Casuarina cunninghamiana) along streams.
Murrumbidgee – Tarcutta Channels and Floodplains **Landscape Code: Mtc**	Channels, floodplain and terraces of Murrumbidgee tributaries on Quaternary alluvium, general	Undifferentiated organic sand and loam on the floodplain, brown gradational loam and yellow texture-	River red gum (Eucalyptus camaldulensis) gallery woodland on banks, yellow box (Eucalyptus melliodora) and grey box (Eucalyptus

Ecosystem Meso grouping: NSS Upper and Lower Slopes	elevation 200 to 400m, local relief 25m.	contrast soils on higher terraces.	microcarpa) open woodland on floodplain and terraces.

Soil Landscapes

Soil mapping has been completed for parts of NSW by the (former) OEH, which identifies two soil landscapes associated with the project area: East Bomen (eb) and Glenmornon (gl) (eSpade v.02). The surrounding soil landscapes include the Kurrajong Plains, located 70 m to the east of the proposal area boundary and Currawarna located 720 m and 1.4 km from the south east and south west of the current assessment area. The area in general is characterised by dark brown to dark reddish-brown sandy clay loam. The East Bomen and Glenmornon soil landscapes are described in Table 3 and shown in Figure 6.

Table 3 Description of the Soil Landscapes relevant to the proposal area (eSpade v.02).

Soil Landscape	*Description*
East Bomen (eb)	Undulating rises, broad crests and ridges and long lower slopes with shallow drainage depressions and almost completely cleared tall woodland, with slopes ranging from 3-10%. Local relief is 15-40 m and elevation between 200–280 m. The soils comprise clay and loam. The topsoil is a dark to dull reddish brown sandy loam to clay loam overlying a bright reddish brown light to medium clay. The subsoil comprises a dull yellow orange to yellowish brown clay overlying a bright orange to bright yellowish brown coarse sandy clay.
Glenmornon (gl)	Ridges and crests of granite low hills with common rock outcropping (20-50%) and extensively cleared tall woodland and open forest. Slope gradients are <15% and some <30 m, local relief ranges from 30-100 m and elevation varies from 200-450 m, rising towards the south east. Soils include a dark brown to dark reddish brown sandy clay loam topsoil overlying a Reddish brown to yellowish sandy clay subsoil.

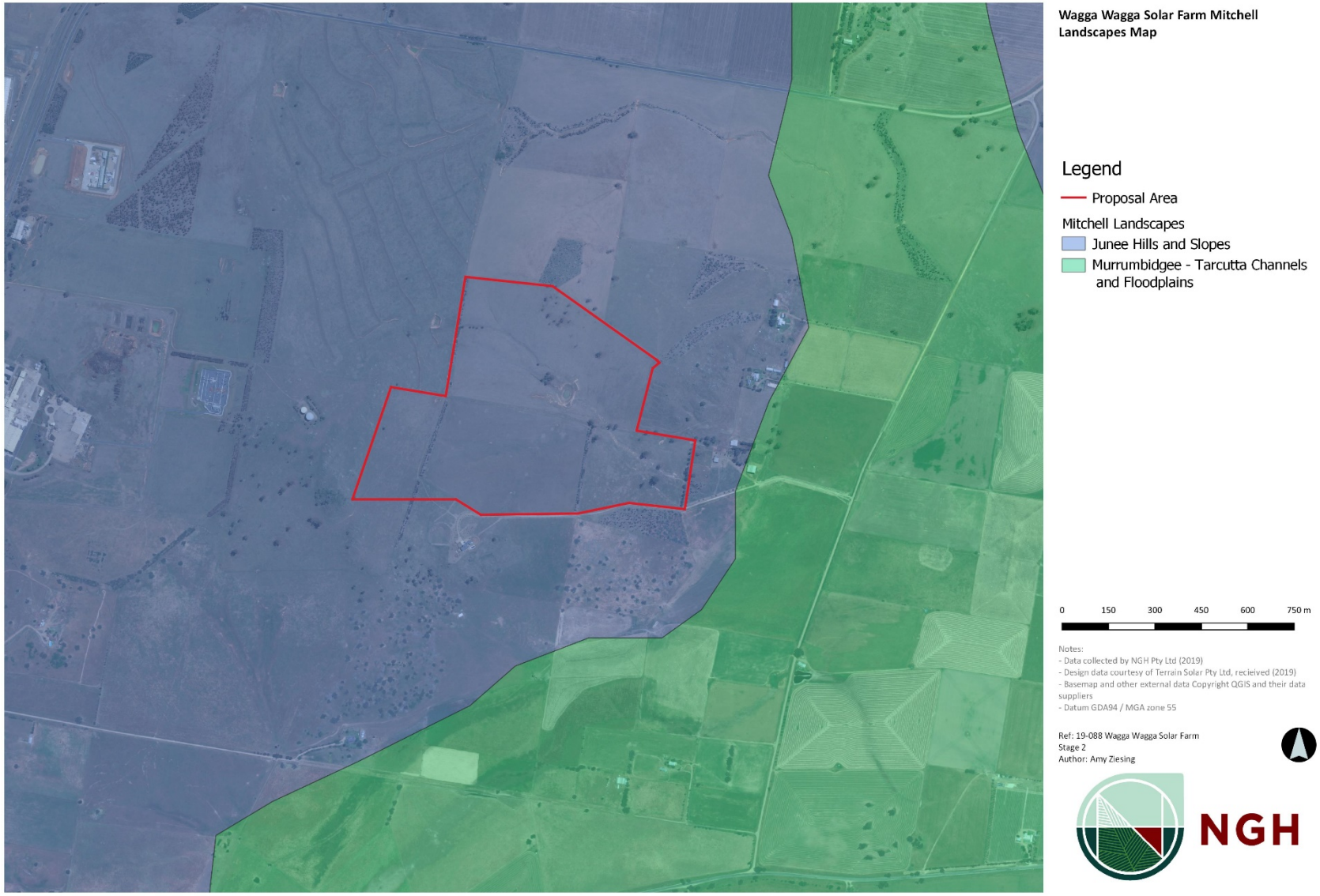


Figure 5 Mitchell Landscapes within 200 m of the Proposal Area.

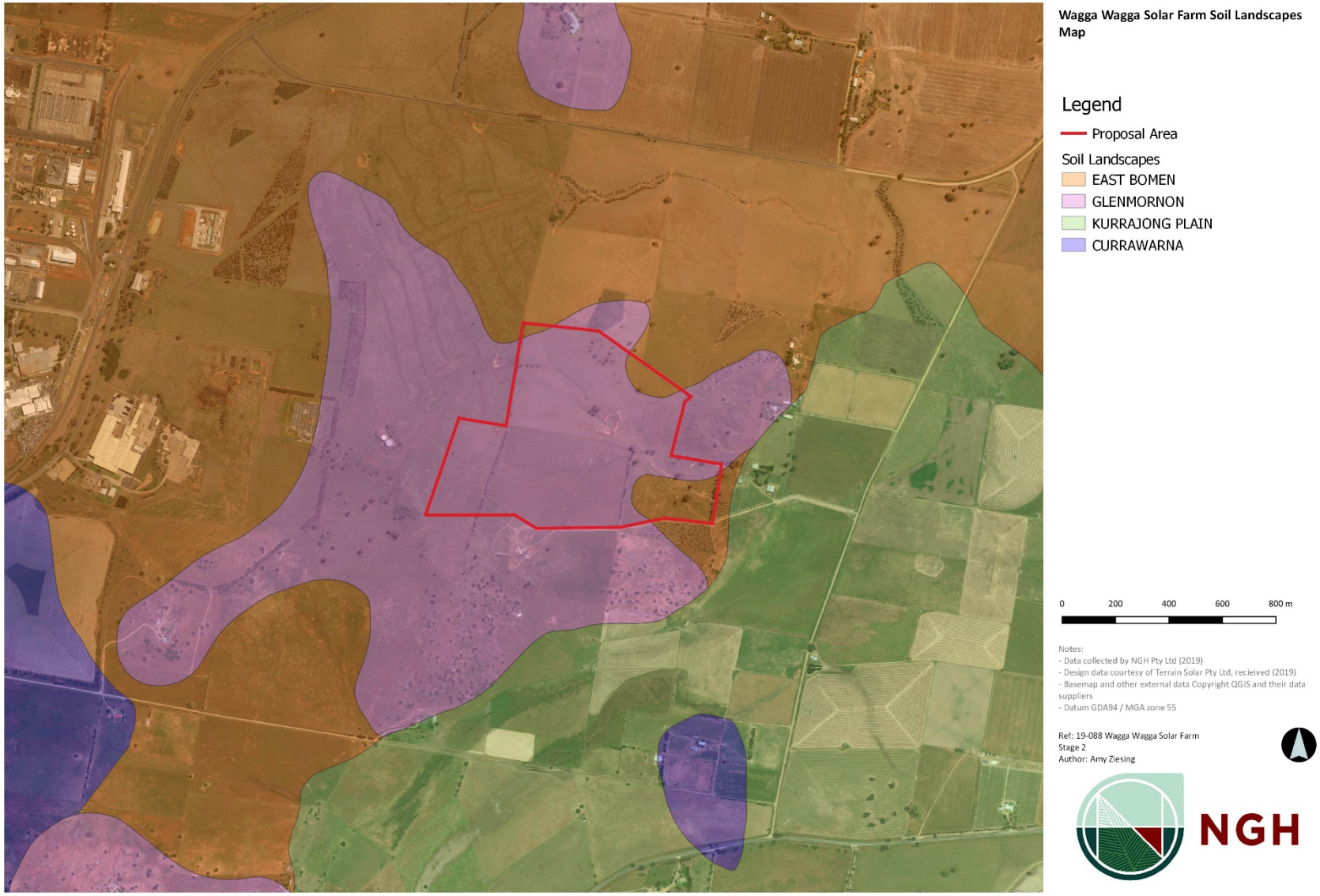


Figure 6 Soil Landscapes within 1 km of the Proposal Area.

3.1.2. Hydrology

Average annual rainfall is 550-650 mm, causing moderately moist soils in winter and spring, but dry deposits in summer and early autumn. Run-on is low across all landforms.

Currently, only minor ephemeral drainage lines exist across the proposal area, with a second order stream running in a north west- south east direction and flowing into Kurrajong Lagoon; and three first order streams branching in, that extend to the western boundary. One large dam sits in the central portion of the site. If this drainage line was infilled at some point in the historic development of the Bomen region then it may have originally been larger and deeper. The most significant watercourse in proximity is the Murrumbidgee River, which lies 2.3 km south east and Dukes Creek which lies 3.4 km to the north west of the proposal area.

Based on the mapping of the Murrumbidgee River floodplain undertaken by Access Archaeology & Heritage, the proposal area sits on the northern floodplain boundary and therefore the landforms associated with the junction of these drainage lines and floodplain are particularly archaeologically sensitive (Figure 7).

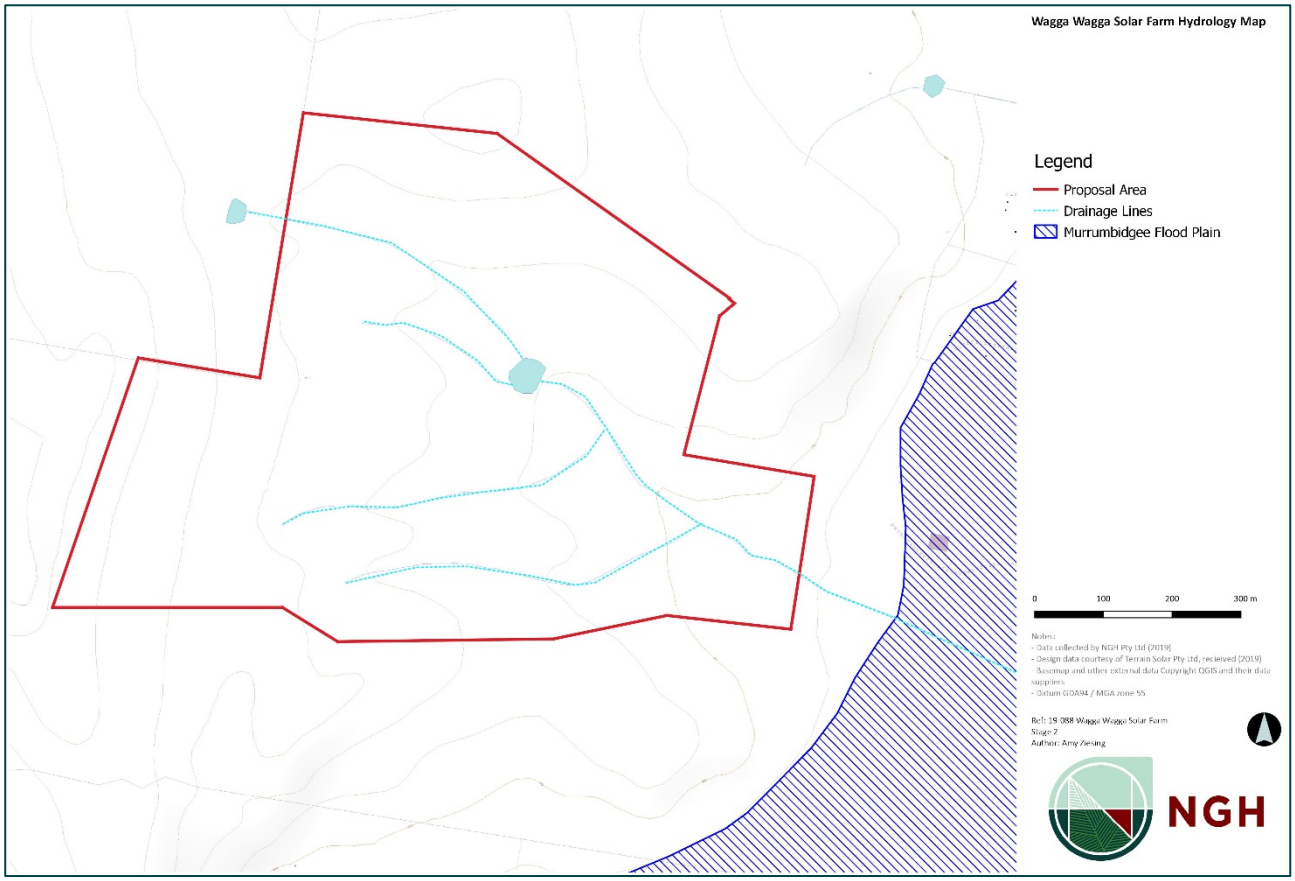


Figure 7 Murrumbidgee Flood Plain and Hydrology Map of the proposal area.

3.1.3. Flora and Fauna

The character of the native vegetation depends to a great extent on the underlying soils and topography.

Areas of the two soil landscapes comprise extensively cleared tall woodland; however, some species do remain as scattered paddock trees. These include tumbledown red gum (*Eucalyptus dealbata*), red ironbark (*E. sideroxylon*), red stringybark (*E. macrorhyncha)* and less commonly, white box (*E. albens*).

The original composition of the understorey has been significantly altered by clearing and the introduction of other species.

The most common species include daphne heath (*Brachyloma daphinoides*), native grass tree (*Xanthorrhoea spp.*) and lovegrass (*Eragrostis spp.*). In areas that have experienced widespread tree clearing, grasses dominate including wallaby grass (*Austrodanthonia caespitosa*), spear grass (*Heteropogon contortus*) and wire grass (*Eriachne obtusa*).

Within the proposal boundary small areas of remnant old growth and scattered isolated trees remain. The remainder has been subject to clearing and replanting with juvenile trees along fence lines.

Some native fauna species common to the Bomen area include Little Eagle (*Hieraaetus morphnoides*), Superb Parrot (*Polytelis swainsonii*), Grey-headed Flying Fox (*Pteropus poliocephalus*), Squirrel Glider (*Petaurus norfolcensis*) and the Sloane's Froglet (*Crinia sloanei*).

Prior to the land clearance and removal of native vegetation, the woodlands would likely have formed habitat a variety of animals including ground-dwelling and arboreal marsupials such as macropods, possums, gliders, wombats, echidnas; birds; lizards, such as goannas; and snakes. These animals were important to past Aboriginal people as they were valuable as a source of food, as well as being resources for clothing (fur) and implements (bone).

During the fieldwork, both registered Aboriginal parties provided cultural information on the wider area and the proposal area itself, which had served as an emu sanctuary. The high cultural significance of the area was also emphasised on several occasions, due to the proximity to both the Bomen Axe Quarry and the Bomen Lagoon.

3.1.4. Historic Land Use and Disturbance

The Bomen and wider Wagga Wagga region has a long history of intensive agricultural and pastoral use. The majority of the area has been utilised for grazing since European settlement in the early 1830's. The location of the proposed Wagga Wagga Solar Farm South is within an area that appears to fall within the boundaries of the old Eunanoreenyha run owned by Charles Tompson and later his son Frederick Anslow Tompson. It was first established in the North Wogga Wogga area in 1833 and remained in the family until 1849 when Frederick suffered financial hardship and had to foreclose and relocate to his residence known as Waterview in current Sturt Street, Wagga Wagga (NGH 2019: 5) Aerial imagery of the pastoral paddocks across the proposal area therefore has been subject to impacts from farming for at least the last 16 years. Previous disturbance in creeks and drainage lines across the Bomen area was seen with attempts to infill these landforms however, it is unknown if this practise extended into the current assessment area.

Land throughout the Bomen region has been used primarily for sheep and cattle grazing as well as the production of crops. This has involved prolonged exposure to ploughing and ground disturbance. Areas that have been overgrazed have lost significant amounts of the topsoil to erosion.

Within the proposal area, crop production and sheep grazing are widespread, excluding the areas at the base of the granite outcropping crests which remain relatively undisturbed.

Localised areas of disturbance have resulted from the installation of a farm dam, troughs, paddock fencing and vehicle access tracks across the site.

3.1.5. Landscape Context

Most archaeological surveys are conducted in a situation 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 archaeological sites. As already noted, three ephemeral drainage lines intersect the proposal area and flow south east to Kurrajong Lagoon.

Locations in close proximity to a water source, on level or gently sloping elevated landforms tend to have been favoured for occupation by past Aboriginal people in the area.

As such, the raised, level well-drained landform units associated with the second order stream are most likely to contain evidence of Aboriginal land use. The location of the northern boundary of the Murrumbidgee Floodplain is also likely to have been a major focus for Aboriginal people as it provided a safe, elevated camping area during times of flood. However, prior to European land modifications, this area as a whole may have provided resources, shelter, water and food for Aboriginal people.

The different soil and Mitchell landscapes noted above were not readily identifiable within the proposal area and were not used as a means of landscape differentiation. The landforms for the survey were instead determined to be five landforms based on topography identified during the visual inspection of the proposal area during field survey and from the review of detailed contour and DEM mapping. These five landforms are shown in Figure 8 and listed below.

- Drainage lines;
- Flats;
- Slopes;
- Elevated flats/spurs; and
- Disturbed areas.

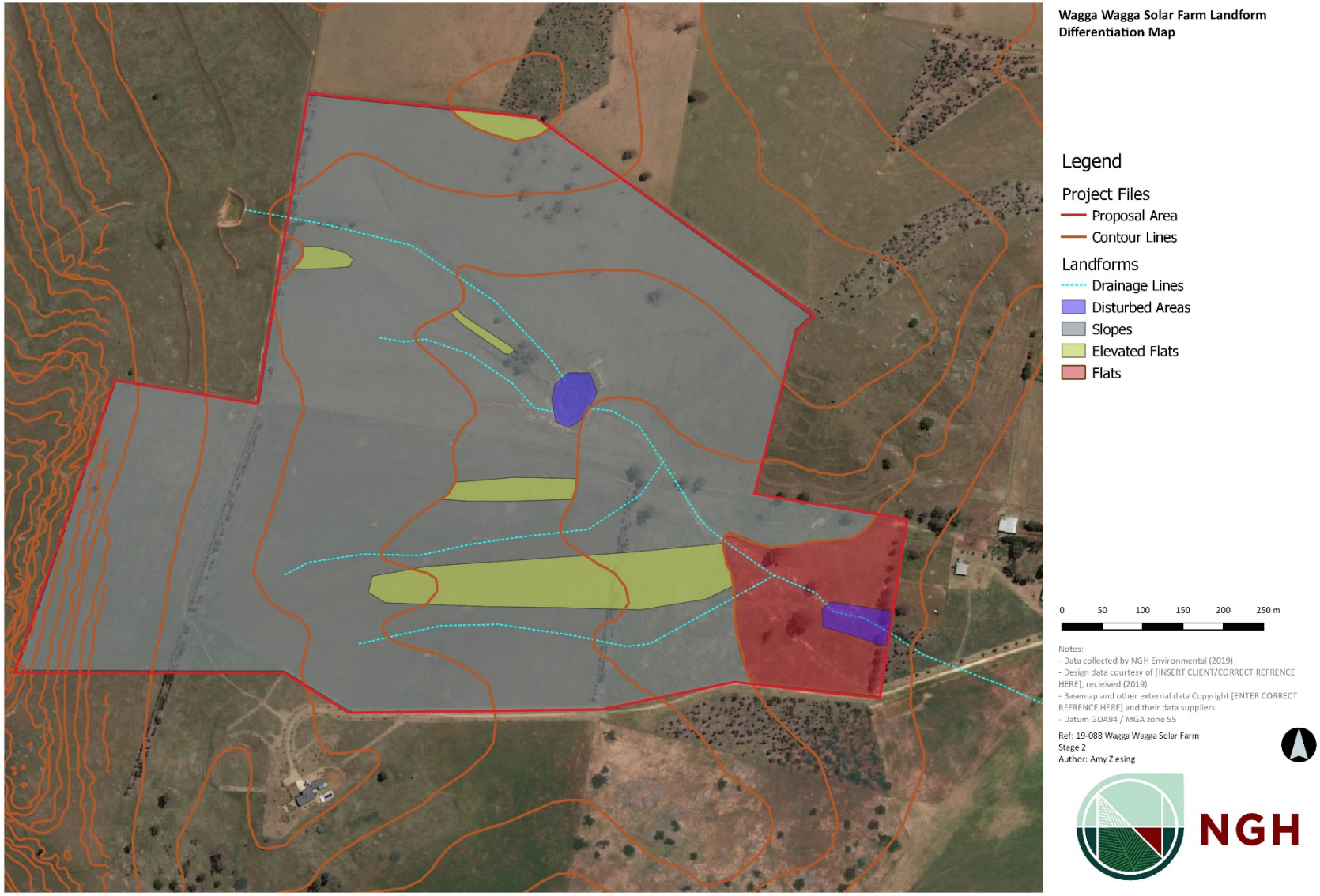


Figure 8 Landform Differentiation in the Proposal Area.

3.2. REVIEW OF ABORIGINAL ARCHAEOLOGICAL CONTEXT

3.2.1. Ethnohistoric 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 however 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 and 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 Aboriginal people of the region continue to have a strong connection to their land.

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 *et al*. 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 et al. 2005, pp. 8 & 16).

Bomen is within an area identified as part of the Wiradjuri language group. This is an assemblage of many small clans and bands speaking a number of similar dialects (Tindale 1974, MacDonald 1983, Horton 1994).

The Wiradjuri language group was the largest in NSW prior to European settlement. The borders were however, not static, they were most likely fluid, expanding and contracting 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 were part of a larger band which comprised several families. They moved within an area defined by their particular religious sites (MacDonald 1983). Such groups might come together on special occasions such as pre-ordained times for ceremonies, rituals or simply if their paths happened to cross. They may also have joined together at certain times of the year at certain places 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 several 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 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.

European settlers started arriving in the district in the 1820s. At this point the Aboriginal population was in decline, due to disease such as smallpox and influenza as well as dispossession from traditional lands and acts of violence against the Aboriginal people.

This meant there was great social upheaval and partial disintegration of the traditional way of life. The dramatic increase in the number of non-indigenous settlers around Wagga Wagga from the 1850s to the 1870s, during the gold rush resulted in the further displacement of the Aboriginal population and acts of violence (Burless 1997). This meant that access to traditional resource gathering and hunting areas, religious life and marriage links and access to sacred ceremonial sites were disrupted or destroyed.

Early settlers and others who wrote about the Wiradjuri people and customs differentiated between the origin of some groups, referring to people as the Lachlan or Murrumbidgee tribes, or the Levels tribe 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, Wiradjuri people were adept at identifying and utilising resources either on a seasonal basis or all year round.

Terrestrial and arboreal 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 (Fraser 1892, Pearson 1981). 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 pre-arranged nets (Ramson 1983).

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 and pastoralists, surveyors, explorers, administrators and others observed traditional Aboriginal activities, including ceremonies, burial practices and general way 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. Anything made from bark and 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 would 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.

3.3. AHIMS SEARCH

The Aboriginal Heritage Information Management System (AHIMS), previously run by the NSW Office of Environment and Heritage (OEH), provides a database of previously recorded Aboriginal heritage sites. 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 submitted for addition to the AHIMS register. As a starting point, the search will indicate whether any sites are known within or adjacent to the investigation area.

The results of an AHIMS search can be relied upon for 12 months for the purposes of a heritage assessment.

A search of the AHIMS database covering an area approximately ~11 km east-west by ~11 km north-south and centred on the proposal area was undertaken on Thursday 4th of April 2019, details provided below:

- AHIMS Client Service Number: 412358
- Search parameters: from Lat, Long -35.1068, 147.3706 to Lat, Long -35.0265, 147.4832
- Buffer: 200 m
- Aboriginal objects: 56
- Aboriginal places: 1

Table 4 shows the breakdown of site types and Figures 9 and 10 show the location of the AHIMS sites in relation to the proposal area.

Table 4 Breakdown of previously recorded Aboriginal sites and places within 11 km of the project area.

Site Type	Number
Artefact	41
Culturally Modified Tree	13
Stone Quarry	1
Stone Quarry; Artefact	1
TOTAL	57

Based upon these search results the main site types in this area are artefacts (71.9%), followed by culturally modified trees (22.8%) and stone quarries (5.2%). The Aboriginal Place is the Bomen Axe Quarry, which is highly significant to the Aboriginal community as a manufacturing site and also for inferring technological information, trade routes and land management practises. The Bomen Axe Quarry and Manufacturing Site is located approximately 600 m north west of the current assessment area. The Bomen Axe Quarry was identified in 1998 during an archaeological survey for a proposed power plant site. The surface hard rock quarry and axe manufacturing site is considered to have high scientific, educational and cultural value to the local Aboriginal community. The site is both rare and representative and large containing surface basalt rock, a distribution of stone cores, flakes and working areas covering approximately 1 ha (Go Green Services 2011: 16). “Bomen axe quarry is proof of long-term occupation of the area by Wiradjuri. It is still there and has high spiritual value. It was and is a gift that was given for use and interaction with other clans for trading. It was and is today held in high esteem. The Bomen axe quarry site was close to resource places (food, water, fish, emus) like Bomen, Parken Pragen and Wollundry Lagoon, the river and Kurrajong Plain. It was a lookout point to Kengal (The Rock) and the eastern highlands, an ideal men’s only area for talking while tool making and a place of reflection. It’s educational value today is in the potential to re-introduce men and younger men to activities and connections that reaffirm their identity as Aboriginal people – to re-establish some of the ways before they are lost” (Go Green Services 2011: 28).

As previous surveys have been conducted to the north of the current assessment area and in surrounding parts of Bomen, the data provides an accurate representation of site type and distribution across this region, including what may be present within the project area.

No AHIMS sites are currently recorded within the proposal area, however seven registered artefact sites are located within the approved works boundary for the Stage 1 part of the solar farm.

These lie within 270-920 m of the northern boundary of the current works area. A stone quarry is also registered within 100 m of the southern boundary and the stone outcrop that contains this site extends into the Wagga Wagga Solar Farm South area. Three artefact sites lie within 70-250 m west of the western boundary and an additional eight recorded sites and one Aboriginal place are within 770 m of the current assessment area.

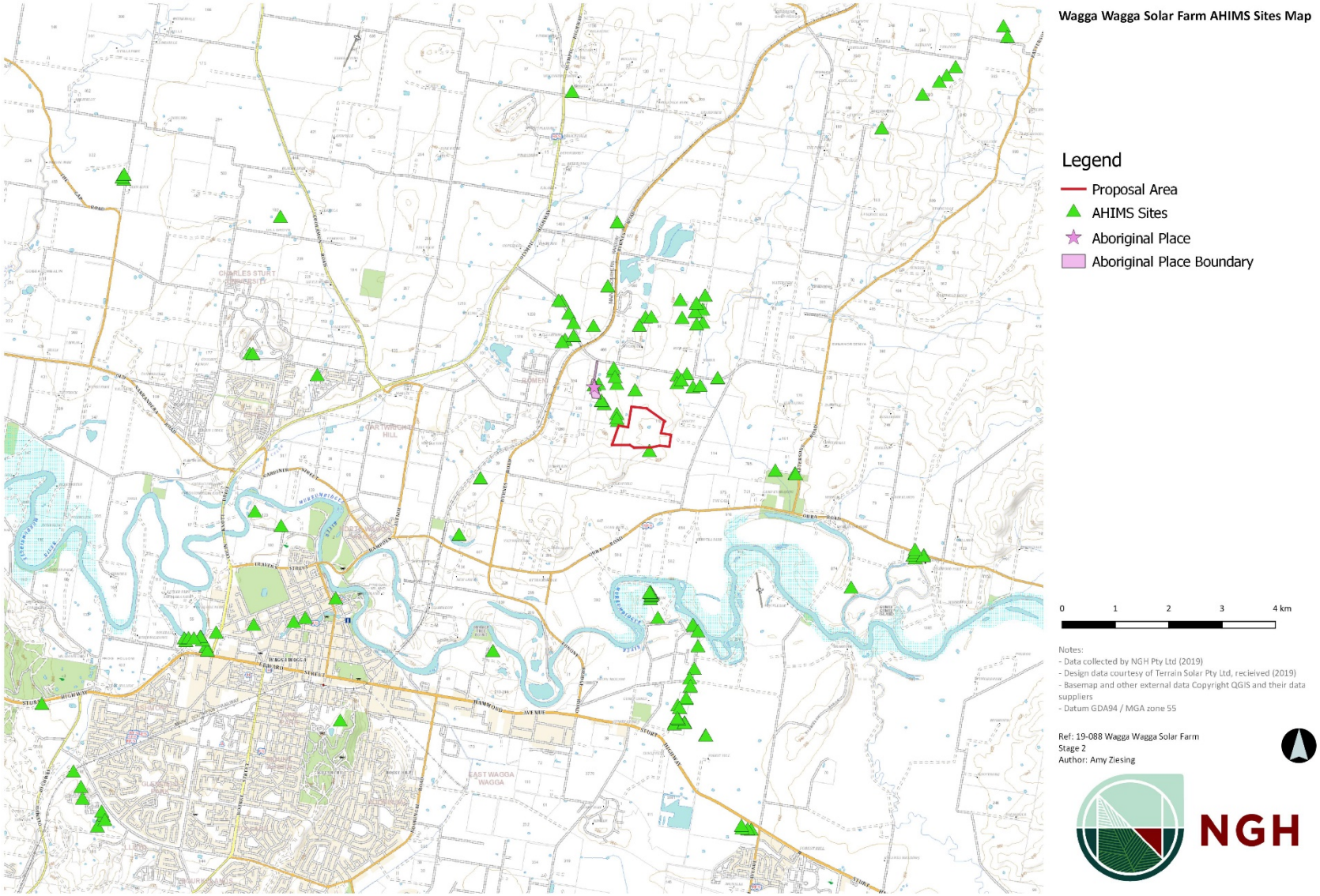


Figure 9 AHIMS Sites and Aboriginal Place in the wider Bomen and Wagga Wagga region.

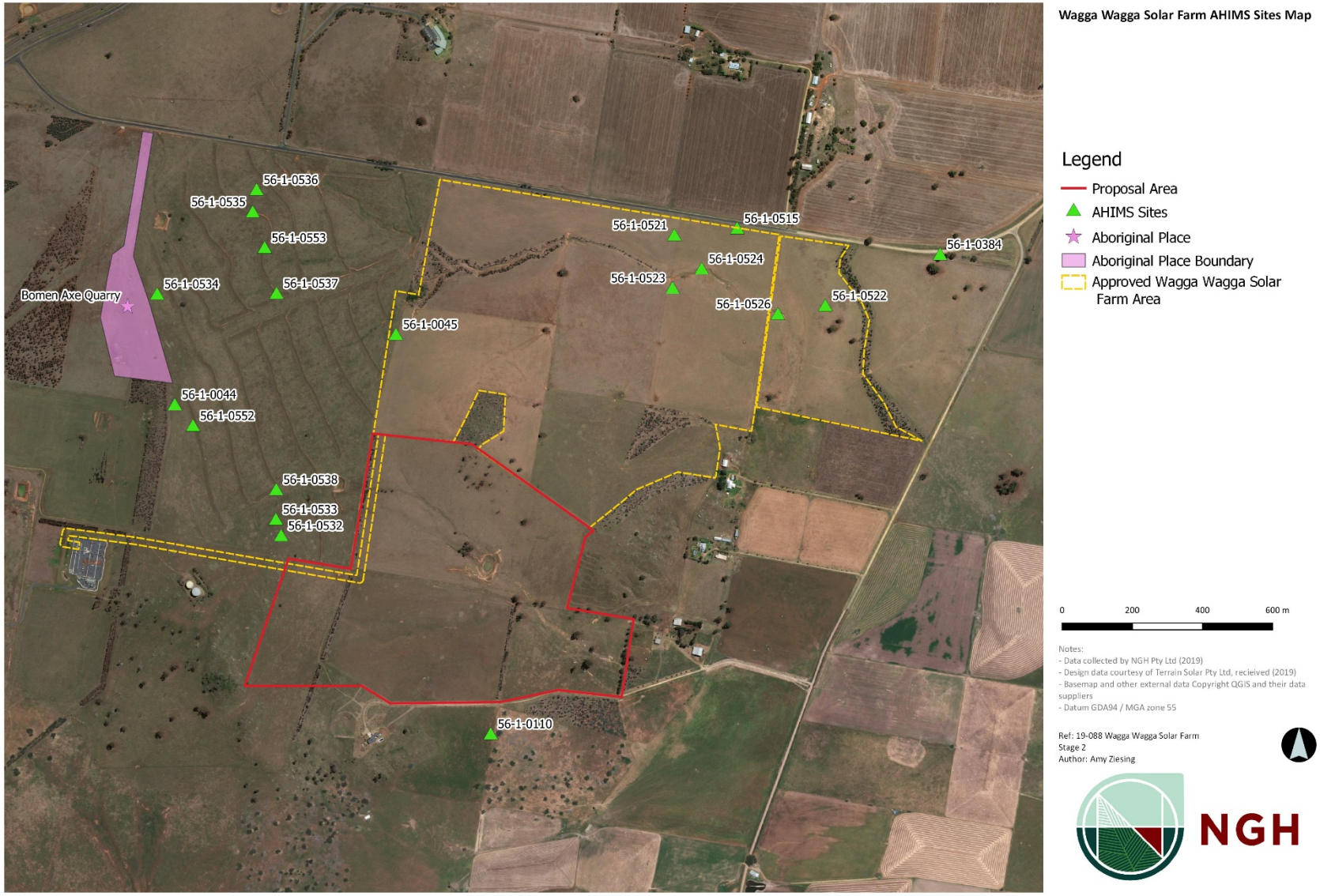


Figure 10 AHIMS Sites and Aboriginal Place within 800 m of the Proposal Area.

3.4. HISTORIC HERITAGE

Other heritage register searches were also undertaken to identify any items or places in proximity to the proposal area, with a focus on the proposal site 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, as well as items on the Register of the National Estate*, to identify any items that are currently listed within or adjacent to the proposal site.

*The Register of the National Estate is a list of natural, Indigenous and historic heritage places throughout Australia. From 19 February 2007 the Register has been frozen, meaning that no places can be added or removed. While the Register of the National Estate no longer carries a statutory weighting, the dataset can be relevant in providing information regarding the heritage values of a place. A number of items listed on the RNE can also be found on state and local level registers.

A search of the Australian Heritage Database was completed on 16th of July 2019. No historic heritage items were listed in Bomen. The closest listed places were in Wagga Wagga, approximately 6 km south east of the proposal area:

Table 5 Australian Heritage Database Search Results.

Scheme	*Heritage Item*	*Status*	*Impact*
Wagga Wagga Solar Farm	Court House	(Registered) Register of the National Estate (Non-statutory archive) Place ID: 751	None
	Post Office	(Registered) Register of the National Estate (Non-statutory archive) Place ID: 752	None
	CBC Bank (former)	(Registered) Register of the National Estate (Non-statutory archive) Place ID: 753	None
	Police Station	(Registered) Register of the National Estate (Non-statutory archive) Place ID: 754	None

Searches of the State Heritage Register for the Wagga Wagga LGA were completed on 16th of July 2019, which found three items of identified state significance located in the Bomen and Wagga Wagga. No items of state significance were located within the solar farm proposal area. The closest site of State significance is located approximately 1.4 km north west of the proposal area.

Table 6 NSW State Heritage Register Database Search Results.

Scheme	*Heritage Item*	*Status*	*Impact*
Wagga Wagga Solar Farm	Wagga Wagga Railway Station and yard group	Registered (#01279) – State Heritage Register	None
	Mobile Cook's galley (museum of the Riverina	Registered (#01722) – State Heritage Register	None
	Bomen Railway Station	Registered (#01093) – State Heritage Register	None

A search of the Wagga Wagga Local Environmental Plan 2010 was completed on 16th of July 2019, which found 70 items of local significance in Bomen and Wagga Wagga. None of these items will be impacted by proposed solar farm with the closest site being over 1.3 km to the north west. The historic heritage places identified near the proposal area are shown in Figure 11 below.

Table 7 Local Environmental Plan Listings

Scheme	Heritage Item	LEP #	Impact
Wagga Wagga Solar Farm	2WG Sign	I268	None
	Ambulance Station	I275	None
	ANZ Bank (former)	I108	None
	Barters Restaurant	I96	None
	Belmore House, Residence	I107	None
	Best Street Railway Gatehouse (former)	I254	None
	Bishops House	I115	None
	Brewery (former)	I86	None
	Brick Building	I283	None
	Bryan J Hamilton Offices (former)	I111	None
	Calvary Hospital and Chapel	I272	None

	Canary Island Palm Trees (along the lagoon)	I274	None
	CBC Bank (former)	I106	None
	Christian Brothers High School and Staff Centre (former Monastery)	I255	None
	Civic Precinct	I251	None
	Collins Park	I102	None
	Corner Store and Residence	I277	None
	Corner Store and Residence	I270	None
	Cottage	I281	None
	Council Chambers (former)	I83	None
	Court House	I104	None
	Croquet Club	I266	None
	Department of Lands Building	I109	None
	Dorset Cottage	I78	None
	Drill Hall	I256	None
	Electrical Substation	I264	None
	Fire Station Building and Residence (former)	I263	None
	Former Corner Store	I262	None
	Former Corner Store	I259	None
	Former Docker Street Railway Gatehouse	I257	None
	Hampden Bridge	I85	None

	Headmasters Residence (former)	I77	None
	House	I118	None
	Kyeamba Shire and Mitchell Shire Office Buildings (former)	I110	None
	Murrumbidgee Milling Company Flour Mill (former) and Outbuildings	I100	None
	Wagga Wagga Primary School	I234	None
	Wagga Wagga Wagga Hall	I237	None
	Palm Tree Avenue	I280	None
	Plaza Theatre	I94	None
	Police Station (former)	I236	None
	Post Office (former)	I105	None
	Racecourse Group of Buildings	I76	None
	Residence	I81	None
	Residence	I235	None
	Residence	I87	None
	Residence	I258	None
	Residence	I101	None
	Residence - Moonbiana	I271	None
	Residence (former Home of Compassion)	I91	None
	Residence (former)	I93	None
	Residence (former)	I92	None

	Residence (former)	I79	None
	Riverine Club	I75	None
	Shops	I119	None
	Semi-detached Residence	I84	None
	Rowan, dwelling	I189	None
	South Wagga Public School	I97	None
	St. Andrew's Manse	I113	None
	St Andrew's Presbyterian Church	I112	None
	St John's Anglican Church	I103	None
	St Michael's Roman Catholic Cathedral	I114	None
	Stationmaster's Residence (former)	I99	None
	Street Directory and Palm Trees	I82	None
	Terrace Building	I90	None
	Victory Memorial Gardens	I250	None
	Wagga Wagga Railway Station and Yard Group	I98	None
	Water Trough	I269	None
	Wesley Uniting Church	I276	None
	Mt Erin Convent, Chapel, High School and Grounds		None
	Bomen Stationmasters Residence	I268	None

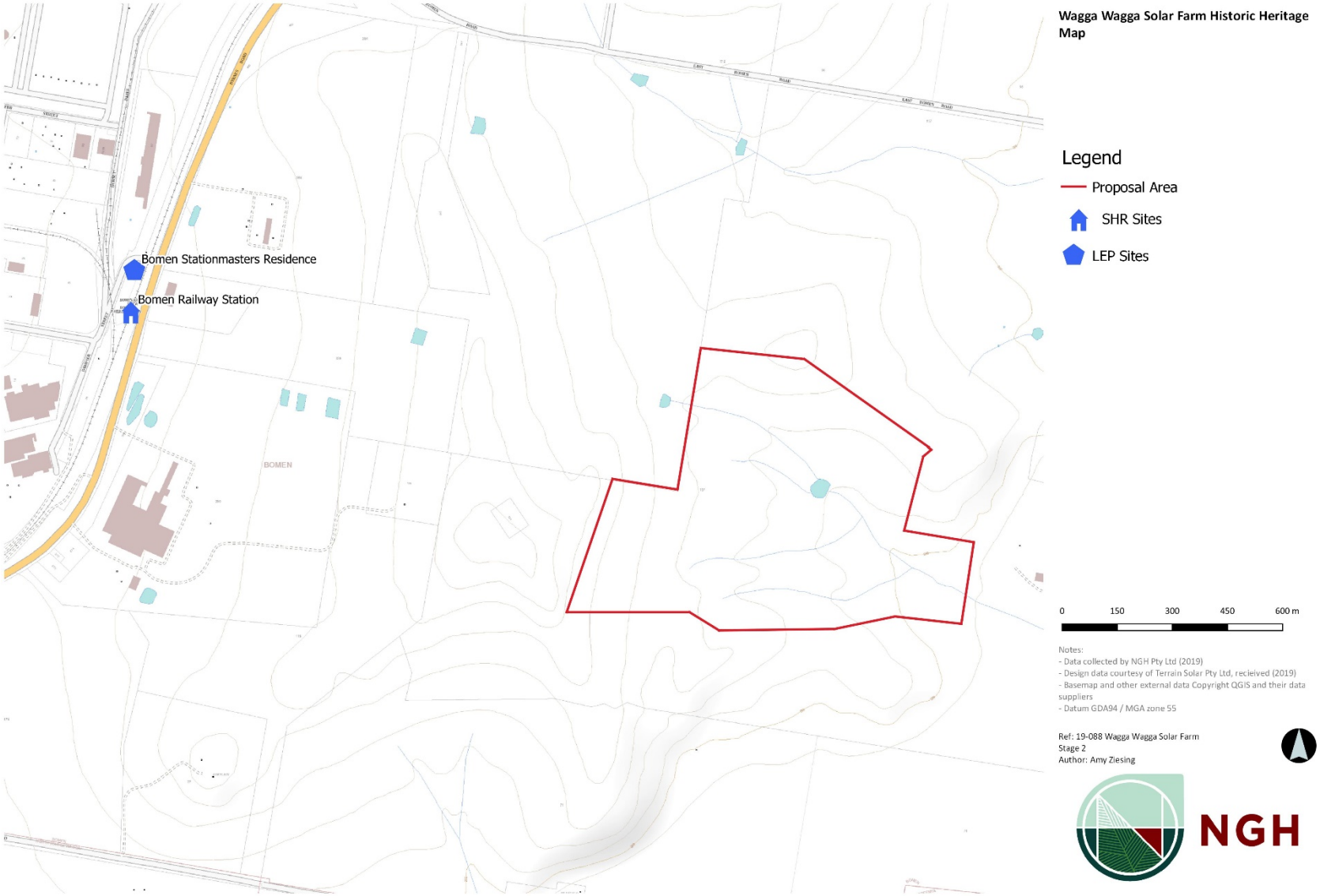


Figure 11 Historic Heritage Sites within 1.5 km of the Proposal Area.

3.5. PREVIOUS ARCHAEOLOGICAL STUDIES WITHIN AND ADJACENT TO THE PROPOSAL AREA

Aboriginal people have occupied what we now know as the Australian continent for at least 40,000 years and perhaps 60,000 years and beyond. There have been no known dated excavations in the Wagga Wagga or Bomen area, although the archaeological evidence from Lake Mungo, 550 km to the north-west provides ample evidence of Aboriginal occupation dating back 40,000 years (Mulvaney and Kamminga 1999, Hiscock 2007). No regional synthesis of the archaeology has been completed for the Bomen or Wagga Wagga area.

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, if any.

3.5.1. Wagga Wagga Archaeological Studies

A number of specific archaeological assessments, surveys and targeted sub-surface testing programs have previously occurred in the wider Wagga Wagga region. These studies are summarised below.

Witter carried out a survey for a gas pipeline between Wagga Wagga and Young in 1980. He recorded 14 artefact scatters, 21 isolated finds, a possible rock well and a modified tree. Most of the sites identified by Witter occurred in association with creeks or water courses within a range of landforms including flats, slopes and spurs. Witter recommended the excavation of some of these sites if avoidance was not possible. One of these sites, artefact scatter BY/4, was salvaged by Kelly later that same year collecting 319 surface artefacts and excavating an additional 48 artefacts (in KNC 2008:4).

A number of transmission line surveys where undertaken in 1983 including Witter and Hughes who surveyed Stage 1 of the Murrumburrah to Yass and Murrumburrah to Wagga Wagga transmission lines during which they identified four artefact scatters, 13 isolated artefacts and a possible modified tree. The artefact scatters were large open camp sites with the dominant lithology quartz. In 1983 Hiscock also identified 13 isolated artefacts and nine modified trees during another transmission line survey from Wagga Wagga to Darlington Point. During the survey of Stage 2 of the Murrumburrah to Yass Transmission line in 1983 Packard and Hughes identified 11 isolated finds, five artefact scatters and two modified trees (as cited in Oz Ark 2012:16-17).

In 1987 Silcox 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 PAD named GG1 was proposed for test excavation due to its proximity to a reliable water source, its elevated, well-drained flat surface suitable for camping and the absence of previous ground disturbance activities. Seventeen test pits at seven locations were excavated and 52 artefacts were recovered. All of the artefacts were of quartz and were found mainly in the upper 25cm of the deposits. He also identified the presence of a thin layer of mussel shell within one trench. The results indicated to Silcox that there is a low-density scatter of artefacts across the lower Murrumbidgee floodplain.

In 1993 Williams surveyed a proposed optic fibre cable route between Albury and Wagga Wagga recording a scarred tree and three artefact scatters. All of the sites were located along the margins of creek lines (as cited in AASC 1995).

Australian Archaeological Survey Consultants (AASC) (1995) conducted a study about 16 km east of Wagga 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 AASC concluded this was an accurate reflection of the Aboriginal use of this steep hill slope area with limited water availability in the area.

From 1996 to 1998 NOHC identified 65 Aboriginal sites while conducting surveys for the Wodonga-Wagga Wagga Natural Gas Pipeline. This consisted of 39 artefact scatters, 19 isolated artefacts and eight PADS. Based on these survey results it was reflected that artefact scatters are likely to be located in well-drained contexts adjacent to water sources (as cited in Central West Archaeological and Heritage Services (CWAHS 2007).

A number of subsurface test pits were excavated along the proposed route by NOHC with quartz the dominant lithology recorded. NOHC concluded from the excavations that there were not sustained or repeated visits occurring to particular areas (as cited in KNC 2008).

NOHC conducted a survey in 2002 for the Lloyd Neighbourhood Land Release Area approximately 12 km south west of the current assessment area. Five Aboriginal sites (LN1 to LN5) were located during the survey, including three artefact scatters, one isolated artefact and one probable culturally modified tree. 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. It was recommended that the scarred tree site LN5 be avoided and that the root and canopy zone of the tree should be protected. Additionally, three PADs were also noted during the survey. The PADs were associated with the eastern and western banks of an ephemeral creek line and a low spur line crest situated between two minor drainage lines. It was recommended that a limited archaeological subsurface testing program be conducted at the locations of the PADs in order to ascertain the true archaeological potential of these areas.

In 2006, Kelton conducted an Aboriginal archaeological heritage assessment for the proposed Lloyd Residential subdivision over approximately 300 ha, including the areas previously surveyed by NOHC in 2002. Five of the previously recorded sites and three PADs were within the 2006 project area. Kelton noted that there were a number of inconsistencies between the AHIMS database, site cards and report locations of sites, resulting in only one of the five previously recorded sites, an open campsite (LN2), being relocated. A total of eight new Aboriginal site locations, two isolated stone artefacts (L-IF-1, L-IF-2) and six scarred tree sites (L-ST-1 to L-ST-6) were identified. An additional four areas of PAD were also recorded (PAD 4 to 7) encompassing or adjacent to the previously recorded sites.

In 2002 Green 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 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 the Wiradjuri people past and present utilise. During the study Green identified two scarred trees and an artefact scatter in association with the Bomen Lagoon and one scarred tree within Wollundry Lagoon. The Wollundry scarred tree is registered as site WW129 however, no further information on this site is provided in the study. Further information on the location of two scarred trees recorded in the Wollundry Lagoon was found in the 2011 nomination of the site as an Aboriginal Place (Green 2011), which is detailed below.

In 2005 Kelton (as cited in CWAHS 2007:15) conducted a primarily desktop study and brief field assessment of approximately 600 ha within the Henwood property, between Coolamon Road the Olympic Highway and Sutherlands Road, Wagga Wagga. While the survey visibility of the area was poor a number of areas of archaeological sensitivity and PADs 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 ridges in the area were also identified as archaeologically sensitive landforms in the area.

In 2005, Kelton from Kelleher Nightingale conducted an Aboriginal archaeological heritage assessment over the proposed 1.4 km eastern extension of Copland Street, Wagga Wagga. This lies approximately 5.8 km south east of the current assessment area on the southern Murrumbidgee floodplain. No Aboriginal sites were found during the field survey. One PAD was identified by Kelton. PAD 1 was situated on a flat alluvial/colluvial terrace adjacent to Dukes Creek, outside the current study area. Kelton assessed PAD 1 as having low-moderate archaeological potential.

In 2005, Austral Archaeology conducted a survey for the proposed Wagga Wagga Rail Bridge Replacement. They produced an ACHA and Statement of Heritage Impact (SOHI) for these works, identifying six areas of potential archaeological deposit, but no new sites of Aboriginal heritage. Areas of high potential were identified along the Murrumbidgee floodplain. These areas were relatively undisturbed and contained deep soil profiles and high potential for *in situ* subsurface finds. Areas of moderate sensitivity were identified 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 undulating floodplain. Areas of low archaeological potential were recorded south of the Murrumbidgee River on the south-east side of the track, between the riverbank and the fence line.

In CWAHS surveyed approximately 40 ha for the proposed extension to the Wagga Quarry on Roach Road, Wagga Wagga. The quarry is on alluvial floodplain on the southern side of the Murrumbidgee River. While the locality has been noted as an archaeologically sensitive area, no sites or PADs were identified. The area was extensively disturbed and CWAHS concluded that the flood prone nature of the survey area would not have been ideal for Aboriginal occupation on a regular basis due to regular inundation.

In 2010 AECOM Australia conducted the Aboriginal and historic heritage study for Stage 1 of a 61 km pipeline project from Bethungra to Wagga Wagga. The survey methodology was designed to 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 recorded along the propose pipeline route, including 24 previously unrecorded sites. The majority of sites identified 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.

In 2011 Go Green Services completed an assessment report for the Aboriginal Place Nomination for Wollundry Lagoon and Tony Ireland Park, approximately 6.6 km south west of the current assessment area (Go Green Services 2011b). The report assessed the significance of the lagoon based on the nomination made by the Wagga LALC. The Wollundry Lagoon was a valuable fishing resource, spiritual and meeting place due to its proximity to the Murrumbidgee River. The name “Wollundry” was noted to be the European version of the Wiradjuri word “Walang-duray,” meaning “stone having” or “place of stones” (Go Green Services 2011: 3). Tony Ireland Park is significant as a Wiradjuri fish breeding and management site and also as the site of the first European blacksmiths shop in Wagga Wagga (Go Green Services 2011: 5). The lagoon was also noted to be significant as a wetland and natural billabong resource (Go Green Services 2011: 3). The field assessment also included the Bomen Axe Quarry, Bomen Lagoon, Wiradjuri Reserve and Flowerdale Lagoon all of which were subsequently nominated as Aboriginal Places (Go Green Services 2012: 5). The assessment detailed the history of the Wollundry Lagoon and its significance both environmentally and culturally, also providing brief details relating to the recorded scarred tree, which it lists as being “partially under water and obscure to visitors” (Go Green Services 2011: 9). The report also explained how the lagoon now contains very little remaining archaeological evidence of Wiradjuri occupation, excluding the two scarred trees recorded by Green in 2002. These trees were both dead River Red Gums standing in the water at the edge of the lagoon however only one of these trees still remains (AHIMS# 56-1-0088), located on the northern bank of the lagoon between Ivan Jack Drive and Beckwith Street bridges (Go Green Services 2011: 48). The dimensions of the scar and tree are also provided. The scar measures 1.3x0.5 m (LxW), with the tree height estimated at 10 m and its circumference at 4 m. The position of the tree in the water is affecting the preservation of the scar. The second scarred tree had fallen over sometime between 2002 and 2011 and its location is no longer obvious. Green presumes that the scars were made on large trees that were situated on the former edges of the ephemeral lagoon. Since this time, the Wollundry Lagoon has been heavily modified to hold water permanently and the water level raised artificially by approximately 1 m, resulting in the inundation of the base of the trees (Go Green Services 2011: 49).

In 2012 Go Green Services completed an assessment report for the Aboriginal Place Nomination for Flowerdale Lagoon, approximately 8.6 km south west of the current assessment area (Go Green Services 2012a). The report assessed the significance of the lagoon based on the nomination made by the Waagan Waagan Project Group.

The Flowerdale Lagoon was noted to be a valuable fishing resource place and also where Wagga Wagga, in the 1830s, obtained its name in the Wiradjuri language. In modern times, the site has been valued by the Aboriginal community as a recreation and learning place in relation to native birdlife, cultural and aesthetic values and spiritual presence associated with the Murrumbidgee River environment (Go Green Services 2012: 1). The assessment details the history of the lagoon and its significance both environmentally and culturally, but it does not provide a description of archaeological sites that were located in the Pound Flat area along the southern edge of the lagoon.

Also, in 2012, Go Green Services completed an assessment report for the Aboriginal Place Nomination for Wiraduri Reserve and Gobba Beach, approximately 6.8 km south west of the current assessment area (Go Green Services 2012b). The report assessed the significance of the site based on the nomination made by the Waagan Waagan Project Group. The Wiraduri Reserve and Gobba Beach were noted as a valuable resource, meeting and river crossing place for Wiradjuri people (Go Green Services 2012b: 3).

Since European settlement, the Reserve has continued to be a camping and meeting place, which possibly housed an Aboriginal camp during the 1870s (Go Green Services 2012: 5). The field inspection revealed no items of Aboriginal archaeological significance remaining within the highly modified landscape of the Wiradjuri Reserve or Gobba Beach (Go Green Services 2012: 77).

In 2012, OzArk Environmental & Heritage Management (OzArk) were commissioned by GHD Wagga and the Wagga Wagga City Council to conduct an Aboriginal and historic heritage survey to identify possible constraints associated with proposed upgrade works to the Main City Levee and the Wagga Wagga Wagga Levee. The Wagga Wagga Levee is located approximately 5.3 km south west of the current assessment area. No Aboriginal objects or sites were identified during the current field assessment and no areas were assessed as having potential to contain further undetected Aboriginal sites.

Umwelt undertook excavations of the Wagga Wagga Courthouse in 2013 as part of the courthouse upgrades during which 23 artefacts were recovered from 18 test pits. Following the subsurface testing program, the location was recorded as site Wiradjuri 1 (W1) and consisted of flakes, broken flakes and flaked pieces all manufactured from quartz. During the consultation process it was noted that the local Aboriginal community associated the location with a burial ground, although no human remains were identified during excavations.

NGH (2016b) investigated an area for the extension of Brunslea Park estate, 9.5 km south-east of Wagga Wagga. Nineteen stone artefacts, a single piece of 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 spit 2 (5-15cm) 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 being a lithic fragment of volcanic material. A single surface find, a flake, was 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 program, the location was recorded as sites Brunslea Park AS7 and Brunslea Park AS8, characterised by low density artefact scatters on low gradient slopes and along the crest of a broad spurline. The average density was 1.9 artefacts/m^2 with a peak of 28/m^2 in one test pit. The excavation results in this area supported KNC's (2008) predictive model 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 (2016d) undertook a due diligence assessment for Aboriginal heritage sites for the proposed construction of two 11 mega litre water reservoirs near the existing Low Level Reservoirs on Willan's Hill in Wagga Wagga, NSW. This study area lies approximately 7.8 km south west of the current assessment area. The survey identified a single quartz isolated artefact (Willan's Hill IF1) on a low gradient slope in the north-east corner of the project area. No other cultural material was identified.

NGH (2016e) undertook a due diligence assessment for Aboriginal heritage sites for the proposed development of equestrian facilities at the Wagga Wagga Exhibition Centre on Lot 6/ DP 1209699 in Wagga Wagga.

The field assessment supported KNC's (2008) model that the Copland Street area has low archaeological potential due to the low elevation above the Murrumbidgee River floodplain. No Aboriginal artefacts were identified within Lot 6/ DP 1209699 and the area was deemed to have negligible archaeological potential.

In 2018, NGH completed an ACHA for the proposed Gregadoo Solar Farm located 13 km south-east of Wagga Wagga on an area covering approximately 124 ha (NGH 2018). Despite the variable visibility encountered during the survey, seven Aboriginal stone artefacts were found across the proposal area. A single possible modified tree was also recorded. Based on the land use history, an appraisal of the landscape, soil, level of disturbance and the results from the field survey it was concluded that there was negligible potential for the presence of intact subsurface deposits with high densities of objects or cultural material within the proposal area.

3.5.2. Bomen Archaeological Studies

A number of specific archaeological assessments, surveys and targeted subsurface testing programs have previously occurred in the Bomen region. These studies are summarised below.

HLA Envirosciences undertook an assessment for a proposed expansion of effluent irrigation system for the Bomen Abattoir, approximately 1.5 km west of the current assessment area (HLA 1997). They examined the alignment of a proposed pipeline, the location of a proposed holding dam and the proposed irrigated paddocks. They located a single isolated artefact (ISF BOM1), a piece of coarse-grained silcrete showing evidence of grinding on one surface, which was located in an upper floodplain area of a paddock. No source material was identified in the area.

In 1998 Navin Officer Heritage Consultants (NOHC) surveyed an area for a proposed power plant site at Bomen identifying three Aboriginal sites, including the axe manufacturing and quarry site East Bomen 1 (#56-1-0043), also known as the Bomen Axe Quarry, and two isolated finds (referenced in Green 2011). The axe quarry itself is situated on the crest of a ridge line that consists of exposures of granite and basalt, approximately 770 m north west of the current assessment area. The basalt material was utilised for the manufacture of axe blanks, which were most likely carried off-site for final production. There were distinct working areas, with primary flaking areas close to the basalt outcrop and secondary working areas located a little further away (NOHC map in Green 2011). The site has been 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 (Green 2011).

In 2008, Kelleher Nightingale Consultancy (KNC) completed an ACHA, as part of the Wagga Wagga City Council's Local Environmental Study (LES) to implement the strategic planning of the Wagga Wagga Spatial Plan 2007. As part of this study, environmental assessments were undertaken for eight sites which were subject to rezoning. These included Lloyd, Bomen, Estella West, Edison Road, Hammond Avenue, Copland Street, Boorooma East and Moorong Street. One isolated find (B IF1) was identified in the Bomen study area, with low to moderate sensitivity identified on midslopes and moderate to high on outcrops, crests, flats and associated drainage lines.

The Bomen study area covered by KNC extends to the western boundary of the Wagga Wagga Solar Farm South and the sensitivity mapping has therefore been extrapolated to cover the current assessment area. KNC determined that areas of low to moderate sensitivity occurred on crests and spurlines, particularly those associated with granite outcropping (moderate). Upper, mid- and lower slopes were also identified as having low to moderate sensitivity. Moderate to high archaeological potential occurred on undulating or flat colluvial deposits and in associated drainage lines. High archaeological sensitivity was also attributed to areas of granite outcropping on upper slopes and crests (KNC 2008:20).

KNC completed site sensitivity mapping as part of their 2008 outlined above. This mapping has been referenced by NGH and Access Archaeology as part of the archaeological studies of the Wagga Wagga Solar Farm proposal areas. A summary table taken directly from the KNC study of these sensitive areas is provided in Table 8 below. The extrapolation of the archaeological sensitivity mapping of the Bomen study area produced by KNC is provided in Figure 12 below. The current Wagga Wagga Solar Farm assessment area is shown in red.

Table 8: Bomen study area archaeological sensitivity (KNC 2008:16).

Landform Type	***Archaeological sensitivity***	***Description***
Spurline crest	Moderate	Less exposed to prevailing winds, increased sensitivity with proximity to drainage lines/terraces
Granite outcrop along upper slope/crest	High	Increased sensitivity where potential artefact raw material present such as quartz
Upper/Mid hillslope	Low	Less possibility of intact archaeological deposits increased sensitivity with gentler slopes and proximity to open drainage lines/terraces
Lower hillslope	Low to Moderate	Increased sensitivity in association with alluvial/colluvial deposits associated with drainage lines
Undulating/Flat colluvial deposits	Moderate to High	Increased sensitivity in association with proximity to drainage lines/terraces
Drainage line and associated alluvial/colluvial deposits	Moderate to High	Increased sensitivity where gentle slopes or raised ground above regular floods

In 2011, Go Green Services completed an assessment report for the Aboriginal Place Nomination for the Bomen Axe Quarry and Manufacturing Site approximately 600 m north west of the current assessment area (Go Green Services 2011a). 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. The surface hard rock quarry and axe manufacturing site is considered to have high scientific, educational and cultural value to the local Aboriginal community. The site is both rare and representative and large containing surface basalt rock, a distribution of stone cores, flakes and working areas covering approximately 1 ha (Go Green Services 2011: 16). Aboriginal quarries are sites where people either took stone from the ground surface or rocky outcrops to make chipped or ground stone tools for many different purposes or dug for ochre. Sites, like Bomen, where stone tool manufacture occurred are called “reduction” sites.

This process always leaves stone debris. The term “stone artefact” includes finished or unfinished products, usually a stone tool, and this debris. The stone tools were used for cutting, for carving and crafting wood, for grinding seed and for making new stone implements and other tools. “Bomen axe quarry is proof of long-term occupation of the area by Wiradjuri. It is still there and has high spiritual value. It was and is a gift that was given for use and interaction with other clans for trading. It was and is today held in high esteem. The Bomen axe quarry site was close to resource places (food, water, fish, emus) like Bomen, Parken Pragen and Wollundry Lagoon, the river and Kurrajong Plain. It was a lookout point to Kengal (The Rock) and the eastern highlands, an ideal men’s only area for talking while tool making and a place of reflection. It’s educational value today is in the potential to re-introduce men and younger men to activities and connections that reaffirm their identity as Aboriginal people – to re-establish some of the ways before they are lost (Go Green Services 2011: 28).

In 2013 Go Green Services completed an assessment report for the Aboriginal Place Nomination for the Bomen Lagoon approximately 3.2 km from the current assessment 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 (Go Green Services 2013: 1). 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 channels intersects (Go Green Services 2013: 21). The area also contains traditional Wiradjuri medicinal and food resource plants, including old man weed and the bush plant nardoo (Go Green Services 2013: 8). The presence of these plants suggests that short term campsites would have existed on the fringes of the lagoon (Go Green Services 2013: 21). 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 (Go Green Services 2013: 21).

In 2014 OzArk carried out a desktop due diligence assessment for a proposed telecommunications tower as part of the National Broadband Network (NBN) in Bomen. While the exact location for the tower was not known at the time of the assessment, the general locality was Lot 22, on the southern side of East Bomen Road, near the access corridor for the Bomen Axe Quarry Aboriginal Place. Their assessment did not include a field component, but they assessed the location as having low archaeological potential due to the landform and previous disturbance from agricultural and road construction activities (OzArk 2014).

In 2015 NGH conducted a due diligence assessment for Stage 1 of the proposed Riverina Intermodal Freight and Logistics (RIFL) Hub at Bomen Park identifying three isolated artefacts (# 56-1-0432, # 56-1-0433 and # 56-1-0434) within disturbed contexts. They also identified two PADs and areas of archaeological sensitivity that were recommended for subsurface testing to establish the archaeological potential and extent of sites in the areas. During the subsequent 2016 fieldwork NGH (2016a) recorded an additional isolated surface find, a subsurface isolated find, four artefact scatters with subsurface deposits and a scarred tree. The scarred tree was identified as having high cultural significance to the local Aboriginal community. An additional two areas of archaeological sensitivity previously identified by KNC (2008) were located and included in the subsurface test excavation program.

Of the 73 test pits excavated, 14 contained stone artefacts with a total of 28 artefacts recovered. Typical of other assemblages in the area, the artefacts were predominantly quartz and no retouched items were found. Fewer artefacts than expected were located during excavation with only discrete low-density artefact scatters and isolated finds recovered. NGH suggested that artefact and site distribution are not restricted to, or predominantly located on, a single landscape, given that artefacts were both absent and present across similar landforms tested.

Additionally, NGH suggested that the predictive modelling undertaken by KNC (2008) should be revised and ground-truthed as several drainage lines that do not hold water, even after considerable rain, were designated as having high to moderate archaeological sensitivity. This level of sensitivity was based on the presence of water however water was not readily available in these depressions and the testing program indicated a lack of sites (NGH, 2016a:36).

As such, the archaeological sensitivity of areas previously mapped as creek lines which were observed to be drainage depressions in the wider undulating landscape, required re-evaluation. The subsurface testing program for the study identified that generally level crests and low gradient upper hillslopes in the Bomen area have moderate archaeological sensitivity rather than moderate to low as predicted by KNC's modelling. The sites identified in that assessment are not in close proximity to water sources and are representative of the opportunistic use and movement of people through the broader landscape. It is likely that people utilised the broad crests and low slopes as travelling routes.

NGH (2016b) conducted a due diligence assessment for the Bomen Solar Energy development north of Wagga Wagga identifying a single site, Bomen Solar ISO1, consisting of two quartz flakes. The site was located in an agricultural field approximately 90 m from a water source in an area identified by KNC (2008) as having high archaeological sensitivity. An area of archaeological sensitivity within the proposed works area was recommended for subsurface testing to establish the true archaeological potential and extent of sites in the area.

NGH Environmental (2017) undertook a due diligence assessment for the proposed Northridge Waste Facility at Bomen that identified no Aboriginal cultural material despite good visibility. The investigation revised the KNC (2008) assessment of the upper spurline within the assessment area to an archaeological sensitivity of low to moderate as the landform was unlikely to have any focused or repeatedly occupied areas of human occupation.

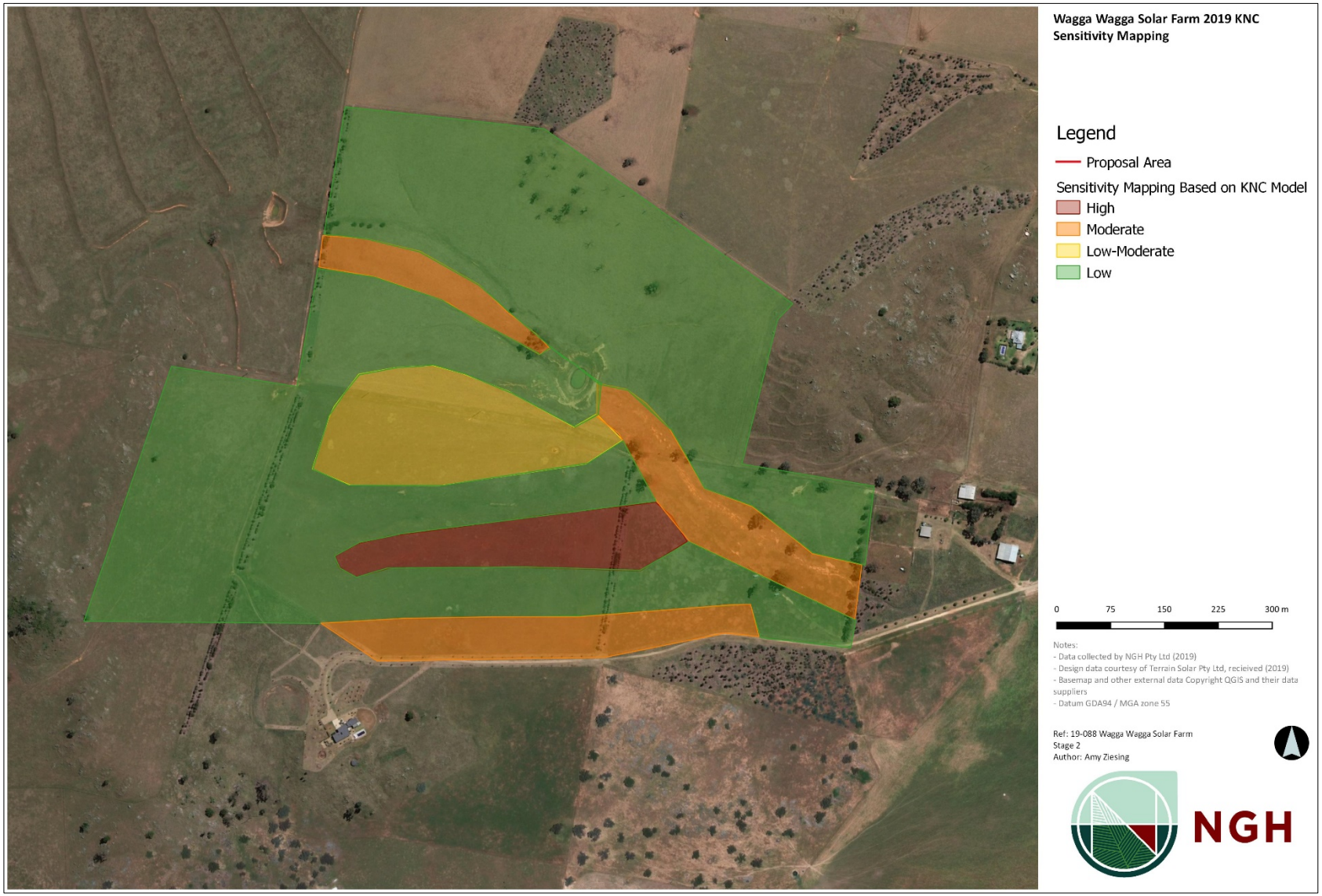


Figure 12. Extrapolated areas of archaeological sensitivity based on KNC sensitivity mapping for the wider Bomen area (KNC 2008:17).

3.5.3. Wagga Wagga Solar Farm Approved Area Assessments

In 2017, NGH was engaged by Terrain Solar to complete an Aboriginal due diligence Assessment for the Stage 1 portion of the Wagga Wagga Solar Farm at Bomen. One isolated quartz artefact was identified during the site inspection on the northern boundary (AHIMS#56-1-0515) of the proposal area. A hill crest and relatively flat areas adjacent to drainage and creek lines were identified to have high and moderate archaeological sensitivity based on pervious modelling that had been undertaken in the Bomen area. It was recommended that further investigation in the form of subsurface testing occur within the areas identified to have high and moderate archaeological sensitivity if they could not be avoided. The results from the initial due diligence assessment for the approved area (Stage 1) of the Wagga Wagga Solar Farm are shown in Figure 13 below.

In 2018, Access Archaeology & Heritage were commissioned by Terrain Solar to undertake an ACHA for Stage 1 of the Wagga Wagga Solar Farm at Bomen which has subsequently been approved for work (DA 170679). The AHCA and subsurface investigation undertaken by Access Archaeology and Heritage was in line with the recommendations of the due diligence assessment initially undertaken by NGH in 2017.The ACHA assessment area included the parcels of land on the northern boundary of the current proposal area and extended north to East Bomen Road (70 ha). Subsurface testing and survey were both conducted for this assessment.

The survey identified two artefact scatters (WWSF-1 and WWSF-2) and two isolated finds (WWSF-3 and WWSF-4), as well as two PAD areas. These were additional areas of sensitivity that were refined from the 2017 due diligence results. WWSF-1 was particularly extensive, covering a north west to south east running creek line for approximately 470 m and containing 92 artefacts. In total, 103 surface artefacts were identified, manufactured predominantly from quartz with small numbers of metamorphosed sedimentary stone, basalt, fine-grained siliceous, quartzite and volcanic raw material.

The subsurface testing focused on the two PAD areas (WWSF-PAD1 and WWSF-PAD2) and areas of sensitivity associated with artefact scatter (WWSF-1), isolated find (WWSF-3) and the drainage line. A total of 55 test pits were manually excavated across these four areas, with 45 subsurface finds being recovered. A summary of the number of test pits and associated finds is provided in Table 8 below. All excavated soil was wet sieved using a mechanical trommel 3 mm wet screen.

WWSF-1 contained 30 artefacts recovered from 20 test pits (4 sample locations) extending along the alluvial flat associated with the artefact scatter and creek line. Four test pits did not contain archaeological material.

Across the testing locations associated with WWSF-3, five test pits were excavated (1 sample location) with three artefacts recovered from two of the pits. The artefact density per metre squared was slightly less than half that of WWSF-1.

WWSF-PAD1 also contained half the density of cultural material recovered from WWSF-1 with six of 15 test pits exhibiting no archaeological material. A total of 12 artefacts were recovered from nine test pits. The PAD location was renamed WWSF-5 as a result of the testing program, incorporating two previously registered sites and the broad area on the north side of an unnamed drainage gully.

WWSF-PAD 2 did not contain any archaeological material despite being previously identified as an area of moderate sensitivity by NGH, Access Archaeology and KNC (2008) for its association with a spurline. Fifteen test pits (3 sample locations) were excavated at this location, extending south east to north west across the spurline. Consequently, the PAD was removed as an area of potential and not considered further as part of the assessment.

Table 9 Overall site density results from the approved area of the Wagga Wagga Solar Farm subsurface testing (Access Archaeology & Heritage 2018:30).

Site Name	*No of Test Pits*	*No of Artefacts*	*Artefacts/m²*
WWSF-1	20	30	6.0
WWSF-3	5	3	2.4
WWSF-PAD1	15	12	3.2
WWSF-PAD2	15	0	0
TOTAL	55	45	3.27

The majority 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 44 of the finds being manufactured from this raw material and one from fine grained volcanic material. The subsurface assemblage comprised 14 complete flakes, six cores, 10 broken flakes, one broken core and 12 flaked pieces (Access Archaeology & Heritage 2018:35).

Overall, the assemblage of surface and subsurface finds from this assessment was heavily dominated by quartz flakes, cores and fragments. The assemblage at WWSF-1 also contained a multi-function hammer/anvil/grindstone, a hatchet pre-form and a muller (Access Archaeology & Heritage 2018:38). These finds, when associated with the higher density of finds across this scatter and the high core to flake ratio suggest that this area was utilised as a base camp rather than a short-term occupation area. It is further suggested that the overall high density of finds at WWSF-1 can be associated with the location near the junction of the creek line and the northern edge of the Murrumbidgee River floodplain, which would have provided a well-drained, raised location for occupation with easy access to the richly resourced flood zone. Similar landforms at the junction of creek lines and the flood plain are suggested to contain high archaeological sensitivity across the region (Access Archaeology & Heritage 2018:38).

Some moderate revisions to the 2008 KNC modelling, outlined below, are proposed based on the results of the approved Wagga Wagga Solar Farm assessment. The higher archaeological sensitivity was identified in assocaition with the higher order water course and raised, level well-drained ground and areas of lower sensitivity were found further away from this water source. Level terraces, spurs and rises close to low order drainage lines have low to moderate archaeological sensitivity.

All results from this study are shown in Figure 13 below.

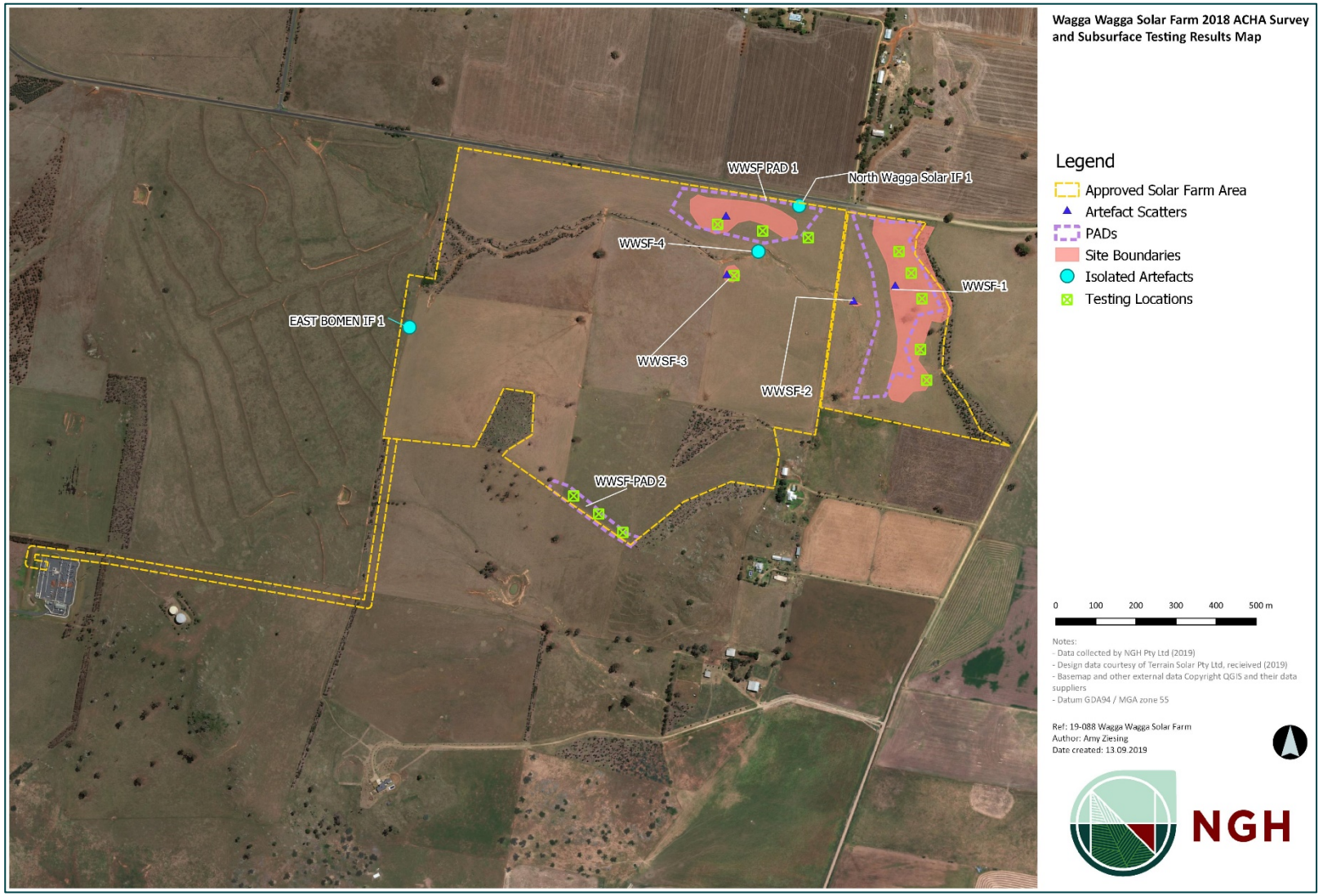


Figure 13 Heritage Results from the previous investigations for the approved area of the Wagga Wagga Solar Farm.

3.5.4. Wagga Wagga Solar Farm 2019 Due Diligence Assessment

In 2019 NGH was engaged to undertake an Aboriginal Heritage due diligence assessment of the proposal area in order to investigate the potential impacts of the project on Aboriginal objects. The due diligence Assessment was undertaken in line with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (OEH 2010).

The assessment was carried out with the following procedure.

- AHIMS site search.
- Brief background research.
- Field inspection.
- Recording of any Aboriginal archaeological material or areas of archaeological potential.
- Report of results (as an email).

The aims of the field inspection were as follows:

- Investigate proposal area to identify any Aboriginal heritage sites or areas of archaeological potential;
- Record any Aboriginal heritage sites; and
- Provide an appraisal of the possible impacts of proposed development on any identified Aboriginal sites or areas of archaeological potential.

During the survey of the proposal area, several sites and archaeologically sensitive landforms were identified. A total of 15 surface artefacts were identified across the proposal area, representing two artefact scatters (Wagga Wagga SF AFT 1 and Wagga Wagga SF AFT 2) and three isolated finds (Wagga Wagga SF IF 1 to Wagga Wagga SF IF 3). Two areas of potential archaeological deposit (PAD) were identified along relatively flat spurs adjacent to drainage lines (PAD 1 and PAD 3) while an additional PAD was recorded on a elevated flat adjacent to a drainage line (PAD 2) (Figure 13).

High archaeological sensitivity was assigned to the spurline, moderate sensitivity to the elevated flats associated with the drainage lines and basal slope associated with Wagga Wagga SF AFT 1 and low to moderate sensitivity to the elevated flat in the central portion of the proposal area. The remainder of the area was assigned low archaeological sensitivity due to the presence of steep slopes which would not be conducive to camping activities by Aboriginal people in the past.

It was recommended that if the areas identified as having Aboriginal sites and moderate to high archaeological sensitivity (see Figure 14) could not be avoided by the proposed works that further archaeological assessment would be required. This ACHA is the continuation of the recommendations from the due diligence assessment of the proposal area undertaken by NGH.

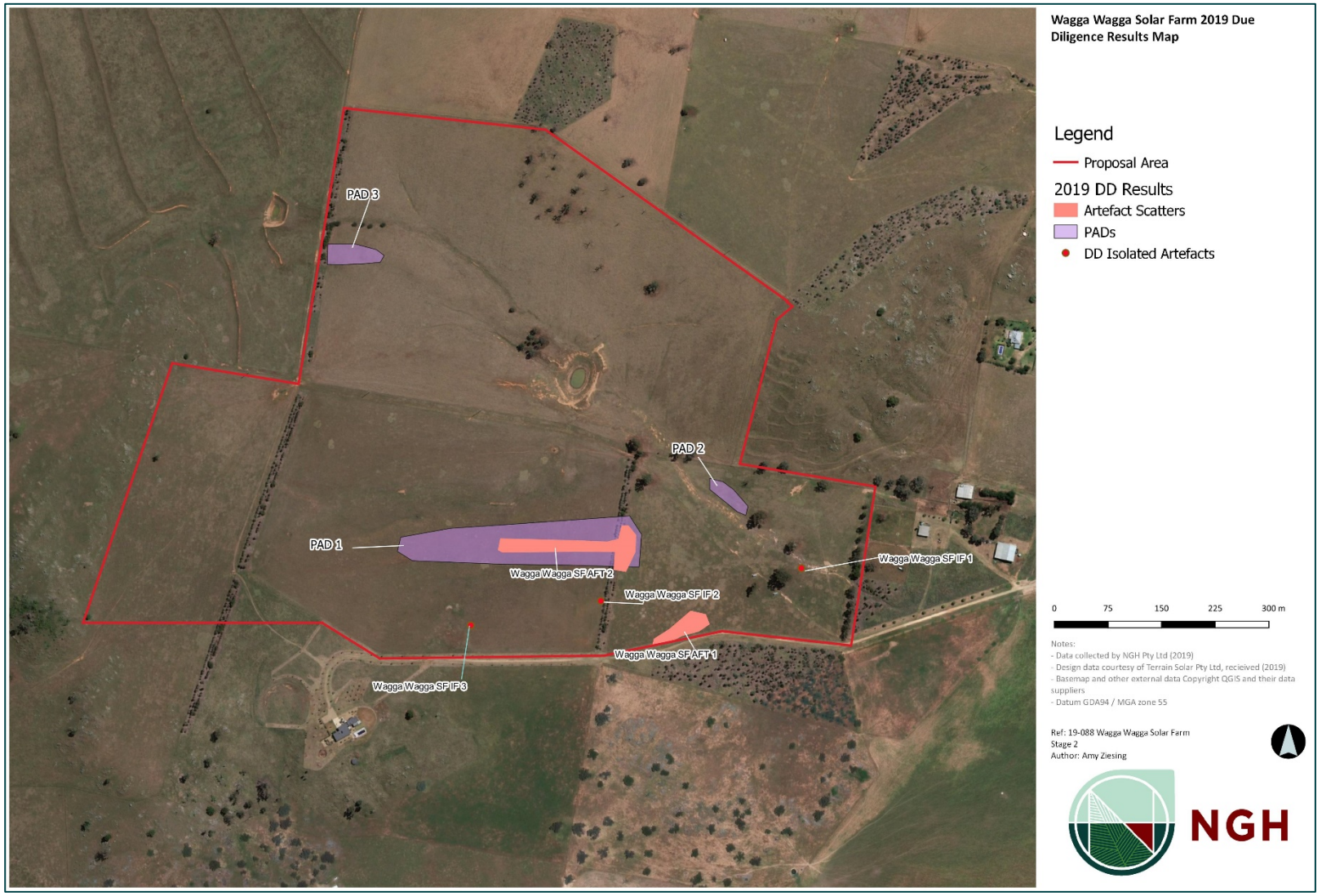


Figure 14. Heritage sites identified in 2019 Due Diligence survey for the proposed Wagga Wagga Solar Farm South.

3.6. SUMMARY OF ABORIGINAL LAND USE

The results of previous archaeological surveys in the region show that there are sites and artefacts present throughout the landscape, albeit concentrated closer to water courses. There does appear however to be a pattern of site location that relates to the presence of potential resources for Aboriginal use with high density sites generally located in elevated areas adjacent to waterways. Lower density background scatters also occur across undulating plains in proximity to water. The dominant lithology within the area appears to be quartz with lesser quantities of fine-grained volcanic artefacts. A number of scarred trees are recorded in the area, but this site type can only occur in areas where old growth trees remain.

Artefact site densities in close proximity to the proposal area are varied, with higher densities present at the junction of creeks and the northern boundary of the Murrumbidgee floodplain and lower densities present in the undulating plains associated with low order ephemeral drainage lines. This may suggest longer term base camp occupation by Aboriginal people in elevated areas near the junction of the creeks and floodplain boundary (Access Archaeology 2018: 38). The undulating plains, spurs, terraces and spurlines may also have been utilised in this way but results to date suggest that these areas were occupied for short time periods or in a transitory capacity by Aboriginal people as they travelled to the long-term base camps and resource areas.

The Aboriginal land use of the Wagga area is in reality little understood, as few in-depth studies have been completed and no sites have been dated. It is possible however, 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 these resources to utilise the broader landscape, but the current archaeological record of that activity is currently limited.

3.7. ARCHAEOLOGICAL SITE LOCATION MODEL

The Aboriginal site modelling for the region to date suggests that there is a strong association between the presence of potential resources for Aboriginal use and the presence of archaeological sites. Areas directly associated with water and or elevated ground appear to have the greatest potential for identification of Aboriginal cultural material. There are exceptions to this however, and relatively low-lying floodplain areas also have potential for the identification of isolated artefacts or campsites.

Based on the results of the previous archaeological investigations in the Bomen area, and through extrapolation of sites from the Wagga Wagga area, it is possible to provide the following model of site location in relation to the proposal area. Based on the reviewed reports and revisions in the predictive modelling of the Bomen region, the key attribute taken into consideration to develop the predictive model was that areas of archaeological sensitivity will occur in association with water sources, including the Murrumbidgee River, creeks and ephemeral drainage lines. Areas of higher archaeological sensitivity are expected in association with the higher order water course and raised, level well drained ground and areas of lower sensitivity are expected further away from this water source. Level terraces, spurs and rises close to low order drainage lines are expected to have low to moderate archaeological sensitivity.

Isolated Artefacts – are present across the entire landscape, in varying densities. As Aboriginal people traversed the entire landscape for thousands of years, such finds can occur anywhere and indicate the presence of isolated activity, dropped or discarded artefacts from hunting or gathering expeditions or the ephemeral presence of short-term camps. This feature is known to occur as located in proposal area during due diligence assessment.

Stone artefact scatters – representing camp sites or flaking and maintenance activity, this site type can occur across the landscape, usually in association with a resource or specific landform such as spurlines or elevated terraces. Within the general region, artefact scatters tend to be dominated by quartz artefacts, with lesser quantities of fine-grained volcanic material as located in proposal area during due diligence assessment.

Artefact scatters are most likely to occur in well-drained elevated, level or gently sloping contexts within riparian zones, flood plains and adjacent to water sources (Access Archaeology 2018: 38). Water bodies, such as

rivers, ephemeral creeks and drainage lines can also be a focus of Aboriginal occupation. The northern edge of the Murrumbidgee River floodplain would have provided a well-drained, raised location for occupation with easy access to the richly resourced flood zone. Similar landforms at the junction of creek lines and the flood plain have been assessed to contain high archaeological sensitivity across the region (Access Archaeology & Heritage 2018:38). Given the location of the proposal area on the northern edge of the Murrumbidgee floodplain low-moderate density artefact scatters are likely to occur.

Stone resources – are areas where people used natural stone resources as a source material for flaking. This requires geologically suitable material and outcropping to be accessible. The proposal area contains multiple areas of naturally outcropping granite and has multiple registered quarries recorded in the Bomen region. This feature is therefore likely to occur.

Scarred Trees – these require the presence of mature trees and are likely to be concentrated along major waterways and around swamps areas. There are very small patches of remnant vegetation within and adjacent to the proposal area however extensive historical clearing of tall woodland has occurred. Some registered scarred trees have been recorded in the immediate vicinity, suggesting that this feature may occur if trees of a suitable age remain standing.

Hearths/Ovens – are identified by burnt clay used for heat retainers. Some are recorded in the district in association with resource locations. However, they could occur either independently or in association with other Aboriginal cultural features such as artefact scatters. Hearths are generally considered to be limited, one-off use sites, or reused only a few times, and are characterised by smaller concentrations of burnt clay. Ovens are considered to represent larger features, often extending over an extended area and can include other material such as bone. No such sites have been recorded in the area and therefore this site type is considered unlikely to occur.

Mounds- are accumulations of heat retainer ovens that have built up over time. They are typically round or oval in shape and range in length from just a few metres to over 100 m and in height from 0.1 m to 2 m. They are identified by the presence of baked clay heat retainers, which have usually been brought to the location from a nearby source of natural clay such as a lakebed, swamp or drainage line. Mounds are generally found in proximity to wetland areas such as lakes, swamps and creeks, often elevated above these areas by being situated on sandy rises, lunettes, source bordering dunes and palaeochannels. Mounds are likely to contain a range of other archaeological features such as bone, shell, stone artefacts and burials. No such sites have been recorded in the area and therefore this site type is considered unlikely to occur

Burials – are generally found within mound sites, in elevated sandy contexts or in association with rivers and major creeks. As there are no major creeks and the Murrumbidgee is over 2.3 km south east of the proposal area, it is considered unlikely that this feature will occur.

Shell Middens – are the agglomeration of shell material disposed of after consumption. Such places are found along the edges of significant waterways, swamps and billabongs. Given that there are no significant waterways, swamps and billabongs in the proposal area it is unlikely that this feature will occur.

In summary, the topography and landscape features within the proposed Wagga Wagga Solar Farm South indicate that this area would have been part of the Wiradjuri landscape and therefore contains an archaeological signature. Nonetheless, given that Aboriginal people have lived in the region for tens of thousands of years, there is potential for archaeological evidence to occur throughout the area, and this is most likely to be in the form of stone artefacts, quarry areas and modified trees.

3.8. COMMENT ON EXISTING INFORMATION

Within the Bomen and Wagga Wagga region there have been extensive archaeological investigations. The information relating to site patterns, their age and geomorphic context is therefore generally quite comprehensive and well understood. The robustness of the AHIMS survey results are therefore considered to be moderate to high for the present investigation. Despite this, there are likely to be sites that exist that have

yet to be identified as thorough transect surveys of the assessment area are yet to be completed. Evidence of pastoral and agricultural activities in the proposal area are evident however these activities have conformed to the current landscapes and only caused minimal modification, suggesting that there is probability for *in situ* archaeological deposits to be present where soils are of a suitable depth. The current study is the most comprehensive assessment of the current proposal locality and, in conjunction with the 2018 ACHA results for the approved solar farm Stage 1 area, is considered to present thorough and up to date results for the Bomen region.

With regard to the limitations of the information available, archaeologists rely on Aboriginal parties to divulge information about places with cultural or spiritual significance in situations where non-archaeological sites may be threatened by development. During the fieldwork, both RAPs mentioned that the proposal area had served as an emu sanctuary. The high cultural significance of the area was also emphasised on several occasions, due to the close proximity to both the Bomen Axe Quarry and the Bomen Lagoon.

To date, no information has been provided on any other such places within the Wagga Wagga Solar Farm South proposal area however there is always the potential for such places to exist.

4. ARCHAEOLOGICAL INVESTIGATION RESULTS

4.1. SURVEY STRATEGY

The survey strategy was to cover as much of the ground surface as possible within the proposal area. Although the actual ground impact from the construction method for the proposed solar farm is likely to be low, the placement of solar arrays across the landscape has the potential to cover any cultural heritage sites.

The strategy therefore was to walk a series of transects across the landscape to achieve maximum coverage. Because the proposal site was predominantly paddocks containing crops and used for grazing livestock, transects were spaced evenly with the survey team spread apart at 30 m intervals, walking in parallel lines. Since the initial due diligence assessment, the density of vegetation across the proposal area had significantly increased due to crop growth exceeding 30 cm in height and obscuring the ground surface. Despite this, the team were able to walk in parallel lines, at a similar pace, allowing for maximum survey coverage and maximum opportunity to identify any heritage features. The survey team consisted of a maximum of four people which allowed a 120 m wide tract of the proposal area to be surveyed with each transect. At the end of each transect, the team would reposition along a new transect line at the same spacing and walk back on the same compass bearing. In addition to this strategy, visibility during the due diligence survey (NGH 2019) was significantly higher (80% average), providing a good indication of areas of archaeological sensitivity. The subsurface testing further compensated for the lack of visibility during the ACHA survey, by providing an understanding of artefact distribution in the six PAD areas within the proposal boundary.

Any mature trees within the proposal area were inspected for evidence of Aboriginal scarring (Long 2005). Native paddock trees were also inspected for any evidence of Aboriginal scarring (Long 2005). Any areas of rock outcropping were also inspected for the presence of grinding grooves and quarrying.

NGH believes that the survey strategy was comprehensive and the most effective way to identify the presence of Aboriginal heritage sites. Discussions were held in the field during each day between the archaeologists and Aboriginal community representatives to ensure all were satisfied and agreed with the spacing and methodology.

The proposal area was divided into five landforms based on contour mapping and visual inspection during field survey. The landforms are listed below and shown in Figure 5 above.

- Drainage Lines;
- Flats;
- Elevated flats/spurs.
- Slopes; and
- Disturbed Areas.

The survey for the Wagga Wagga Solar Farm South was undertaken by the team over one day on the 22nd of July 2019. Over the course of the survey, notes were made about visibility, photos taken, and any possible Aboriginal features identified were inspected, assessed and recorded if deemed to be Aboriginal in origin.

4.2. SURVEY COVERAGE

The solar farm area was characterised primarily by paddocks containing unharvested crops that had been subject to farming activities. Survey transects were undertaken on foot and traversed the entire proposal area. Visibility within the proposal area was variable however as a whole, the visibility was generally low, averaging 10% overall. The effective visibility in the unharvested paddocks ranged from 40% in exposures to 5% in areas with a dense low crop cover. Between the survey participants, over the course of the field survey, approximately 38 km of transects were walked across the proposal area.

Table 10 below shows the calculations of effective survey coverage and Plates 1-8 show examples of the transects and landforms within the proposal area.

Allowing for an effective view width of 5 m for each person and given the variability in the ground visibility across the proposal site overall, the survey effectively examined 24.7% of the proposed development footprint. It is considered that the survey of the Wagga Wagga Solar Farm South proposal area had sufficient and effective survey coverage.

The discovery of a number of Aboriginal sites indicates that the survey technique was effective enough to identify the presence of Aboriginal occupation in the area. Therefore, the results identified are considered a true reflection of the nature of the Aboriginal archaeological record present within the proposal area.

Plate 1. View of disturbed area around drainage line in the eastern portion of the proposal area.

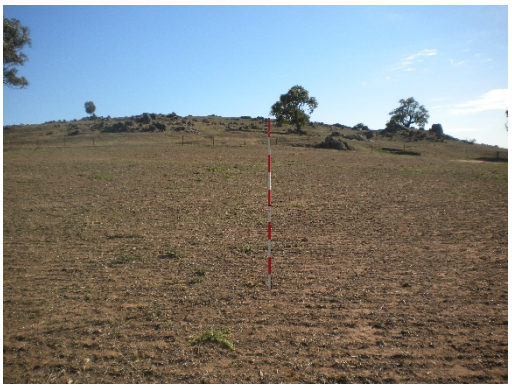


Plate 2. View north of the slope up to a granite outcropping.

Plate 3. View north east the slope down to the drainage lines in the eastern half of the proposal area.

Plate 4. View north of granite rock outcropping in the southern portion of the proposal area.

Plate 5. View north west of the low ground surface visibility with unharvested crops present.

Plate 6. View north west of the man-made dam in the centre of the proposal area.

Plate 7. View west showing the slope in the north eastern portion of the proposal area with the drainage line in the background.

Plate 8. View north west across elevated flats on either side of the drainage lines and vehicle access track in the south eastern portion of the proposal area.

Table 10 Summary of effective survey coverage for the Wagga Wagga Solar Farm South.

Survey Section/ Topography	*Number of Survey Transects*	*Exposure type*	*Proposal Area ha*	*Surveyed area (length m x width m)*	*Survey Area m^2*	*Visibility*	*Effective coverage (area x visibility) m^2*	*Proposal Area surveyed (ha)*	*Percentage of Proposal area effectively surveyed*	*Survey Archaeological result*
Drainage Lines	16	Bare ground, vehicle and animal tracks, ploughed ground and disturbance areas	3.3	270 x 8 450 x 8	5,760	5% average	288	0.029	0.88%	No finds
Flats	8	Bare ground, vehicle and animal tracks, ploughed ground and disturbance areas	1.2	215 x 8	1,720	5% average	86	0.009	0.75%	2 Isolated Finds 2 Artefact Scatters 1 PAD
Elevated Flats/Spurs	8	Bare ground, vehicle and animal tracks, dam walls, ploughed ground and disturbance areas	2.7	800 x 8	6,400	5% average	320	0.032	1.19%	5 Artefact Scatters 6 PADS
Slopes	40	Bare ground, vehicle and animal tracks, dam walls, ploughed ground and	47	620 x 16 350 x 8 640 x 16	22,960	10% average	2,296	0.229	0.49%	3 Isolated Finds 1 Artefact Scatter

		disturbance areas								
Disturbed Areas	16	Bare ground, vehicle and animal tracks, dam walls, ploughed ground and disturbance areas	0.8	90 x 8 70 x 8	1,280	30% average	384	0.038	4.75%	No finds
Total		NA	55	NA	38,120	NA	3,374	0.337	8.06%	5 Isolated Finds 8 Artefact Scatters 6 PADS

4.3. SURVEY RESULTS

Despite the variable visibility encountered during the survey four artefact scatters (Wagga Wagga SF AFT 1 to Wagga Wagga SF AFT 4) and five isolated finds (Wagga Wagga SF IF 1 to Wagga Wagga SF IF 5) were recorded. A total of six areas of potential archaeological deposit were also recorded in association with relatively flat spurs adjacent to drainage lines (PAD 1, PAD 3, PAD 4 and PAD 6) and on elevated flats associated with drainage lines (PAD 2 and PAD 5). Three of these PADs had been initially recorded during the due diligence assessment. The location of PAD 2 was revised during the ACHA survey, based on discussion held between the RAPs and archaeologists, and three additional PAD areas were included that were deemed warranted for subsurface testing. No culturally modified trees were present across the proposal area. The details of these sites are outlined below, and their locations shown in Figure 15.

One site was recorded by Bundyi Aboriginal Cultural Knowledge representative, Mark Saddler, and submitted to AHIMS independently. Axe Quarry 439645 (AHIMS# 56-1-0606) represents a hammerstone/anvil that was incorporated into the original recording of Wagga Wagga SF AFT 2 (AHIMS# 56-1-0604). Contact has been made with BCD to get this site listed as a duplicate.

A summary of all the newly identified Aboriginal sites recorded during survey within the Wagga Wagga proposal area is provided in Table 11. The surface artefact data is provided in full in Appendix C with detailed site descriptions provided in Appendix D.

Table 11 Summary of all cultural and archaeological sites recorded during survey of the Wagga Wagga Solar Farm South proposal area.

AHIMS	*Name*	*Type*
56-1-0597	Wagga Wagga SF IF1	Isolated Find
56-1-0596	Wagga Wagga SF IF2	Isolated Find
56-1-0595	Wagga Wagga SF IF3	Isolated Find
56-1-0594	Wagga Wagga SF IF4	Isolated Find
56-1-0593	Wagga Wagga SF IF5	Isolated Find
56-1-0605	Wagga Wagga SF AFT1	Artefact Scatter
56-1-0604	Wagga Wagga SF AFT2	Artefact Scatter
56-5-0603	Wagga Wagga SF AFT3	Artefact Scatter
56-1-0602	Wagga Wagga SF AFT4	Artefact Scatter
56-1-0606	Axe Quarry 439645	Isolated Artefact (duplicated site, included as Wagga Wagga SF AFT 2)
	PAD 1	Potential Archaeological Deposit
	PAD 2	Potential Archaeological Deposit
	PAD 3	Potential Archaeological Deposit
	PAD 4	Potential Archaeological Deposit

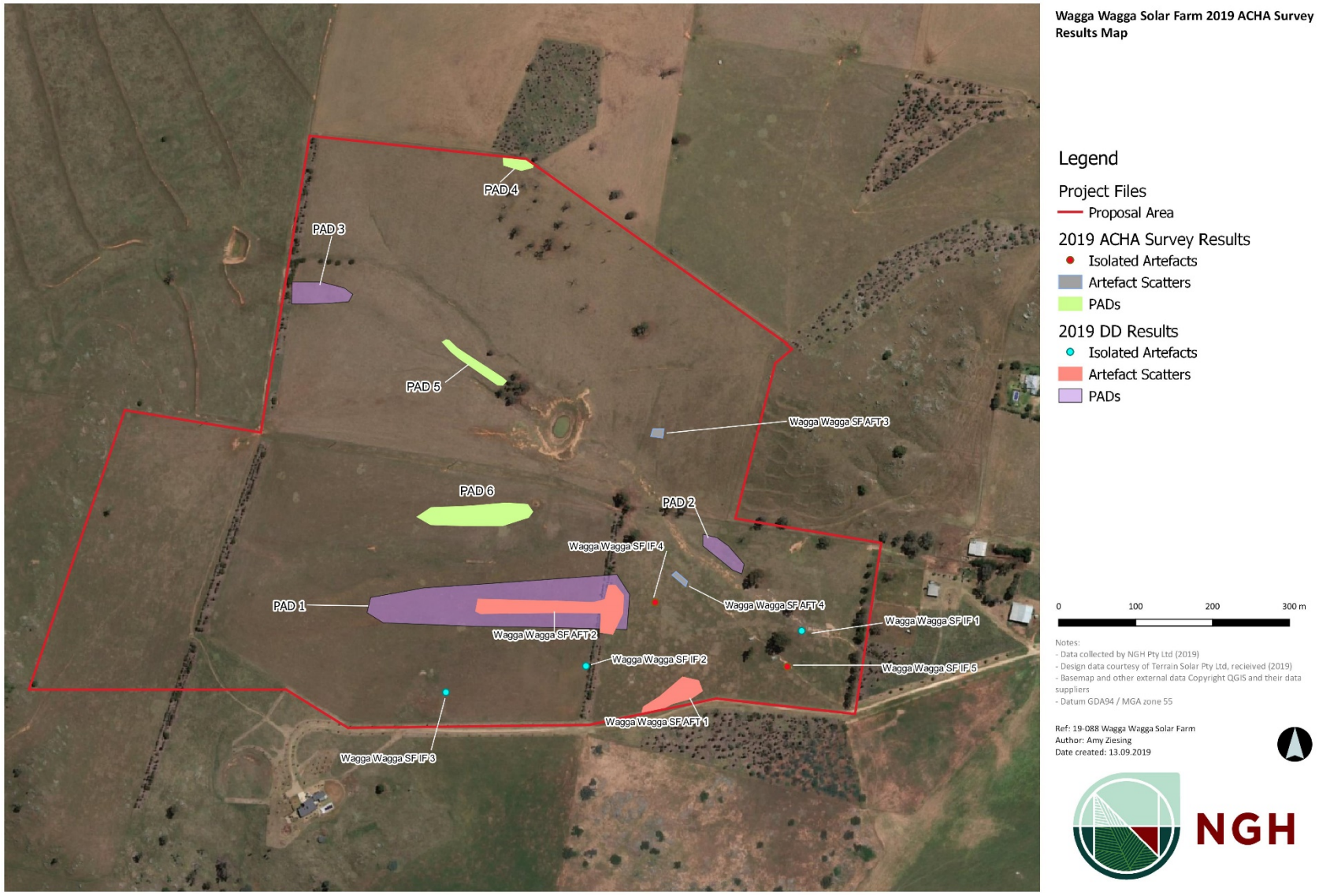


Figure 15 Results Map from the 2019 ACHA and Due Diligence Surveys.

4.4. SUBSURFACE TESTING METHODOLOGY

Based on the results of the due diligence assessment of the proposal area it was determined that subsurface testing was required to investigate the presence and extent of archaeological material within the sensitive landform in the proposal area. The subsurface excavation was undertaken in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (the Code)*. 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 subsurface testing program for the Wagga Wagga Solar Farm South.

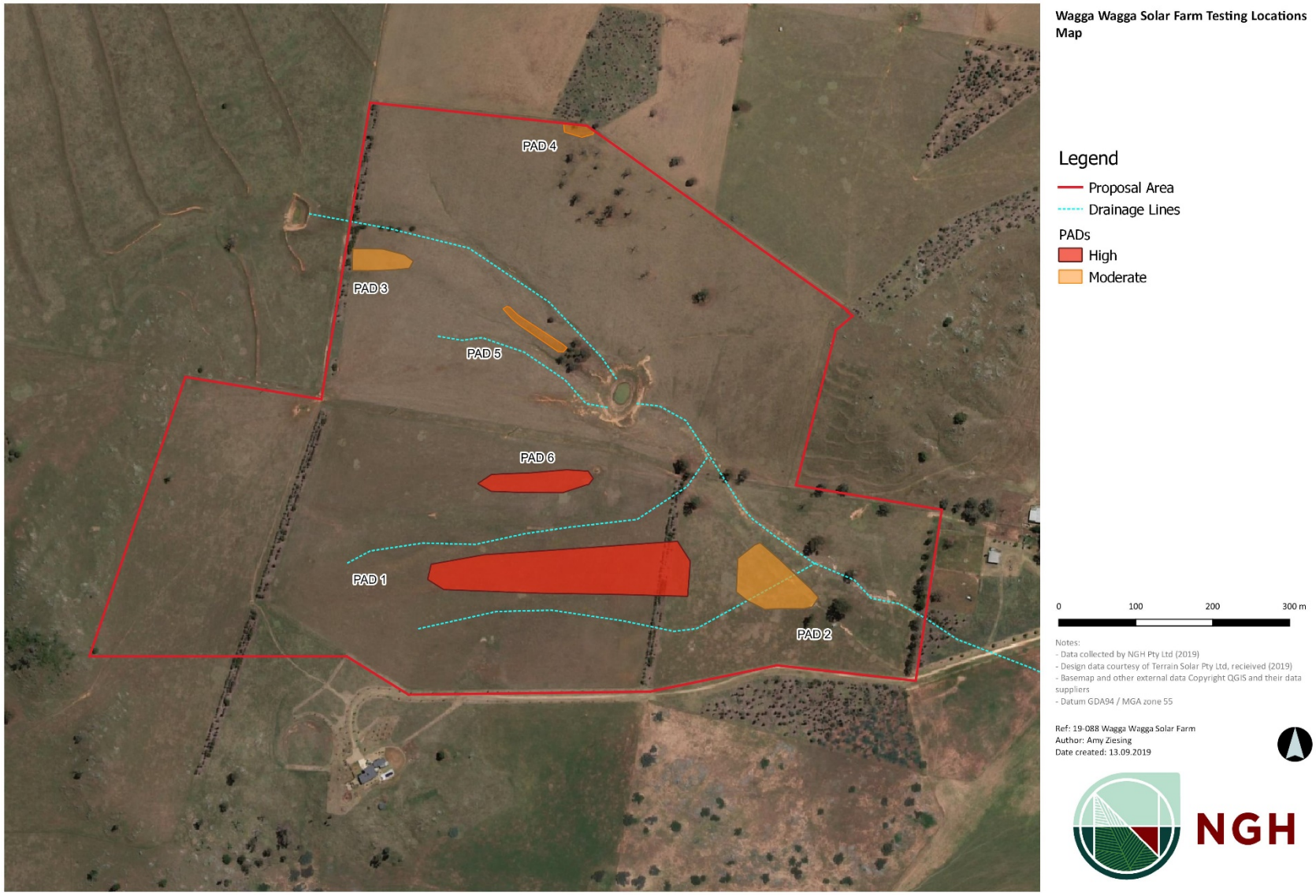
Testing occurred in all areas assessed to have moderate to high archaeological sensitivity during the due diligence and ACHA surveys. Some of the proposed testing locations altered slightly from what was outlined in the ACHA methodology. The location of PAD 2 was altered during the subsurface testing, based on discussions with the RAPs and to gain a better understanding of this slightly elevated landform, this is shown in Figure 16. Three additional testing areas were also added (PADs 4, to 6) based on these field discussions and to ensure that an understanding of all aspects of such a culturally sensitive landscape were understood, given the close proximity to the Bomen Axe Quarry and a number of other registered sites. Test pit spacing of 10 -20 m was maintained along transects at each area of PAD. A total of 49, 50 cm x 50 cm test pits were placed across the archaeologically sensitive landforms. The location of the test pits was recorded in the field using a GPS enabled tablet utilising QGIS-Qfield software equipped with recording forms. Plates 9-18 show the landscape of the transect alignments.

Figure 16 below provides the PAD areas and the corresponding archaeological sensitivity of each area that was subject to subsurface testing. These areas were selected based on the results of the due diligence survey and then refined and added to during the ACHA survey by NGH archaeologists and the Aboriginal community representatives. Excavation proceeded in line with the requirements of the Code of Practice and outlined in the methodology provided to the Aboriginal stakeholders. The test pitting methodology involved the following actions.

- Individual hand sieve stations were set up for each group to carry out dry sieving of all excavated material.
- Manual excavation was employed using shovels and trowels and test pits dimensions were 50 x 50 cm.
- Spits (levels) from the initial pit at each separate PAD were removed in 5 cm spits, with subsequent spits excavated in 10 cm increments unless a feature was found that required a different strategy.
- All excavated deposit was placed in buckets labelled by spit and test pit.
- Deposits were dry sieved one spit/bucket at a time.
- Any Aboriginal objects or possible Aboriginal objects identified in the sieves was removed, placed in a bag and labelled for analysis.
- Excavated material was analysed in NGH offices in Wagga Wagga.
- Manual excavation in each test pit continued until sterile natural clay was reached.
- Photographs were taken of excavated sections and the progress of the excavation work.
- Scale-drawn records of the stratigraphy/soil profile features and information Aboriginal objects was noted for each test pit.
- Once the excavation was completed to sterile natural clay, each test pit was backfilled with the sieved material that had been stockpiled next to each test pit.

The recording and analysis of the artefacts recovered from the test excavations was undertaken at the NGH Environmental office in Wagga Wagga. The artefacts had a range of variables and technological attributes recorded including the following:

- Raw material type and colour.
- Dimensions (percussion length, width, thickness for complete items).
- Technological characteristics (platform surface, platform type and termination type).
- Presence and extent of cortex.
- Presence and extent and type of edge damage (use wear, retouch).
- General comments.



Wagga Wagga Solar Farm Testing Locations Map

Legend

- Proposal Area
- Drainage Lines

PADs

- High
- Moderate

0 100 200 300 m

Notes:
- Data collected by NGH Pty Ltd (2019)
- Design data courtesy of Terrain Solar Pty Ltd, recieived (2019)
- Basemap and other external data Copyright QGIS and their data suppliers
- Datum GDA94 / MGA zone 55

Ref: 19-088 Wagga Wagga Solar Farm
Author: Amy Ziesing
Date created: 13.09.2019

NGH

Figure 16 PAD Locations subjected to testing and their corresponding archaeological sensitivity.

Plate 9. View east along east to west running testing area of PAD 1.

Plate 10 View north of north to south testing transect along PAD 1.

Plate 11 View north of north to south testing transect along PAD 1.

Plate 12 View north east of north to south testing transect along PAD 1.

Plate 13 View north east of PAD 2 testing areas.

Plate 14. View south east of PAD 3 testing area.

Plate 15 View north east of PAD 4 testing area.

Plate 16. View north east of PAD 5 testing area.

Plate 17. View east of PAD 5 testing area.

Plate 18. View east of PAD 6 testing area.

4.5. TESTING RESULTS

Test pits were excavated in six archaeologically sensitive locations (PAD 1 to PAD 6) within the Wagga Wagga Solar Farm South proposal area. All locations corresponded with elevated flats and spurlines associated with ephemeral drainage lines. A summary of the test pitting results is provided in Table 12 below; test pits not specifically listed contained no artefacts. A further four artefact scatter sites were also recorded based on the location of the subsurface finds. These are known as Wagga Wagga Solar AFT 5 to Wagga Wagga Solar AFT 8. A total of 49 test pits were excavated totalling 3.71 m^3 of excavated deposit.

Table 12 Summary of Test Pitting Results for the Wagga Wagga Solar Farm South.

Test Pits	*Associated with Survey Sites*	*Test Pit Number*	*Number of Artefacts Identified*	*New Artefact Site Name*
16-26 **39-45**	PAD 1	22	1	Extension of Wagga Wagga Solar AFT 2
		23	1	
		40	1	
		41	1	
		43	1	
		44	1	
		45	4	
Subtotal			10	
27-38	PAD 2	28	1	Wagga Wagga SF AFT 8
		30	1	
		32	1	
		34	1	
		35	1	
Subtotal			5	
1-4	PAD 3	1	1	Wagga Wagga SF AFT 5
		2	5	
Subtotal			6	
46-49	PAD 4	46	1	Wagga Wagga SF AFT 7
		47	1	
		48	2	

Subtotal			4	
5-9	PAD 5	6	8	Wagga Wagga SF AFT 6
		9	1	
Subtotal			9	
10-15	PAD 6	N/A	N/A	N/A
Total			34	All

PAD 1 (Pits 16-25 and 39-45)

PAD 1 was associated with artefact scatter 'Wagga Wagga SF AFT 2' and is located on an east to west running spurline situated between two ephemeral drainage lines. A total of 17 test pits were excavated, with 11 located on an east-west axis and six located on a north to south axis in order to achieve coverage of the landform. Of these test pits, ten contained subsurface finds, identified between 0 and 20 cm depth. The spacing between the initial 11 test pits was 20 m, however for the six pits excavated on the north-south axis, this was decreased with the intention of determining if closer spacing resulted in variable outcomes. Excavation continued until the deposit was determined to be culturally sterile clay, which occurred between 12 and 40 cm depth in PAD 1. The subsurface finds from these test pits will be incorporated into an extension of Wagga Wagga SF AFT 2.

PAD 2 (Pits 27-38)

PAD 2 was associated with artefact scatter 'Wagga Wagga SF AFT 4' and is located on elevated flats associated with south east to north west running drainage lines. The PAD contained a total of 12 test pits, with six placed on a south east-north west axis, two of which contained subsurface artefacts; and six were located on a north east to south west axis, three of which contained subsurface finds. All artefacts were identified between 0 and 10 cm depth. The spacing between the initial six test pits (north west-south east axis) was 20 m, however for the six pits excavated on the north east-south west axis, this was decreased with the intention of determining if closer spacing resulted in variable outcomes. Excavation continued until the deposit was determined to be culturally sterile clay, which occurred between 20 and 67 cm depth in PAD 2. In pits 033 to 038, the sediment comprised a sandy matrix which graduated to a high-density gravel deposit; this layer was assessed to either be a decomposing bedrock, or a palaeochannel. Excavation of these pits ceased at this layer. The subsurface finds from these test pits have been recorded as Wagga Wagga SF AFT 8.

PAD 3 (Pits 1-4)

PAD 3 is located on an elevated flat associated with south east to north west running drainage lines. A total of four test pits were excavated within this PAD, along an east-west axis. Of these test pits, two contained subsurface finds, identified between 5 and 20cm depth. The spacing between the four test pits was 10 m due to the small size of the PAD.

Excavation continued until the deposit was determined to be culturally sterile clay, which occurred between 17 and 35 cm depth in PAD 3. The subsurface finds from these test pits have been recorded as Wagga Wagga SF AFT 6.

PAD 4 (Pits 46-49)

PAD 4 was associated with the highest flat point of a hill crest on the northern boundary of the proposal area. The PAD contained a total of four test pits, located on an east-west axis. Of these test pits, three contained subsurface finds, identified between 0 and 20 cm depths. The spacing between the four test pits was 10 m to allow for a maximum number of test pits in such a confined location. Excavation continued until the deposit was determined to be culturally sterile clay, which occurred between 25 and 36 cm depth in PAD 4. The subsurface finds from these test pits have been recorded as Wagga Wagga SF AFT 7.

PAD 5 (Pits 5-9)

PAD 5 was associated with an elevated level spur between two ephemeral south east to north west running drainage lines. Five test pits were excavated within this PAD, along the same axis as the spur. Of these test pits, two contained subsurface finds, identified between 0 and 10 cm depth. The spacing between the five test pits was 20 m. Excavation continued until the deposit was determined to be culturally sterile clay, which occurred between 30 and 50 cm depth in PAD 5. The subsurface finds from these test pits will be known as Wagga Wagga SF AFT 5.

PAD 6 (Pits 10-15)

PAD 6 was associated with an east to west running spurline situated between two ephemeral drainage lines. Six test pits were excavated within this PAD, located on the same axis as the spurline. Of these test pits, none contained subsurface finds. The spacing between the six test pits was 20 m. Excavation continued until it was determined that culturally sterile clay had been reached, between 10 and 35 cm in depth. PAD 6 is no longer considered to be an Aboriginal heritage site as a result of the test excavation program.

The site names used for the subsurface artefact scatters were a continuation of the naming and numbering conventions used in both the due diligence and ACHA survey assessments.

4.6. DEPOSIT CHARACTERISTICS

The excavation revealed a largely similar soil profile across each of the six PAD areas with a reddish brown to silty to gritty sandy loam topsoil underlain by a friable sandy clay over a compacted red clay. The clay layer generally appeared at a depth of 15 to 30 cm. The only variation to this was in the western extension of the PAD 2 test pits (033-038) which contained a fine yellow sand which became more compacted with higher density angular gravel with depth. Some test pits in PAD 2 and PAD 5 were also a lot deeper, with clay not being reached until 30 -50 cm. No compacted clay level was reached in four of the PAD 2 test pits extending westwards (Pits 033 to 038) and it is assumed that this sand layer was either the result of decomposing granite bedrock or the presence of a palaeochannel or creek bed. Soil colour was generally red brown to yellowish red across the proposal area. The colour of the sterile base clay ranged from deep red across most areas to a grey/yellow brown in the initial testing transect in PAD 2 (027 to 032). The characteristics of the main three stratigraphic units identified as part of this assessment are summarised in Table 13 below.

Excavation was made difficult by the compaction of the soil due to dryness. Consequently, the primary hand tools used for excavation were mattocks and crowbars. No modern inclusions were present in any of the test pits and only two samples of charcoal were encountered during the excavations. The charcoal was identified in test pits 3 and 4 (PAD 3) at a depth of 18 to 20 cm but it was not considered to be unequivocally cultural and therefore was not considered useful for dating of the cultural layers. Likely origins of the charcoal were considered to be bushfires and land clearing activities. These pits were noted to have a high level of insect and root activity.

The excavation noted the presence of insects and grass roots through the deposits. The impacts of these actions result in the continual movement of soil and through it the movement of stone artefacts, a process known as bioturbation. However, the greatest impact on the deposits is through agricultural and pastoral activities of the land including vegetation clearance and ploughing, which were apparent to a depth of 5-15 cm.

Table 13 Stratigraphic Soil Profile.

Stratigraphic Unit	*Depth (cm)*	*Sediment Description*	*Comments*	*Artefacts Present*	
1	0-20	Loosely compacted reddish brown to yellowish red gritty sandy loam with root matter and small to moderate sized gravels.	Topsoil layer is reddish brown to brown across proposal area. Evidence of ploughing disturbance (up to 15 cm)	24 artefacts	
2	20-60	Friable sandy clay with minimal roots, some gravels and clay nodules.	Gravel content is increased in close proximity to the drainage lines. Sandy clay is yellowish red to reddish brown across all areas.	9 artefacts	

3	20-40	Compacted red, red brown yellowish red clay.	Compacted bright red clay across all landforms, except drainage lines which have a yellowish gravelly sand.	1 artefact	

4.7. ARTEFACT CHARACTERISTICS

4.7.1. Surface Artefacts

A total of 20 surface artefacts were identified on the ground surface during the due diligence and ACHA surveys. These were recorded as four artefact scatters (Wagga Wagga SF AFT 1 to Wagga Wagga SF AFT 4) and five isolated artefacts (Wagga Wagga SF IF 1 to Wagga Wagga SF IF 5). The majority of surface finds were flakes (n=8, 40%), followed by cores (n=6, 30%), broken flakes (n=5, 25%), and a hammerstone (n=1, 5%). No retouch or edge damage was noted on any of the surface artefacts.

4.7.2. Subsurface Artefacts

Of the 49 test pits excavated across the proposal area during the subsurface investigation, 19 contained stone artefacts. In total there were 34 stone artefacts recovered. For seven test pits Spit 1 constituted 0-5 cm and for the remaining 42 test pits Spit 1 resulted in 0-10cm of deposit being excavated. These seven test pits (Pits 001, 005, 010, 017, 027, 042 and 045) were the initial pit excavated in each of the six PAD locations. The full details of these are provided in Appendix F. Table 14 shows the breakdown of artefacts excavated by pit number and spit and Figure 17 shows the artefact distribution across the testing areas. Plates 19-22 provide examples of the range of subsurface artefacts recovered across the proposal area.

Table 14 Distribution of artefacts by test pit and spit.

Test Pit No	SPIT 1 (0-5 cm)	SPIT 1 (0-10 cm)	SPIT 2 (5-15 cm)	SPIT 2 (10-20 cm)	SPIT 3 (15-25 cm)	SPIT 3 (20-30 cm)	SPIT 4 (25-35 cm)	SPIT 4 (30-40 cm)	SPIT 5 (35-45 cm)	TOTAL
1							1			1
2		2	3							5
6		8								8
9		1								1
22		1								1
23		1								1
28		1								1
30			1							1
32		1								1

34		1								1
35		1								1
40		1								1
41			1							1
43		1								1
44			1							1
45	2		2							4
46		1								1
47			1							1
48		2								2
Total		24	9			1		0		34

The distribution through the soil profile shows that 70.6% of the artefacts came from spit 1 (0-10 cm below the surface). The topsoils at this level comprised a loose reddish-brown silty loam. It is likely that bioturbation and farming activity have resulted in at least some artefacts moving through the soil profile. Evidence of ploughing was apparent in the top 10-15 cm of deposit in multiple locations, suggesting that the artefacts recovered from these spit layers had not been pulled up from deeper deposit layers, but were instead sitting within the topsoil and were distributed by the farming activities to marginally lower depths. This was followed by spit 2 (5-15 cm), accounting for 26.5% of the artefacts, which only occurred in seven of the test pits. Figure 17 shows the subsurface artefact distribution over the six testing areas. PAD 1 contained 18 test pits with ten subsurface finds (15.75 artefacts/m^3), PAD 2 contained five test pits and 11 subsurface finds (4.81 artefacts/m^3), PAD 3 contained four test pits and six subsurface finds (3.15 artefacts/m^3), PAD 4 contained four test pits and four subsurface finds (1.4 artefacts/m^3), PAD 5 contained five test pits and nine subsurface finds (3.93 artefacts/m^3) and PAD 6 contained six test pits but no subsurface finds (0 artefacts/m^3).

Table 15 and Figure 18 show the typological characteristics of the artefacts recovered from the test pits. It is clear that the majority of artefacts were flakes with low numbers of broken flakes and flaked pieces also recovered. No cores were recovered from the test pits however six cores were identified on the surface. Two of the artefacts exhibited edge damage but none were retouched. One unfinished tool, a basalt hammerstone was identified as part of surface artefact scatter Wagga Wagga SF AFT 2. No formal subsurface tools were recovered from the test pits.

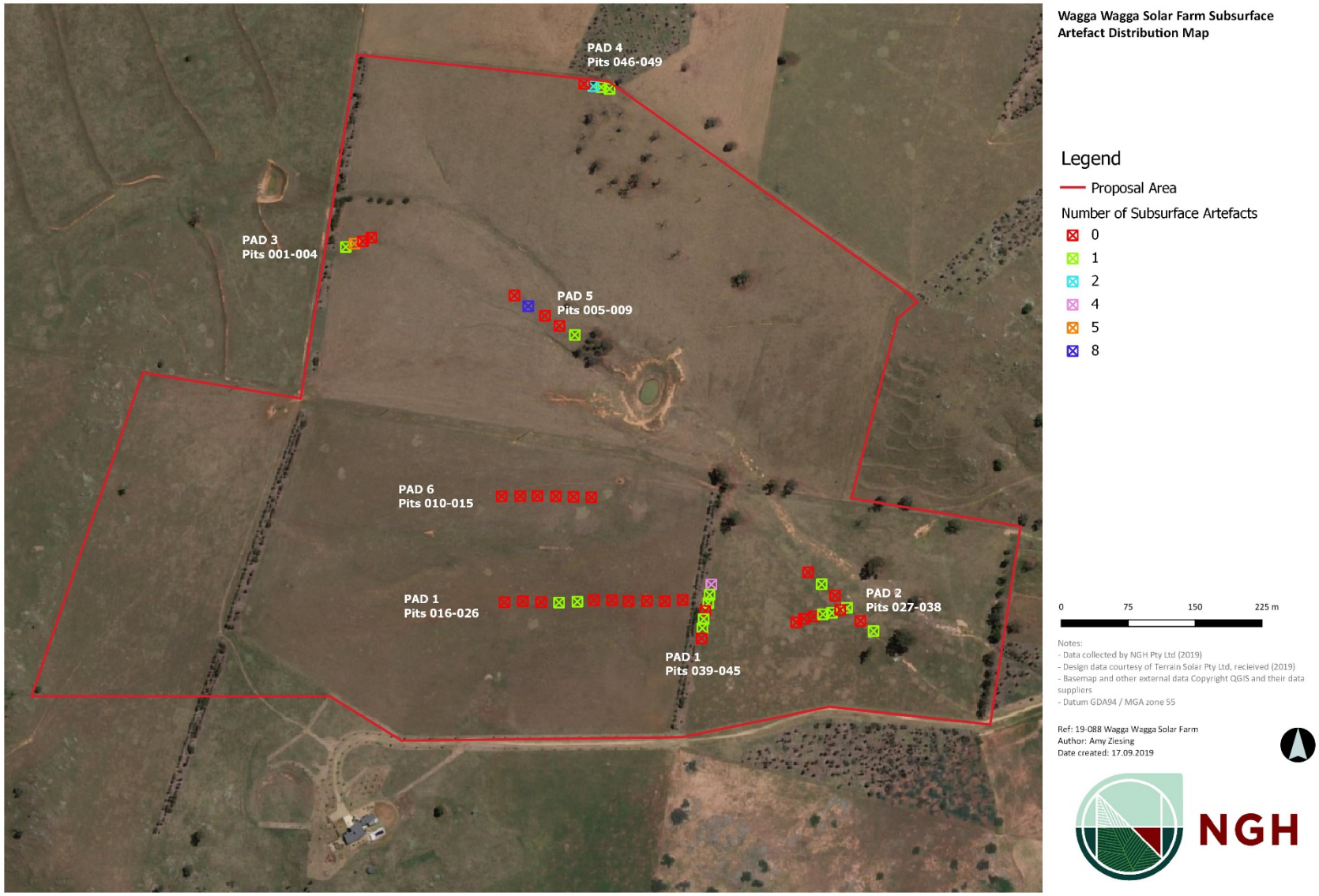


Figure 17 Artefact density across the six testing areas.

Table 15 Test pit artefact characteristics.

PAD	Test Pit	Flake	Broken Flakes	Core	Flaked Piece	Formal Tools	Total
1	22	1					1
	23	1					1
	40		1				1
	41	1					1
	43	1					1
	44				1		1
2	28	1					1
	30	1					1
	32	1					1
	34	1					1
	35	1					1
3	1	1					1
	2	2	3				5
4	45	2			2		4
	46	1					1
	47	1					1
	48	2					2
5	6	6	2				8
	9	1					1

	47	1					1
	48	2					2
	Sub Total	25	6	0	3	0	34
	Surface Artefacts	8	5	6	0	1	20
	TOTAL	33	11	6	3	1	54

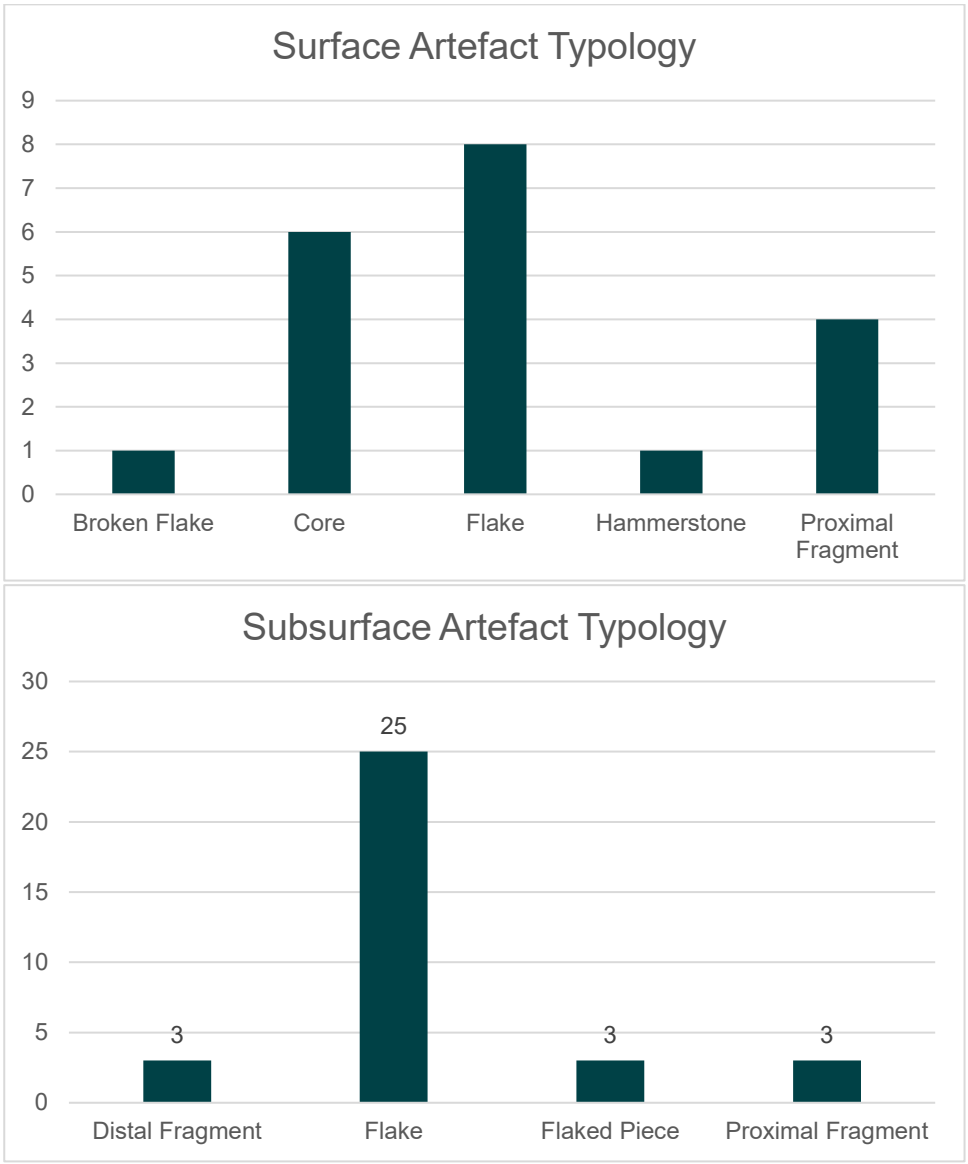


Figure 18 Surface Artefact Typologies vs Subsurface Artefact Typologies

The artefacts recovered from the surface and the test pits are likely to be waste materials from the flaking process, especially the three flaked pieces which had no obvious diagnostic features to be assigned a specific artefact typology. One basalt hammerstone was identified on the surface (Wagga Wagga SF AFT 2), exhibiting

evidence of grinding and pitting on multiple surfaces. The high number of surface cores may indicate a high discard rate of material, given that there are ample stone resources in the surrounding region. The lack of cores may also imply that artefacts were not specifically being manufactured within the proposal area but were instead simply being transported through this landscape.

All the artefacts recovered from the test pits and recorded on the surface were manufactured from quartz which tends to be the dominant lithology in the project area and common for the wider Bomen area. No quartz rock outcrops were observed in the project area suggesting that this raw material was sourced elsewhere in Bomen or Wagga Wagga and brought into the site.

The average length of the 25 complete subsurface flakes was 14.05 mm and the average mass was 2.14 grams. No subsurface flakes were recorded showing evidence of retouch however two were recorded with edge damage along the entirety of their right lateral margins. While there were no subsurface cores a relatively high number of cores (n=6; 30%) were recorded as surface artefacts in the proposal area. The lack of diversity of materials and types prevents any further detailed technological analysis.

The technological characteristics of the artefacts would suggest they are part of a general-purpose toolkit, manufactured as required. The artefacts themselves are typical and do not appear to represent any departure from the basic toolkit used by Aboriginal people in south eastern Australia with stone tools manufactured as required. The assemblage across the proposal area is suggestive of small ephemeral stopovers by hunters or small family groups for short periods of time.

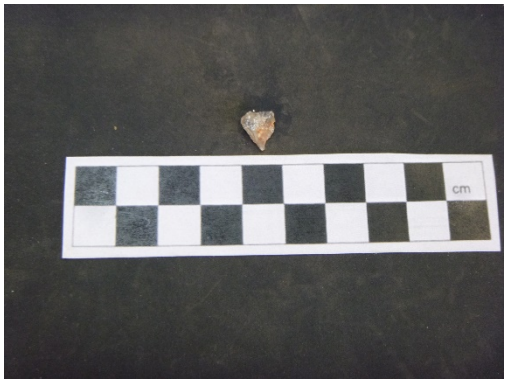


Plate 19 Crystal quartz flake from Pit 022, Spit 1 (PAD 1).

Plate 20 White quartz flake from Pit 028, Spit 1 (PAD 2).

Plate 21 White quartz flake from Pit 041, Spit 2 (PAD 1).

Plate 22 Crystal quartz flake from Pit 047, Spit 2 (PAD 4).

4.8. SPATIAL DISTRIBUTION

The spatial distribution of the cultural material in the proposal area recovered during the subsurface testing program is shown in Figure 19. The highest artefact density was identified in Pit 6 (n=8, 23.5%), indicating an approximately density of 32 artefacts/m^2 in that location The overall density of artefacts across the entire excavated area for all test pits was 2.78/m^2, which is the most accurate representation of the likely artefact occurrence. Figure 17 indicates that artefact distribution within the subsurface testing program and Figure 20 shows all the sites recorded during the survey and subsurface testing program.

Of the 11 test pits (Pit 16 to 26) placed along east to west along the spurline (PAD 1) within the site Wagga Wagga SF AFT 2, two subsurface artefacts were recovered from two test pits (Pits 22 and 23). The artefacts recovered from the crest were both quartz flakes. Given the pattern of subsurface artefact distribution across the crest it is likely that this crest landform is characterised by discrete low-density artefacts interspersed with areas of very low or no artefactual material. A further six test pits were placed on a north to south axis within the eastern extent of PAD 1, which was a continuation of the same spurline. From the six test pits (Pits 039 to 045), eight subsurface artefacts were recovered from five pits (Pits 40, 41, 43, 44 and 45). All subsurface finds were manufactured from quartz and included 3 flaked pieces, one broken flake and four flakes.

In contrast to the results from PAD 1, the pits at PAD 6, located approximately 100 m north of PAD 1 on the other side of the drainage line, contained no artefacts (Pits 10 to 15).

This may be due to a slight increase in previous ground disturbances along this elevated flat area from the installation of a trough and also regular grazing of this paddock. Over-grazing of this may paddock may also account for the lower number of subsurface finds identified in Pits 16 to 26 of PAD 1 in opposition to the higher density of finds which were recovered from Pits 39-45 of PAD 1, where fewer such disturbances appeared evident.

The PAD 2, PAD 3, PAD 4 and PAD 5 test pits were all characterised by discrete low-density clusters of artefacts interspersed with areas of very low or no artefactual material. Pit 6 (within PAD 5) contained the highest density of subsurface finds and was located at the highest point of the elevated flat associated with the drainage line. The areas that correspond with the presence of artefacts are generally the highest points in the landform.

Generally, there was an even spread of artefacts appearing in low densities across five out of six testing areas. Based on an analysis of the spatial patterning of artefacts across the proposal area, the most likely explanation in terms of the Aboriginal occupation of this area is that it reflects the intermittent and opportune occupation of the area as people travelled through country and occasionally camped in the general area.

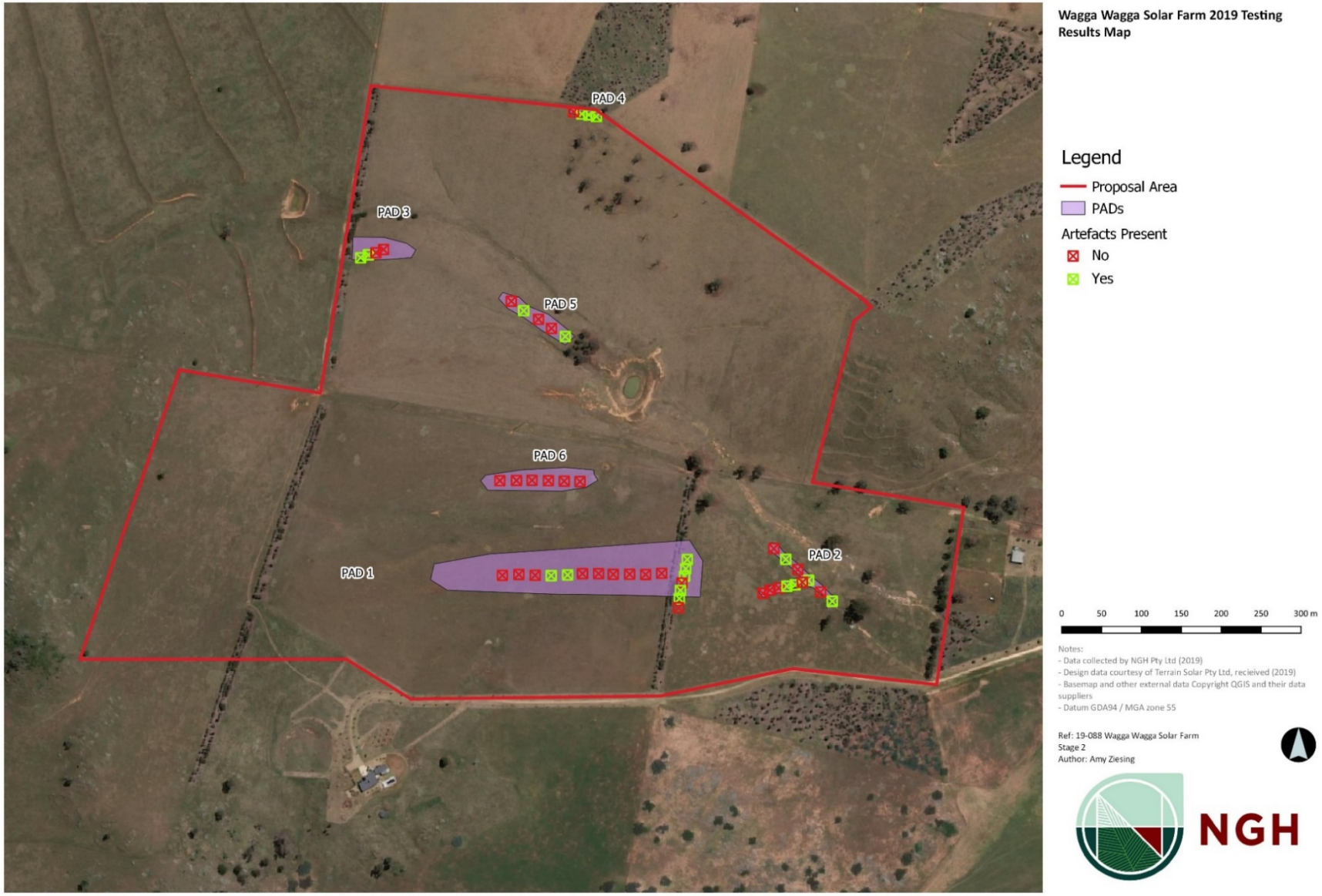


Figure 19 Results Map from the Test Excavation Program

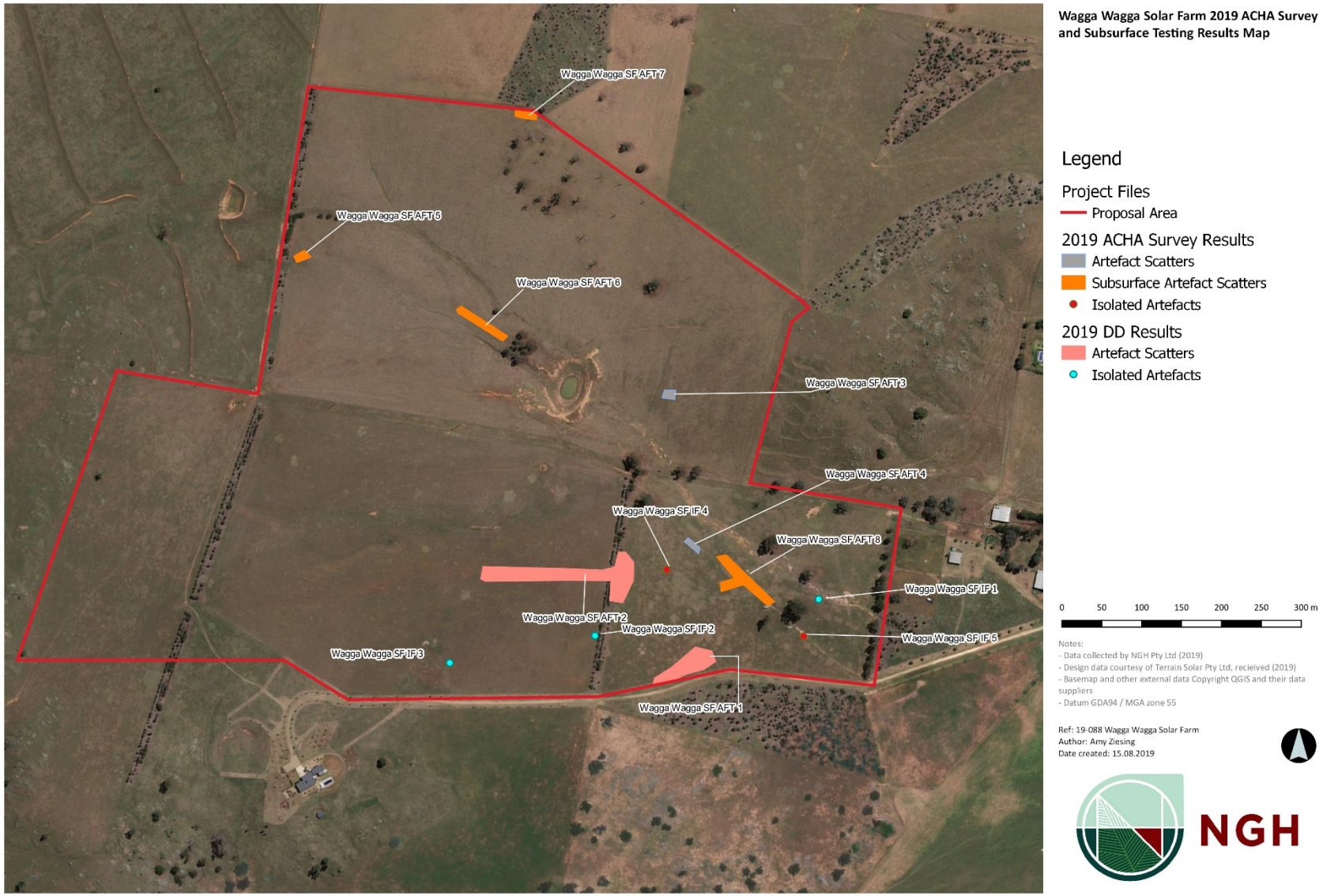


Figure 20 Results of the ACHA survey and Subsurface Testing Program showing all archaeological sites identified across the proposal area.

4.9. DISCUSSION

The predictions, based on modelling for the proposal area, were that isolated artefacts and artefact scatters consisting predominately of quartz objects were the most likely manifestation of Aboriginal occupation in the proposal area. The results indicate that artefact scatters and Aboriginal objects can occur throughout the landscape, even in areas disturbed by farming activities. While Aboriginal sites may be expected through all landscapes, there does appear to be a pattern of sites in the general region that relate to the presence of potential resources for Aboriginal use, specifically with reference to the Murrumbidgee floodplain.

The survey results have confirmed these predictions with five isolated finds and eight artefact scatters across the proposal area. The sites identified in this assessment are scattered across the proposal area and are representative of the opportunistic use and movement of people through the landscape. The area was likely used intermittently over a period of time for camping, hunting and gathering resources. The sites are most likely representative of the use of country bordering the northern Murrumbidgee floodplain which may have been used as a travelling route and stone resource for Wiradjuri people. Based on this assumption, there is every chance that there are similar artefact scatters or isolated artefacts across comparable landforms in the Bomen and Wagga Wagga areas and these site types, particularly stone objects, could be more prevalent in this area than previously envisaged.

The relatively low density of the total assemblage across the proposal area indicates that small groups of Aboriginal people were occupying short-term camps for short periods of time across the proposal area with a focus along creek banks and on slightly elevated areas. No direct evidence of longer-term base camps was identified within the proposal area.

All of the artefacts recorded during the survey and subsurface testing program were manufactured from quartz which is common for the general region. A hammerstone, cores, flakes, broken flakes and flaked pieces indicates that tool manufacture may have occurred onsite, although the presence of the hammerstone may imply some uncompleted tools and materials were also brought to the site or that it was discarded due to easy availability in the wider landscape. The low number of cores (n=6; 30%) may be representative of the low discard rate of quality raw materials in the area. The lack of cores may also imply that artefacts were not specifically being manufactured within the proposal area but were instead simply being transported through this landscape. Alternately, the lack of cores may also indicate that farming activities in the area have removed any larger stones from the paddocks given that the hammerstone was located along a paddock fence line.

It should also be noted that the results of this survey have somewhat increased the number of stone artefact sites recorded in the local area from 41 to 54 with an additional 13 artefact sites recorded during this assessment. The implications for this relate to significance assessments and the related appraisal of site representativeness. We would argue that there are likely to be many hundreds of such artefact sites in the local area, and this is reflected by the number of previously recorded artefact sites in the area which suggests a lack of previous investigations in the area.

In terms of the current proposal, extrapolating from the results of this survey, it is likely that additional low-density surface artefacts could occur within the proposed development footprint. However, consideration must also be given to the level of disturbance of any such sites. Based on the land use history of the proposal area, and an appraisal of the results from the field survey, there is negligible potential for the presence of intact subsurface deposits with high densities of artefacts or cultural material within the Wagga Wagga Solar Farm proposal area. The six areas of PAD (PAD 1 to PAD 6) assessed have demonstrated the presence of low-density scatters (PADs 1 to 5) or the absence of artefacts (PAD 6) (Figure 19). These results correlate directly with the results from the 2018 ACHA and subsurface testing program and the amendments to the sensitivity mapping recommended in that assessment. Some moderate revisions to the 2008 KNC modelling, outlined below, are proposed based on the results of the approved Wagga Wagga Solar Farm assessment (Access Archaeology 2018).

Higher archaeological sensitivity was identified in association with the higher order water course and raised, level well-drained ground and areas of lower sensitivity were found further away from this water source. Level terraces, spurs and rises close to low order drainage lines have low to moderate archaeological sensitivity.

5. CULTURAL HERITAGE VALUES AND STATEMENT OF SIGNIFICANCE

The assessment of the significance of Aboriginal archaeological sites is currently undertaken largely with reference to criteria outlined in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011), which are based on those in the ICOMOS Burra Charter (Marquis-Kyle and Walker 1994). 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 of course, 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.

5.1. 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.

It has been noted by the two of the RAPs, Bundyi Aboriginal Cultural Knowledge and Bidya Marra, that this area of Bomen contains an emu sanctuary and also holds high significance to the community due to the proximity to the Aboriginal places the Bomen Axe Quarry and the Bomen Lagoon. Both of these sites have provided abundant resources to Aboriginal groups in the past.

Feedback about the cultural value of the sites while in the field with representatives was that all sites hold cultural value to the Aboriginal community. It was clear from the conversations held in the field that the community view the stone artefacts as important and would like to see the surface artefacts collected before any development occurs. It was noted during the conversations that there was importance placed on collecting the artefacts and placing them in a safe location to avoid future disturbance. Furthermore, it was noted by the representatives on site that this area of Bomen, covering the flats outside of the current assessment area, contains an emu sanctuary and also holds high significance to the community as the locations of the Bomen Axe Quarry and the Bomen Lagoon. Both of these sites have provided abundant resources to Aboriginal groups in the past.

5.2. SCIENTIFIC (ARCHAEOLOGICAL) VALUE

The research potential of the sites located during this assessment is considered to be low. While the presence of the sites can be used to assist in the development of site modelling for the local landscape, their scientific value for further research is limited.

While the artefacts themselves are intrinsically interesting in terms of their base technical information their current lack of temporal context and the absence of information about local resources makes further conclusions about land use difficult. Their scientific value for further research is also limited due to the disturbed nature of the landscape and the movement of objects by clearing and ploughing activities.

The findings of this project have substantially increased the number of sites listed in the AHIMS database for the area. In terms of representativeness and rarity however, we would argue that there are likely to be many hundreds of such sites in the local area, the lack of sites in AHIMS is merely an indication that few surveys have been undertaken in the Wagga Wagga area and therefore they are yet to be found. The nature of Aboriginal occupation in almost any landscape in Australia is that stone artefact sites considerably outnumber any other site type, including scarred trees. This is due to the organic nature of many objects and implements manufactured and used by past Aboriginal people, which do not survive long in the archaeological record.

5.3. AESTHETIC VALUE

There is some aesthetic value associated of the cultural landscape incorporating the emu sanctuary within the flats to the south east of the proposal area. Despite this, there is no aesthetic value associated with the archaeological site per se, apart from the presence of Aboriginal artefacts in the landscape. The modified and heavily disturbed landscape within the solar farm development area however detracts from this aesthetic setting.

5.4. HISTORIC VALUE

There are no known historic values associated with the proposal area, the sites identified or links to known people.

5.5. OTHER VALUES

The area may have some educational value (not related to archaeological research) through educational material provided to the public about the Aboriginal occupation and use of the area, although the archaeological material is within private property and there is little for the public to see.

6. PROPOSED ACTIVITY

6.1. HISTORY AND LAND USE

It has been noted above that historically the Wagga Wagga Solar Farm South proposal area has been impacted through land use practices, in particular clearing, ploughing and grazing.

The implications for this activity are that the archaeological record has been compromised in terms of the potential for scarred trees to remain outside the areas of remnant vegetation. The implication for stone artefacts is that they may have been damaged or moved but they are likely to remain present in the general area they were discarded by Aboriginal people, except in cases where the landform has been completely modified.

Despite the impacts, Aboriginal artefacts and cultural material remain in the area, indicating the presence of past Aboriginal people and providing indications of their use of this landscape.

6.2. PROPOSED DEVELOPMENT ACTIVITY

As noted in section 1.2, the proposal involves the construction of Wagga Wagga Solar Farm South with a capacity to supply 18.7 MW (AC) of power. The power generated will be fed into the National Electricity Market (NEM) via a 66kV transmission line that would connect to the existing TransGrid Substation.

Disturbances will largely be in the preparation of the ground for the solar farm. Piles would be driven or screwed into the ground to support the solar array's mounted tracking system reducing the potential overall level of ground disturbance. Flat plate PV modules would be installed onto each mounted tracking system across the site. Each of them would be linked to an inverter and a transformer. Trenches would be dug for the installation of a series of underground cables linking the arrays across the proposal site.

Some internal access tracks would also be required, and typically these would comprise a compacted layer of gravel laid on stripped bare natural ground.

Some ancillary facilities would also be required including parking facilities, operations and maintenance buildings which is proposed for the approved area of works to the north.

Electrical transmission infrastructure will be required to connect the solar arrays and substation to the existing 66 kV transmission line.

A perimeter fence would be constructed around the solar farm and if required vegetation buffers would contain a vegetation screening buffer around all boundaries except the northern boundary where it adjoins the approved area of the Wagga Wagga Solar Farm.

In total, the construction phase of the proposal is expected to take 9 to 12 months. The Wagga Wagga Solar Farm is expected to operate for around 30 years. After the initial operating phase, the proposal would either be decommissioned, removing all above ground infrastructure and returning the site to its existing land capability, or upgraded with new photovoltaic equipment.

The development activity will therefore involve disturbance of the ground during the construction of the solar farm. Once established however, there would be minimal ongoing disturbance of the ground surface.

The final details and timing of the proposed construction activity have yet to be finalised, but it is anticipated that construction could commence in 2020.

6.3. ASSESSMENT OF HARM

As described in this report, five isolated finds and eight artefact scatters were located within the assessment area.

Seven of these artefact sites will be directly impacted by the proposed solar farm, including four artefact scatters (Wagga Wagga SF AFT3, Wagga Wagga SF AFT4, Wagga Wagga SF AFT5 and Wagga Wagga SF AFT8) and three isolated artefacts (Wagga Wagga SF IF1, Wagga Wagga SF IF3 and Wagga Wagga SF IF4). A further four artefact sites (Wagga Wagga SF AFT1, Wagga Wagga SF AFT2, Wagga Wagga SF AFT5 and Wagga Wagga SF AFT6) will be partially impacted by the location of the solar arrays. Wagga Wagga SF IF2 and Wagga Wagga SF AFT 7 will not be impacted by the proposed development. Table 16 below details the degree of harm and the consequence of that harm upon the heritage value of each site resulting from the proposed works. Figure 21 also shows the location of the sites and the proposed development footprint.

There is Aboriginal archaeological material present within the Wagga Wagga Solar Farm South proposal area and the assessment is that there are likely to be other artefacts present as well, although in similar low densities. The proposed level of disturbance for the construction of the solar farm area could impact the stone artefacts recorded during the field survey and others that may be present within other areas of the development site.

Of the 13 Aboriginal archaeological sites recorded, including eight artefact scatters and five isolated artefacts, 11 are situated within the area of the proposed solar arrays, tracks and fencing and would be impacted, either directly or partially, by the proposed development (see Figure 21).

The impact to these 11 sites is likely to be most extensive where earthworks will occur such as the installation of cabling and the transmission line poles, which may involve the removal, breakage or displacement of artefacts. This is considered a direct impact on the sites and the Aboriginal objects by the development in its present form.

The proposed construction methodology for the project will however result in only small areas of disturbance. The construction of access and maintenance tracks may involve some grading but given the flat nature of the majority of the terrain, this is likely to be minimal. The installation of the solar arrays involves drilling or screwing the piles into the ground and no widespread ground disturbance work such as grading is required to accomplish this. The major ground disturbance will be the trenching for cables and vehicle movement during construction.

The assessment of harm overall for the project is therefore assessed as low to moderate.

Table 16. Summary of the degree of harm and the consequence of that harm upon site types

Site Type	Type of Harm	Degree of Harm	Consequence of harm	No. of Sites	% of site type
Isolated Finds	Direct	Complete	Total loss of value	4	80
	Partial	Nil	Partial loss of value	0	0
	Nil	Nil	None – avoided by the proposed development	1	20
Artefact Scatters	Direct	Complete	Total loss of value	3	37.5
	Partial	Nil	Partial loss of value	4	50
	Nil	Nil	None – avoided by the proposed development	1	12.5

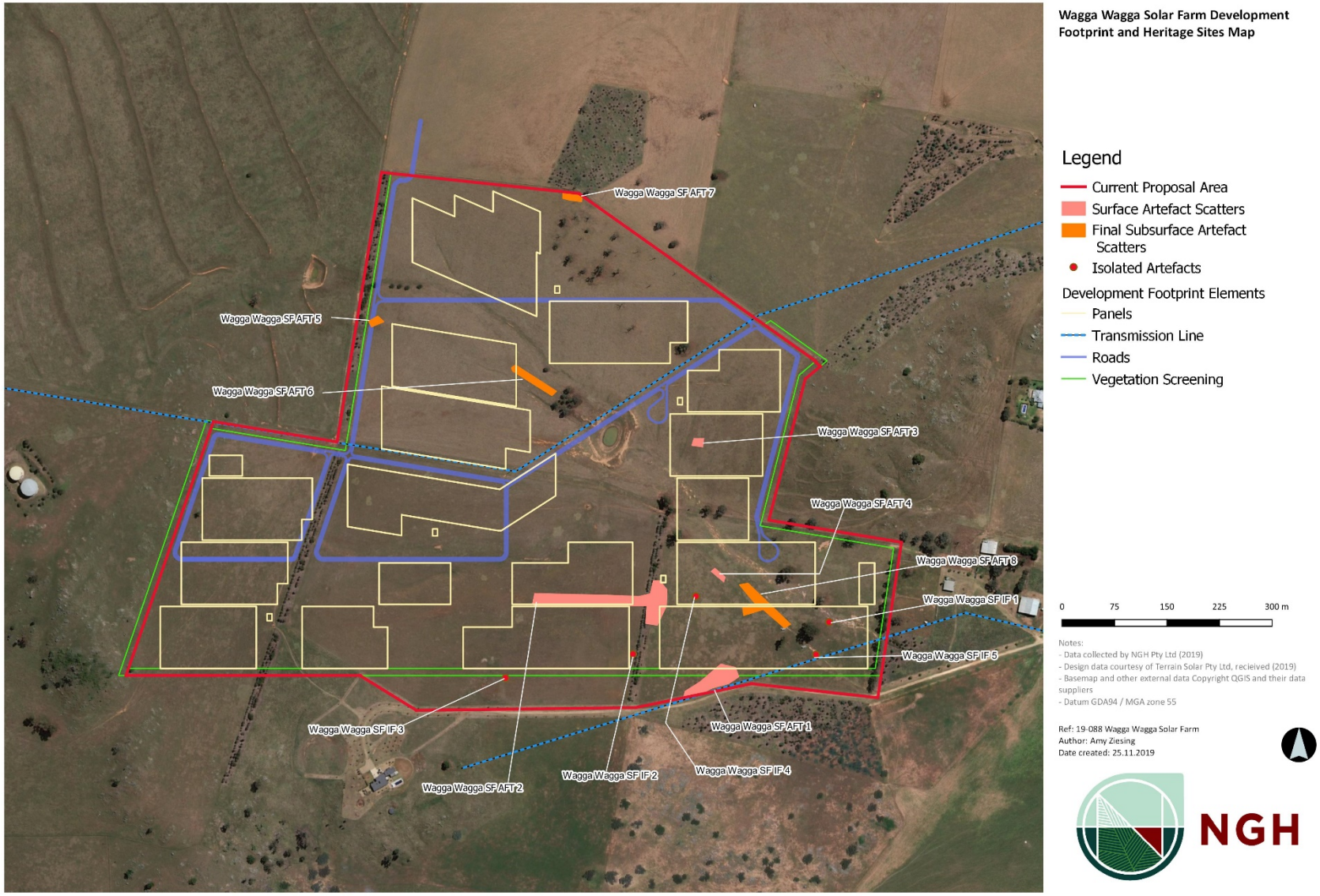


Figure 21 Proposed development footprint with heritage sites overlayed.

6.4. IMPACTS TO VALUES

The values potentially impacted by the development are any social and cultural values attributed to the artefacts and the sites by the local Aboriginal community. The extent to which the loss of the sites or parts of the sites would impact on the community is only something the Aboriginal community can articulate.

The impact to scientific values for this development are summarised in Section 5 and detailed in Table 17 with the stone artefact sites rated as having low loss of scientific value. While, seven stone artefact sites are rated as having total loss of scientific value, it is argued that there are likely to be a number of similar sites in the local area and therefore the impact to the overall local archaeological record is considered to be low. A further four artefact scatters are rated as having a partial loss of scientific value and two artefact sites will be avoided by the proposed development.

The stone artefacts have little research value apart from what has already been gained from the information obtained during the present assessment. This information relates more to the presence of the artefacts and in the development of Aboriginal site modelling, which has largely now been realised by the recording.

The intrinsic values of the artefacts themselves may be affected by the development of the proposal area. Any removal of the artefacts, or their breakage, would reduce the low scientific value they retain.

The proposed development design and the locations of the sites assessed in this report are shown in Figure 21. No other values have been identified that would be affected by the development proposal.

Table 17. Identified risk to known sites.

AHMIS #	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
56-1-0605	Wagga Wagga SF AFT 1	Poor – 100+ year history of agricultural and pastoral use.	Low	Partial	Partial	Partial loss of value	Salvage surface objects prior to development of proposal area.
56-1-0604	Wagga Wagga SF AFT 2 (formerly PAD 1)	Poor – 100+ year history of agricultural and pastoral use.	Low	Partial	Partial	Partial loss of value	Salvage surface objects prior to development of proposal area.
56-1-0603	Wagga Wagga SF AFT 3	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
56-1-0602	Wagga Wagga SF AFT 4	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
56-1-0601	Wagga Wagga SF AFT 5 (formerly PAD 3)	Poor – 100+ year history of agricultural and pastoral use.	Low	Partial	Partial	Partial loss of value	Salvage surface objects prior to development of proposal area.
56-1-0600	Wagga Wagga SF AFT 6 (formerly PAD 5)	Poor – 100+ year history of agricultural and pastoral use.	Low	Partial	Partial	Partial loss of value	Salvage surface objects prior to development of proposal area.
56-1-0599	Wagga Wagga SF AFT 7 (formerly PAD 4)	Poor – 100+ year history of agricultural and pastoral use.	Low	None	None	No loss of value – outside of development footprint	5m buffer zone around site to avoid impact

56-1-0598	Wagga Wagga SF AFT 8 (formerly PAD 2)	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
56-1-0597	Wagga Wagga SF IF 1	Poor – 100+ year history of agricultural and pastoral use.	Low	Partial	Partial	Partial loss of value	Salvage surface objects prior to development of proposal area.
56-1-0596	Wagga Wagga SF IF 2	Poor – 100+ year history of agricultural and pastoral use.	Low	None	None	No loss of value – outside of development footprint	5m buffer zone around site to avoid impact
56-1-0595	Wagga Wagga SF IF 3	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
56-1-0594	Wagga Wagga SF IF 4	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
56-1-0593	Wagga Wagga SF IF 5	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.

7. AVOIDING OR MITIGATING HARM

7.1. 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 and the potential for mitigating impacts to the sites recorded during the survey for the proposed Wagga Wagga Solar Farm South works. The main consideration was the cumulative effect of the proposed impact to the sites and the wider archaeological record. The precautionary principle in relation to Aboriginal heritage implies that development proposals should be carefully evaluated to identify possible impacts and assess the risk of potential consequences.

In broad terms, the archaeological material located during this investigation is similar to what has been found previously within the region, comprising isolated finds and low-density artefact scatters dominated by quartz lithology. Prior to the completion of this assessment, the most commonly recorded site type in the immediate area was artefact sites (71.9%). The identification of an additional 13 sites with one or more stone artefacts during this survey suggests that the dominance of artefact sites in the record for the local area is an accurate representation of the archaeological record. The findings of this survey are therefore believed to accurately represent the Aboriginal cultural record of land use for the Wagga Wagga area.

While there have been archaeological investigations for other projects in the local area and region, including subsurface investigations, there is no clear regional synthesis of the nature, number, extent and content for archaeological sites within the Wagga Wagga LGA. Nevertheless, given the size of the geographical area, it is almost certain that there would be similar site types present within the region. The result of this Aboriginal heritage assessment supports the proposed model of site location and site distribution, whereby objects and sites could be expected to occur across all landscapes and in particular in close proximity to a water source, even in areas of highly disturbed farming activities. The results of this Aboriginal heritage assessment suggest that more sites could be expected to occur in the area than was previously envisaged.

The implications for ESD principles are that in fact more sites are likely to be present in the region than previously thought, which reduces the individual value of the particular sites within the proposal area, as they are likely to be represented elsewhere. It must be recognised that large parts of the region have been heavily cleared, farmed and developed through the construction and maintenance of roads and residential structures and therefore other sites are also likely to have been disturbed.

As noted above, the archaeological values of the site within the development footprint, considering the scientific, representative and rarity values assigned to them, was deemed to be low. In terms of representativeness and rarity the previous number of overall sites, particularly stone artefact sites, in AHIMS for the local area was merely an indication of the surveys that have been undertaken in the immediate Bomen area. It is believed therefore that the proposed impacts to the stone artefact sites through the development of this particular solar farm proposal would not adversely affect the broader archaeological record for the local Bomen area or the wider Wagga Wagga region.

The principle of inter-generational equity requires the present generation to ensure that the sites and diversity of the archaeological record is maintained or enhanced for the benefit of future generations. We believe that the diversity of the archaeological record is not compromised by development of the proposed Wagga Wagga Solar Farm South. Further to this, the number of yet unknown sites in the wider region allow opportunity for identification by future generations.

We estimate, that while the current development proposal will impact all of the stone artefact sites identified, the overall cumulative impact on the archaeological record for the region is likely to be minimal, assuming a similar density of artefact sites remain across the wider region. Therefore, it is argued that the cumulative impacts of the proposal are not enough to reject outright the development proposal.

7.2. CONSIDERATION OF HARM

Preventing harm to the five isolated finds and eight artefact scatter sites identified within the proposed Wagga Wagga Solar Farm South area is technically possible through avoidance; however; design modifications have already been made in an effort to avoid, or partially avoid, impact to six artefact sites. The scattered nature of the stone artefact sites across the area prevent further modifications to the development footprint of the proposed solar farm.

Based on the assessment of the sites and in consideration of discussions with the Aboriginal representatives during the field survey, it is not considered necessary to prevent the proposed development of Wagga Wagga Solar Farm South, or for total avoidance of the stone artefact sites identified within the current solar farm area. The stone artefact sites have been shown to be in highly disturbed contexts with little remaining scientific value. Aboriginal cultural value has been determined by the local Aboriginal community to be generally low enough to not prevent the proposed Wagga Wagga Solar Farm South proceeding.

A total of 11 sites with stone artefacts, comprising seven artefact scatters and four isolated finds, are situated within the area of the proposed solar arrays, tracks and fencing that would be impacted by the proposed development of the Wagga Wagga Solar Farm South (see Figure 18). The most likely cause of harm to these stone artefact sites will therefore be through ground preparation such as vegetation clearance, installation of the posts and solar arrays.

However, the question remains about possible occurrences of artefacts and cultural material within the balance of the solar farm site. It is possible and considered likely that additional artefacts will be present, most likely in the form of isolated artefacts or small low-density scatters. Without knowing their exact locations, it is difficult to manage the impacts. We do not consider that the risk of such disturbances means the development should be abandoned. The archaeological material identified in the survey, and potentially present in the balance of the development site is not of sufficient value to reject the development proposal.

Mitigation of harm to cultural heritage sites generally involves some level of detailed recording to preserve the information contained within the site. Mitigation can be in the form of minimising harm, through slight changes in the development plan or through direct management measures of the sites and Aboriginal objects.

Complete avoidance has already been achieved for one artefact scatter and one isolated find and partial avoidance has been achieved for four artefact scatters, therefore, it is argued here that mitigation in the form of further alteration may not be feasible or warranted within the remainder of the solar farm area. However, any stone artefact sites within the development footprint that cannot be avoided by the proposed works are conducive to salvage as a mitigation strategy as requested by the Aboriginal representatives during the field survey.

As identified above, it is recommended that the impacted sites recorded within the development footprint for the proposed Wagga Wagga Solar Farm South are salvaged by an archaeologist with representatives of the registered Aboriginal parties prior to the proposed development commencing. The artefacts should be collected and moved to a safe area for reburial within the property that will not be subject to any ground disturbance.

8. LEGISLATIVE CONTEXT

Aboriginal heritage is primarily protected under the NPW Act 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 through 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 AHIMS site cards for all sites located during heritage surveys.

Section 90 of the NPW Act deal 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 considered to be a part of the environment. This Act requires that Aboriginal cultural heritage and the possible impacts to Aboriginal heritage that development may have are formally considered in land-use planning and development approval processes.

The planning approvals pathway for the proposed Wagga Wagga Solar Farm South project lies under Part 5 of the NSW EP&A Act. A review of environmental factors (REF) is required to assess the potential environmental impacts in accordance with sections 110 and 111 of the EP&A Act. In addition to this, the approvals for impact to Aboriginal heritage remains with BCD.

9. RECOMMENDATIONS

The recommendations are based on the following information and considerations:

- Results of the current archaeological survey and subsurface testing program of the area;
- Consideration of results from other local 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. A minimum 5 m buffer must be observed around the boundary extent of all sites prior to the achievement of the below recommendations.
2. The proponent applies to the Biodiversity and Conservation Division (BCD) within the Department of Planning, Industry and Environment (DPIE) and receives an Aboriginal Heritage Impact Permit (AHIP) to allow harm to the 11 Aboriginal archaeological sites that will be partially or completely impacted within the proposal area by the Wagga Wagga Solar Farm South. The AHIP should be sought for the entire proposal area for the Wagga Wagga Solar Farm South.
3. Should the proponent seek to apply for an AHIP, this report must accompany the application, as outlined in the BCD document: Applying for an Aboriginal Heritage Impact Permit: Guide for Applicants.
4. Once an AHIP has been issued the 11 impacted sites within the development footprint, as approved by the AHIP, must be salvaged prior to the proposed work commencing and moved to a safe area within the property that will not be subject to any ground disturbance.
5. The collection and relocation of the artefacts should be undertaken by an archaeologist with representatives from the registered Aboriginal parties and be consistent with Requirement 26 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. A site impact card will be submitted for each site salvaged and a new site card will need to be completed once the artefacts are buried to record their new location on the AHIMS database.
6. All artefacts recovered from the subsurface testing program currently in temporary care at NGH Wagga Wagga office must be reburied by an archaeologist with representatives from the registered Aboriginal parties and be consistent with Requirement 26 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. A new site card will need to be completed once the artefacts are reburied to record their new location on the AHIMS database.
7. No further archaeological investigation or salvage excavation program is warranted or required for the proposal area assessed in this report.
8. If any objects suspected of being Aboriginal in origin are located in areas outside a valid AHIP, work must stop, and the BCD notified.
9. The proponent must prepare a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction work. The CHMP would outline an unexpected finds protocol to deal with construction activity. Preparation of the CHMP must be undertaken in consultation with the registered Aboriginal parties.

10. In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity. BCD and the local police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. Should the remain be identified to be Aboriginal in origin BCD would advise the proponent and/or archaeologist on the appropriate Aboriginal parties to contact.
11. Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation. This would include consultation with the registered Aboriginal parties and may include further field survey.
12. The proponent is reminded that it is an offence under the *National Parks and Wildlife Act* to harm an Aboriginal object without a valid AHIP.

10. REFERENCES

Access Archaeology & Heritage, March 2018. Aboriginal Cultural Heritage Assessment Report, Proposed Wagga Wagga Solar Farm, Bomen, NSW. Unpublished report to Terrain Solar Pty Ltd.

Austral Archaeology Pty Ltd., (2005). Wagga Wagga Rail Bridge Replacement, Wagga Wagga, NSW. Aboriginal Cultural & Archaeological Heritage Assessment & Statement of Heritage Impact. Unpublished report prepared for Connell Wagner Pty Ltd, on behalf of Rail Track Corporation Ltd.

Brayshaw, H. & Dallas, M. (1985). Preliminary Archaeological Survey of Proposed Coal Mine and Power Station At Oaklands, Southern NSW. Unpublished Report to NPWS and Gutteridge Haskins & Davey Pty. Ltd.

Dearling, C. & Evans, B. (n.d.). Kapooka Military Area: Resource Assessment. Unpublished report to Grinbergs, Knight and Associates.

Go Green Services, 2011a. Bomen Axe Quarry and Manufacturing Site Assessment and Statement of Significance for an Aboriginal Place Declaration. Unpublished report prepared for the NSW Office of Environment and Heritage.

Go Green Services, 2011b. Wollundry Lagoon Including Tony Ireland Park Statement of Significance for an Aboriginal Place Declaration. Unpublished report prepared for the NSW Office of Environment and Heritage.

Go Green Services, 2012a. Flowerdale Lagoon Aboriginal Place Nomination Assessment Report. Unpublished report prepared for the NSW Office of Environment and Heritage.

Go Green Services, 2012b. Wiradjuri Reserve - Gobba Beach Statement of Significance for an Aboriginal Place Declaration. Unpublished report prepared for the NSW Office of Environment and Heritage.

Go Green Services, 2013. Bomen Lagoon Aboriginal Place Nomination Assessment Report. Unpublished report prepared for the NSW Office of Environment and Heritage.

Hiscock, P. (1983). An Archaeological Survey Of The Proposed Electricity Transmission Line Between Wagga Wagga and Darlington Point. Unpublished report to NPWS.

Kelleher Nightingale Consulting Pty Ltd Archaeological and Heritage Management, March 2010. Wagga Wagga Local Environmental Study Aboriginal Cultural Heritage Assessment. Unpublished report prepared for Wilana Associates.

Kelton, J. (2005a). An Aboriginal Archaeological Study Of The Proposed Eastern Extension of Copland Street, Wagga Wagga. Unpublished report to CPC Land Development Consultants and Wagga Wagga City Council.

Kelton, J. (2005b). A Preliminary Aboriginal Archaeological Heritage Study Of The Henwood Property: Coolamon Road–Olympic Highway–Sutherlands Road Residential Structure Plan, Wagga Wagga, NSW Unpublished report to MJM Solutions and Wagga Wagga City Council.

Koettig, M. & Silcox, R. (1985). Survey for Aboriginal and Historic Sites along the Proposed Alternative Yass By-Pass Route. Unpublished report to NSW Dept of Main Roads.

Lance, A. (1984). An archaeological survey of mining lease application 48 [Albury] in southern New South Wales. Report to NPWS and Loftus House Pty. Ltd.

Navin, K. (1992). Preliminary Archaeological Investigation of Proposed Expansion to Landfill Facility at Gregadoo, Wagga Wagga, NSW. Unpublished report to the GHD Group.

Navin Officer Heritage Consultants. (2002). Lloyd Neighbourhood Land Release Area, Wagga Wagga NSW Local Environmental Study: Cultural Heritage Component. Unpublished report to Willana Associates.

Navin, K. & Officer, K. (c1997). An Archaeological Report upon The Assessment of A Natural Gas Pipeline Between Albury and Dubbo (interim / preliminary report sighted by consultant at Dubbo DEC (NPWS) office, 1998). Unpublished report to AGL.

NGH Environmental 2015 Aboriginal Heritage Due Diligence Assessment Bomen Business Park Enabling Infrastructure. Report prepared for Wagga Wagga City Council.

NGH Environmental 2016a Aboriginal Cultural Heritage Assessment Brunslea Park Subsurface Testing. A report prepared for EDM Group and Brunslea Estate.

NGH Environmental 2016a. Bomen Rifl Survey and Subsurface Testing. Report prepared for Wagga Wagga City Council.

NGH Environmental 2016b Aboriginal Cultural Heritage Assessment Brunslea Park Subsurface Testing. A report prepared for EDM Group and Brunslea Estate.

NGH Environmental 2016c Aboriginal Heritage Due Diligence Assessment Bomen Solar Energy System. Report prepared for Southern Cross Energy Pty Ltd.

NGH Environmental, May 2018. Aboriginal Cultural Heritage Assessment: Gregadoo Solar Farm. Report produced for Gregadoo Solar Farm Pty Ltd.

OEH, 2010a. Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.

OEH, 2010b. Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales.

OEH, 2010c. Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.

Officer, K & Navin, K. (1998). Archaeological Survey For Aboriginal Sites, Proposed Power Plant at Bomen, Wagga Wagga Wagga NSW. Unpublished report to East Australian Pipeline Ltd.

OzArk EHM (2011). Kapooka Bridge Replacement Project. Unpublished report prepared for NSW Roads and Traffic Authority – South West Region, Dubbo, NSW.

OzArk EHM (2012). Aboriginal and Historic Heritage Assessment: Wagga Wagga Levee Upgrade Project. Unpublished report prepared for GHD Wagga and Wagga Wagga City Council.

Silcox, R. (1986) Survey for Aboriginal Sites Along the Proposed Water Pipeline Routes and Construction Sites of Stage 1 of Augmentation of South West Tablelands Water Supply Scheme, NSW NPWS no. C-1273. Report to Public Works Dept, NSW.

Tindale, N. B., 1974. Aboriginal tribes of Australia: their terrain, environmental controls, distribution, limits, and proper names. Canberra: ANU Press.

Witter, D. (1980). An Archaeological Pipeline Survey Between Wagga Wagga and Young. Unpublished report to NSW NPWS.

Witter, D. & Hughes, P. (1983). Stage 1 of an Archaeological Survey of the Murrumburrah-Yass and Murrumburrah-Wagga Wagga Electricity Transmission.

APPENDIX A ABORIGINAL CONSULTATION

Newspaper advertisement in Daily Advertiser on Friday the 17th of May 2019.

36 THE DAILY ADVERTISER Friday, May 17, 2019 dailyadvertiser.com.au

Connect with Classifieds

The Daily Advertiser

Phone: 1300 656 562
Email: riverinaclassifieds@fairfaxmedia.com.au

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Save time, submit online 24/7 advertisers.com.au
Print and online packages available throughout Australia
Ongoing business advertising self service enquiries: acmadonline@fairfaxmedia.com.au
Emoji now available

Funeral Notices

CORNELIUS "CON" CROESE
(Reverend Father)
Passed away peacefully
9th May 2019, aged 90 years.
A Memorial Mass will be held at St Michael's Cathedral Wagga Wagga, on Wednesday 22nd May 2019, at 10:30am.

Tributes

KEEN
Neville Robert
28/1/1946 - 9/5/2019
73 years
Fondly remembered as a kind, caring, protective and fun loving parent and friend by his in-laws.
RIP Neville.

Lost & Found

LOST Red Heeler Sat 4th May Tolland area, 1 floppy ear, Ruby. Phone Michael: 0457 225 950.

Firewood

A1 HOT WOOD delivered or yard sales. Phone Geoff Clout 6921 1958 0438 859 112

FIREWOOD Good quality, dry burning firewood. Sold in loads $180 Delivered in Wagga.Trevor 0417 033 440

For Sale

TYRE SPECIALS

205/65R15	$79
205/55R16	$95
215/60R16	$95
225/60R17	$135
225/65R17	$140
235/55R18	$165
185R14C	$79
245/70R16 AT	$150

ABC TYRES
25 PEARSON ST
Ph: 6925 5305

Firewood

FIREWOOD
Split and ready for delivery or pickup
Various size loads available
0455 044 596

FIREWOOD 6 x 7 ute load $180. 6 x 4 trlr load $135, both $300. Ph: 0407 775 864.

Motor Vehicles

LANDCRUISER VX 4.7 V8, VGC, leather, sunroof, BTK87T, $29,990 NEG. 0439 027 017

STAND OUT!! ADD COLOUR TO YOUR AD

Public Notices

Notification for registration of interest for Aboriginal stakeholders

NGH Environmental has been contracted by Terrain Solar (PO Box 1113, Manly NSW 2095) to undertake an Aboriginal Cultural Heritage Assessment (ACHA), including subsurface testing, for a proposed Solar Farm within a portion of Lot 15/DP 1108978 on East Bomen Road, North Wagga, NSW.

The project area comprises of approximately 55 hectares and is located in close proximity to the declared Aboriginal place the Bomen Axe Quarry (AHIMS #56-1-0043). The purpose of the consultation with Aboriginal people is to assist the proponent in the preparation of the ACHA and to be involved in consultation as part of possible lodgement of an Aboriginal Heritage Impact Permit application.

In order to fulfil the requirements set out in the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, NGH Environmental is seeking interested Aboriginal parties who hold cultural knowledge of the assessment area to register their interest in the consultation process for the project and to assist in the determination of cultural significance of any Aboriginal objects or places located therein.

Registrations should be provided in writing to:
NGH Environmental Pty Ltd
PO Box 5464
WAGGA WAGGA NSW 2650
Or via email to:
amy.z@nghenvironmental.com.au

Closing date for registration is 31 May 2019

Those registering an interest will be contacted to discuss the project further. Those who do register are advised that their details will be provided to OEH and the Local Aboriginal Land Council, unless they specifically advise in writing that their details are not to be forwarded.

Public Notices

STAMP & COIN FAIR
Sturt Primary School, White Ave, Wagga
Saturday, May 18th
Sunday, May 19th
From 9.00am
SEVEN DEALERS - FREE ADMISSION
INQUIRIES PHONE: 6922 3393

Positions Vacant

Qualified Light Vehicle Mechanic Required
Email your resume to: bousfieldauto@gmail.com
Ph: 6921 4055
Confidentiality assured

6 DAY CAR DEAL

- Photo & 4 lines
- Online ad on Country cars
- Appears on the The Daily Advertiser website

Phone your local classified team on 1300 656 562.

FOR ONLY $66

The Daily Advertiser

*additional lines are charged at casual rate. Private sellers only.

WWPC Inc
The Wagga Wagga Poultry Show
Sunday, May 19
at the Wagga Show Ground
FREE Entry from 10am
Come and have a look at all the poultry breeds on display

Positions Vacant

TAXI DRIVERS
Day & Night Shifts
Training provided
Uniforms supplied
Phone Garry
0411 058 012

Positions Vacant

Casual Route Service Driver
Wagga Wagga Based
BusBiz is searching for an enthusiastic Route Service Bus Driver to join our team.
The successful applicant will be required to operate Route services between Wagga Wagga and Canberra on a Saturday Timetable.
To be considered for this position applicants must hold:
- Heavy Rigid Licence
- NSW Drivers Authority
- Working with Childrens' Certificate
- First Aid Certificate preferable

Competitive pay and on-the-job training will be provided.
Please email hr@shbl.com.au with a resume or details of experience.
BusBiz.net.au

Trade Services

A Job for Bob
- Lawn Mowing
- Tree Lopping
- Tree, Fence & Rubbish Removal
- Shed & Yard cleaning
- Best Rates

Phone 0418 658 770

Adult Services

0467 346 779
New 2 Thai Ladies Busty, Passionate, Fun, Massage Top Service

Abbey New in Town
Sexy Bikini Body, Absolute Stunner, Fun, Pic avail.
0424 865 572

Adult Services

Gypsy's
NEW Aussie Stunners
Ally Ella Lola
Pick UP & Drop OFF
5star Legal..7dys.. Efpos
Support your Local
0448 415 845

New Saxons
JO JO, SUZIE
NEW Macao, Thail,
Friendly, Top service
New Management
Day time special,
In or Out call / Open 24/7
4 Saxon St
0416 182 116
02 6925 1828
(DA97/0251)

KRISTINA
Pocket Rocket
0450 632 101

LISA, LINDA
New in Town
Japan, Hong Kong, 20 & 25 yo, Size 6, 7, Sweet, Friendly
All fantasies
Daytime Special
In/out calls
6931 8118

TRANSEXUAL
Beautiful Asian, Stunning, Hot, Active
0410 701 333

TRANSGENDER TIFFANY
Busty, Thai, Lovely
New in town.
Phone:
0449 765 583

Violet
Sexy Hypnotic-
Real Pics Avail
Don't Miss Out
0410 835 002

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Place your classified ad anytime 24/7
advertisers.com.au
Fairfax Media

Organisation	Contact	Action	Date Sent	Reply Date	Replied by	Response
OEH	Andrew Fisher and South West Branch	letter to OEH via email	15/05/2019	29/01/2019	letter via email	provided list of potential stakeholders
NTScorp		Letter to NTS Corp via email	15/05/2019			
National Native Title Tribunal		online search	15/05/2019			No determination identified within the proposal area
Office of Registrar Aboriginal Land Rights Act	Elizabeth Loane	Letter to Office of the Registrar via email	15/05/2019	14/01/2019	Email	Suggested contacting Wagga Wagga LALC
Wagga Wagga LALC	Lorraine Lyons	Letter to Albury LALC via email	15/05/2019			
Bundyi Aboriginal Cultural Services	Mark Saddler	Letter sent via email	15/05/2019	16/05/2019	Email	AZ acknowledged registration via email on 16/05/19
Yalmambirra	Yalmambirra	Letter sent via email	15/05/2019	15/05/2019	Email	AZ acknowledged registration via email on 16/05/19
Peter Ingram		Letter sent via email	15/05/2019			
Alice Williams		Letter sent via email	15/05/2019			
Kathy Williams		Letter sent via email	15/05/2019			

Narrandera LALC		Letter sent via email	15/05/2019			
Brungle/Tumut LALC		Letter sent via email	15/05/2019			
Waagan Waagan Project Group		Letter sent via email	16/05/2019			
Wagga Wagga Aboriginal Elders Group			16/05/2019			
Riverina Local Land Services		Letter to LLS via email	15/05/2019			
Wagga Wagga City Council		Letter sent via email	15/05/2019			
Bidya Marra Consultancy	James Ingram			07/06/19	Phone call	AZ acknowledge registration on 11/06/19
Local Newspapers	Newspaper advertisement	Daily Advertiser	15/05/2019			
OEH list of potential stakeholders						
All stakeholders already contacted						

Notification to OEH of stakeholders	Andrew Fisher and South West Branch	NGH via email	11/06/2019	11/06/2019	via email acknowledge received	Please note for the OEH records the registered Aboriginal Parties for the proposed Wagga Wagga Solar Farm South project as the Bundyi Aboriginal Cultural Knowledge, Yalmambirra and Bidya Marra Consultancy. No other parties have registered for this project.
Methodology sent						
Bundyi Cultural Services	Mark Saddler	NGH sent methodology via email	04/06/2019	05/06/2019	Email	MS would like additional subsurface testing of area near drainage line and dam. Provided rates and insurances.
Yalmambirra		NGH sent methodology via email	04/06/2019	21/06/19	Email	No comments on methodology. Unable to provide insurances for fieldwork.
Bidya Marra Consultancy	James Ingram	NGH sent methodology via email	11/06/2019	04/07/2019	Email/phone	In agreement with methodology. Provided rates and insurances
OEH informed of subsurface testing and provided methodology						

OEH	Andrew Fisher/Lyndon Patterson	Report via email	04/07/2019	10/07/2019	Email	OEH provided comments for consideration in refining methodology. Provided below.
Fieldwork						
Bundyi Cultural Services	Mark Saddler	Email	05/07/2019	05/07/2019	Email	Confirmed availability for four days of fieldwork
Yalmambirra		Email	05/07/2019	05/07/2019	Email	Unable to attend due to lack of insurances
Bidya Marra Consultancy	James Ingram	Email	05/07/2019	05/07/2019	Email	Confirmed availability for all fieldwork days
Mark Saddler Cultural Report						
Bundyi Cultural Services	Mark Saddler	Report via email	19/09/2019	19/09/2019	Email	AZ acknowledged receipt of cultural report
NGH response letter to cultural report						
Bundyi Cultural Services	Mark Saddler	Letter via email	22/08/2019			

Draft Report						
Bundyi Cultural Services	Mark Saddler	NGH sent draft report for review and comment via email	24/10/2019			No comments received
Yalmambirra		NGH sent draft report for review and comment via email	24/10/2019			No comments received
Bidya Marra Consultancy	James Ingram	NGH sent draft report for review and comment via email	24/10/2019			No comments received
Final Report						
Bundyi Cultural Services	Mark Saddler	NGH sent final report for review and comment via email	25/11/2019			
Yalmambirra		NGH sent final report for review and comment via email	25/11/2019			
Bidya Marra Consultancy	James Ingram	NGH sent final report for review and comment via email	25/11/2019			

Additional refinements to methodology recommended by OEH (BCD) on the 10th of July 2019

From: Lyndon Patterson
To: Amy Ziesing
Cc: John Gilding
Subject: RE: 19-088 : Notification of Subsurface Testing for the Proposed addition to the Wagga Wagga Solar Farm
Date: Wednesday, 10 July 2019 3:19:13 PM

Good afternoon Amy,

Thank you for sending through the methodology for survey and testing for Wagga Wagga Solar Farm. The methodology has a detailed review of the previous archaeological assessments completed in the area. Of particular relevance in terms of proximity to the current proposal is the ACHAR by Access Archaeology in 2017-18 for part of the proposed solar farm, which you have highlighted. We have a few comments for your consideration in refining the methodology as follows.

- The ACHAR should assess any potential direct and indirect impacts on particularly the nearby Bomen Axe Quarry Aboriginal Place but also Aboriginal objects in the area in accordance with 'Guide to investigation, assessing and reporting on Aboriginal cultural heritage in NSW'.
- Ensure the Aboriginal objects identified (Wagga Solar AFT 1 and 2 and IF 1, 2 and 3) are registered on AHIMS in accordance with the NPW Act.
- On page 8 of the methodology it states "seven artefacts sites are within the approved Wagga Wagga Solar Farm boundary...". DA (Development Application) 17/0679 for a Solar Farm at lot 15 DP 1108978 was refused on 11 September 2018. Consult with Terrain Solar or Wagga Wagga City Council on the status of the project to ensure correct terminology in reporting. The current assessment may be for a new DA.
- The test pit spacing proposed is 20-30m. The spacing of test pits should reflect the sensitivity of the landform to contain archaeological sites. The landforms assessed of higher sensitivity e.g. granite outcrops and the terrace above the waterway you might consider a closer spacing of test pits, for example 20 metres or less, to give greater certainty that artefact concentrations are not missed. Granite outcrops may indicate the presence of stone quarries that are known in the area (e.g. Bomen Axe Quarry and site 56-1-0110 immediately to the south of the project area).

We look forward to seeing the fieldwork results. Please contact me if you have any questions.

Regards,
Lyndon
Lyndon Patterson
Archaeologist

Biodiversity and Conservation Division | Department of Planning, Industry and Environment
M 0436 676 791 | **E** Lyndon.Patterson@environment.nsw.gov.au
C/- Level 1, 512 Dean Street, Albury NSW 2640
www.dpie.nsw.gov.au

NSW GOVERNMENT | Planning, Industry & Environment

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge

the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: Amy Ziesing [mailto:amy.z@nghenvironmental.com.au]
Sent: Thursday, 4 July 2019 1:56 PM
To: Andrew Fisher <Andrew.Fisher@environment.nsw.gov.au>
Cc: Lyndon Patterson <Lyndon.Patterson@environment.nsw.gov.au>; John Gilding <John.Gilding@environment.nsw.gov.au>; ROG South West Region Mailbox <rog.southwest@environment.nsw.gov.au>
Subject: 19-088: Notification of Subsurface Testing for the Proposed addition to the Wagga Wagga Solar Farm

Good Afternoon Andrew,

NGH is proposing to complete subsurface testing under the Code of Practice for the proposed addition to the Wagga Wagga Solar Farm.
The ACHA survey for this will be completed first, including the refinement of any PADs identified in the Due Diligence assessment, followed by the testing programme. The draft methodology covering both the survey and testing is attached to this email for your review.
The draft methodology RAP review period closes on the 9th of July 2019 however, all Registered Aboriginal Parties have provided their comments on this draft document.

Can you please review the methodology and get back to me with any comments by the 18th of July 2019 at the latest.

Please do not hesitate to contact me if you have any questions regarding this project.

Kind Regards,
Amy

Cultural Report provided by Bundyi Aboriginal Cultural Services to NGH following field survey

Bundyi Cultural Services

Mark Saddler

Wagga Wagga Solar
Windmill Rd

Bundyi Cultural Services, Mark Saddler

18/08/2019

Artwork by Mark Saddler. (Copyright)

Artwork Title, Murrawarra (stand your ground, protect)

Contents:

This report was compiled by Bundyi Cultural Services, Mark Saddler, for Riverina Local Land Services.

"I would like to acknowledge the traditional custodians of this land, my land, "The Wiradjuri People"

What I record and find is dedicated to those who have gone before us, to those present and to those who will follow us"

Mark Saddler, Wiradjuri Gibirr (man)

Travelling Stock Reserves (TSRs)

Travelling Stock Reserves (TSRs) are parcels of Crown land reserved under legislation for use by travelling stock. Local Land Services is responsible for the care, control and maintenance of almost 500,000ha of TSRs in NSW.

TSRs provide pasture reserves for travelling or grazing stock. These reserves can be beneficial in times of drought, bushfire or flood. They are also used for public recreation, apiary sites and for conservation.

Local Land Services manages the land to strike a balance between the needs of travelling or grazing stock and the conservation of native species.

The role of Local Land Services role in managing TSRs includes:

- Authorising and monitoring stock, recreation and apiary site use
- Controlling noxious weeds
- Controlling pest animals and insects
- Provision and maintenance of fencing, watering points and holding yards
- Consideration of land management and animal health legislation.

Local Land Services has developed the first draft state-wide planning framework for TSRs to support the future management of this land. We are now keen to hear from the public with their opinions on how to manage TSRs in the future. We want to understand the values people hold important for TSRs, including biodiversity and Aboriginal cultural heritage values.

The draft state-wide framework allows for the development of TSR regional management plans to facilitate more consistent and transparent management, resourcing and reporting.

NSW Travelling Stock Reserves Draft State Planning Framework 2016-19
TSR State Planning Framework Fact Sheet
Frequently asked questions

Aboriginal objects:

Aboriginal objects are physical evidence of the use of an area by Aboriginal people. They can also be referred to as 'Aboriginal sites', 'relics' or 'cultural material'.

Aboriginal objects include:

* Physical objects, such as stone tools, Aboriginal-built fences and stockyards, scarred trees and the remains of fringe camps
* Material deposited on the land, such as middens
* The ancestral remains of Aboriginal people.

Handicrafts made by Aboriginal people for sale are **not** 'Aboriginal objects' under the NPW Act. Known Aboriginal objects and sites are recorded on OEH's Aboriginal Heritage Information Management System (AHIMS). If you find a site you should report it to us.

Protecting Aboriginal objects and places:

You will need to exercise due diligence in determining whether your actions will harm Aboriginal objects. The **Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW** http://www.environment.nsw.gov.au/resources/cultureheritage/ddcop/10798ddcop.pdf This link will explain and provide practical guidance about what due diligence means. Anyone who exercises due diligence in determining that their actions will not harm Aboriginal objects has a defence against prosecution for the strict liability objects offence if they later harm an Aboriginal object.

An Aboriginal Heritage Impact Permit (AHIP) can be issued by OEH under Part 6 of the NPW Act where harm to an Aboriginal object or Aboriginal place cannot be avoided. An AHIP is a defence to a prosecution for harming Aboriginal objects and/or Aboriginal places if the harm was authorised by the AHIP and the conditions of that AHIP were not contravened.

Find out about AHIPs, due diligence and care agreements see **Information on Aboriginal Heritage Impact Permits.** http://www.environment.nsw.gov.au/licences/Section87Section90.htm

Purpose of code of practice for Due Diligence.

This code of practice is to assist individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether they should apply for consent in the form of an Aboriginal Heritage Impact Permit (AHIP). The National Parks and Wildlife Act 1974 (NPW Act) provides that a person who exercises due diligence in determining that their actions will not harm Aboriginal objects has a defence against prosecution for the strict liability offence if they later unknowingly harm an object without an AHIP.

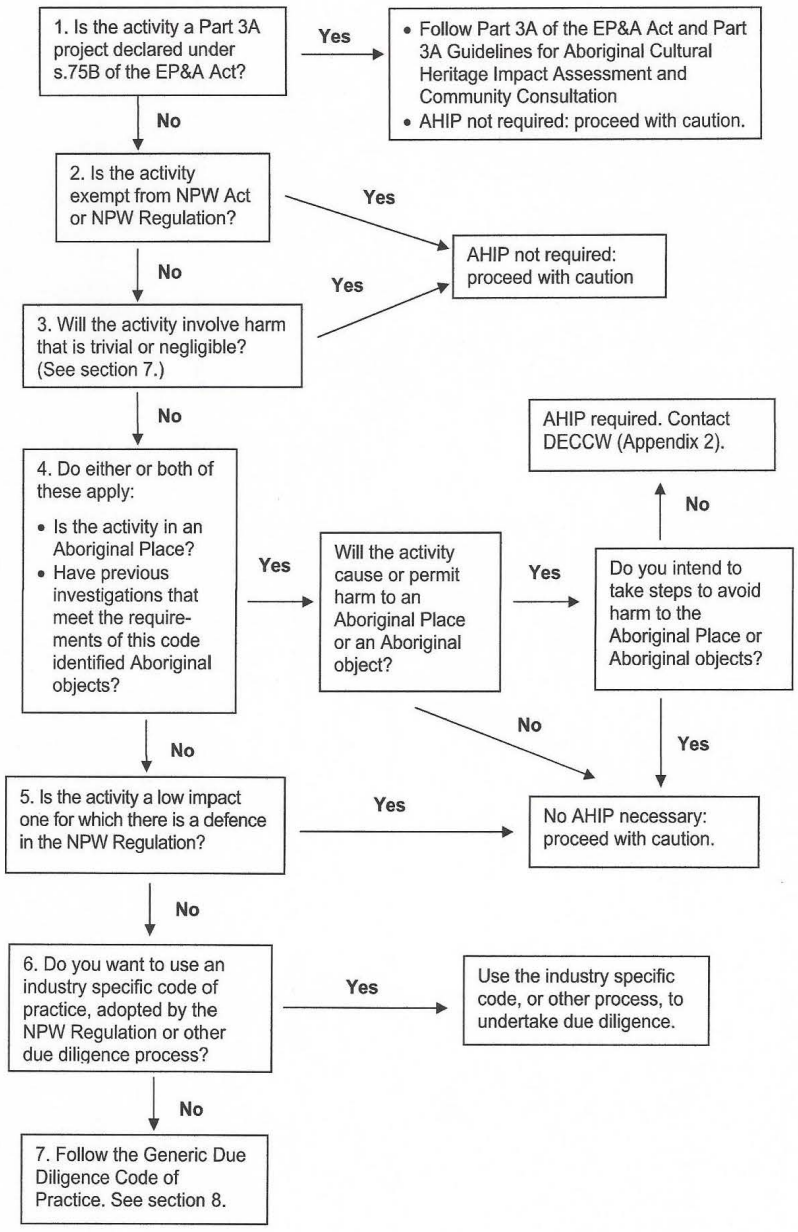
The NPW Act allows for a generic code of practice to explain what due diligence means. Carefully following this code of practice, which is adopted by the National Parks and Wildlife Regulation 2009 (NPW Regulation) made under the NPW Act, would be regarded as 'due diligence'. This code of practice can be used for all activities across all environments.

This code sets out the reasonable and practicable steps which individuals and organisations need to take in order to: 1 identify whether or not Aboriginal objects are, or are likely to be, present in an area 2 determine whether or not their activities are likely to harm Aboriginal objects (if present) 3 determine whether an AHIP application is required.

If Aboriginal objects are present or likely to be present and an activity will harm those objects, then an AHIP application will be required. Information about the permits and how to apply for them can be obtained through the Department of Environment, Climate Change and Water (DECCW) website at

www.environment.nsw.gov.au/licences/index.htm.

1 Do you need to use this due diligence code?



6

AHIMS Data Base Search.

Mark Saddler

Date: 18 August 2019

P.O.Box 8005 Kooringal Post Office
Kooringal New South Wales 2650

Attention: Mark Saddler

Email: marksad@live.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 55, Eastings : 539500 - 539700, Northings : 6118000 - 6118500 with a Buffer of 1000 meters. Additional Info : Due Diligence, conducted by Mark Saddler on 18 August 2019.

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

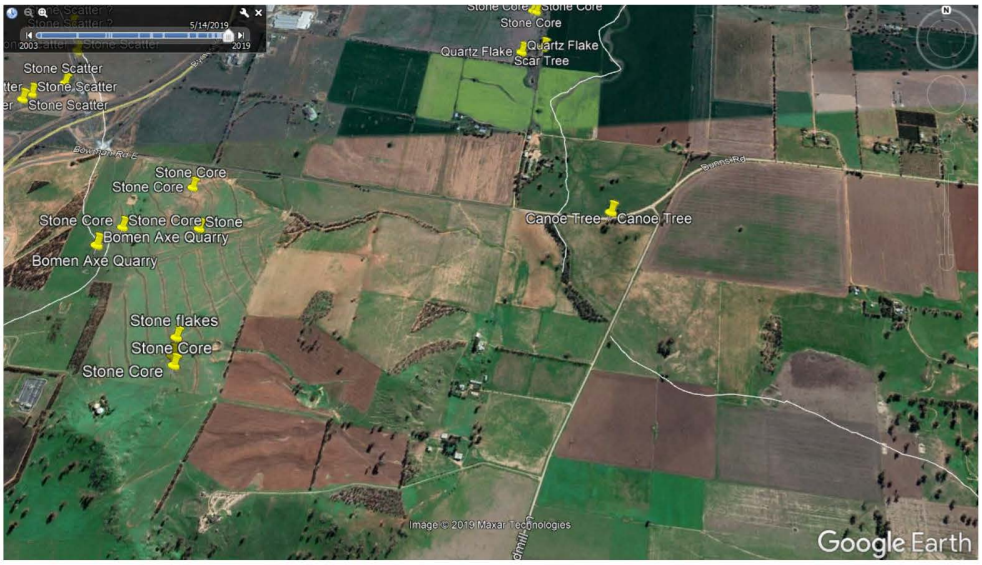
A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

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

ID	Aboriginal Place Name
77	Bomen Axe Quarry

7

Map and reference location to site:



8

Site recordings and location of site cards relevant to this site:

Site name	Wagga Wagga Solar Farm Windmill Rd Wagga NSW.		
Recorder	Mark Saddler		
Contact details	Ph 0412 693 030	Email:	marksad@live.com.au
Date prepared	18/08/2019	Web:	http://www.bundyiculture.com.au/

AHIMS ID (Site Card ID)	Site Type	Location of Site Cards on Web Page.	Date Recorded
56-1-0606	Artefact	http://www.environment.nsw.gov.au/awssapp/login.aspx	18/08/2019

Stakeholder details	Responsibilities	
Bundyi Cultural Services, Mark Saddler	Culture Advisor, Recorder, Knowledge Holder	0412 693 030 E: marksad@live.com.au

To find out more about Cultural Site Management, rules and protection go to this these web page links for more in depth information.

Do you need to use the due diligence code?

http://www.environment.nsw.gov.au/resources/cultureheritage/ddcop/10798ddcop.pdf

OEH **legislation** which ensures that Aboriginal cultural heritage must be considered as part of land management practices.

http://www.environment.nsw.gov.au/conservation/aboriginalculture.htm

10

Site Report and Recommendations.

18/08/2019

Wagga Wagga Solar Farm,
Windmill Rd,
Wagga Wagga 2650

On the 23/07/2019 I began several days survey work with NGH at the proposed Wagga Wagga Solar Farm near Wagga.

Over the next few days we dug and tested many pits in this area. Many smaller artefacts as well as some larger ones were located in this area.

No major Aboriginal sites or places were located, however with the closeness of the Bomen Axe Quarry, which is a protected site, I would encourage that care is taken during the process of building and infrastructure in and around this area.

Any major soil removal or disturbance of the ground or area should be done in the presence of a RAP or local Wiradjuri Elder or community member. This work would also be a paid position.

With regards to the actual Solar Farm project I would also ask that an 8% target be sought and met with regards to Aboriginal employment and training both while the plant is being built and also for the continuing maintenance of the site.

Also any salvage of any artefacts will be done with a RAP or Wiradjuri community member or Elder and once again these people are to be paid for their time and expertise.

I would also ask that native vegetation and trees be planted in the area so as to repair this place as well as offer habitat for local animals.

I recorded one major artefact in this area which is a grinding/hammer stone. (see page 9)

Procedures to work around Aboriginal sites can be found at this link,

http://www.aboriginalheritage.org/sites/legislation/

References:

OEH, http://www.environment.nsw.gov.au/

Local Land Services, http://www.lls.nsw.gov.au/livestock/stock-routes

Mark Saddler, Cultural Advisor and Knowledge holder, www.bundyiculture.com.au

Goggle Earth Maps, https://www.google.com/earth/

Aboriginal Heritage, http://www.aboriginalheritage.org/sites/legislation/

Prepared by:
Mark Saddler, Bundyi Cultural Services
P.O.B 8005 Kooringal Post Office NSW 2650
Ph: 0412 693 030
Email: marksad@live.com.au
Web: www.bundyiculture.com.au

NGH Letter Response to Bundyi Aboriginal Cultural Services Report

22 August 2019

Mark Saddler
Bundyi Cultural Services
PO Box 8005
KOORINGAL NSW 2650

marksad@live.com.au

Dear Mark

Re: 19-088 Response to Cultural Report for Wagga Wagga Solar Farm

NGH received a cultural report from Bundyi Cultural Services (BCS) on the 19th of August 2019 outlining the isolated artefact site (56-1-0606) recorded by BCS during the recent heritage fieldwork for the proposed addition to the Wagga Wagga Solar Farm. A number of recommendations for the project were also outlined in the report you provided. NGH would like to thank you for providing this report and the AHIMS site card you submitted for the project.

NGH will incorporate the following recommendations into the ACHA report that are in line with the recommendations in your cultural report:

> If complete avoidance of the isolated find and artefact scatters recorded within the proposal area is not possible the surface stone artefacts within the development footprint must be salvaged. The salvage of these objects must occur prior to the proposed work commencing. Until salvage has occurred a minimum 5 m buffer must be observed around all stone artefact sites.
>
> The collection and relocation of the surface artefacts should be undertaken by an archaeologist with representatives of the registered Aboriginal parties and be consistent with Requirement 26 of the *Code of practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. The salvage of Aboriginal objects can only occur following the approval off an AHIP.
>
> A minimum 5 m buffer should be observed around all sites with stone artefact that are being avoided by the proposed development.
>
> Terrain Solar should prepare a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction of the solar farm and management of known sites and artefacts. The Plan should include the requirement for cultural awareness training inductions and an unexpected finds procedure to deal with construction activity. Preparation of the CHMP should be undertaken in consultation with the registered Aboriginal parties.

WAGGA WAGGA
Suite 1, 39 Fitzmaurice Street (PO Box 5464) Wagga Wagga NSW 2650
T. (02) 6971 9696 **E.** ngh@nghconsulting.com.au **W.** www.nghconsulting.com.au
BEGA • BRISBANE • CANBERRA • GOLD COAST • NEWCASTLE • SYDNEY • WAGGA WAGGA
ABN 31 124 444 622 ACN 124 444 622

While preparation of the CHMP would be undertaken in consultation with the registered Aboriginal parties it would be at the discretion of Terrain Solar who was engaged to provide cultural awareness training or education although it is noted to be best practice to engage with the local Aboriginal community for such cultural programs.

The employment and monitoring issues raised are not related to this archaeological assessment and the issues would be dealt with separately by Terrain Solar. NGH are unable to comment further on these particular matters.

If you have any questions, please contact me, on (02) 6923 1548. I would be pleased to discuss this letter with you further.

Yours sincerely,

Amy Ziesing
Heritage Consultant
0411 781 911
NGH Pty Ltd
ABN: 31 124 444 622
ACN: 124 444 622

No comments were received on the Draft ACHA report.

APPENDIX B AHIMS SEARCH

Culturally sensitive information withheld

APPENDIX C SURFACE ARTEFACT DATA

Surface Find #	Site ID	Type	Raw Material	Length	Width	Thickness	Platform surface	Platform type	Termination	Reduction stage	Comments
1	Wagga Wagga SF AFT 1	Core	Quartz	50	74	40				Secondary	
2	Wagga Wagga SF AFT 1	Flake	Quartz	22	17	9	Flake scar	Broad	Step	Tertiary	
3	Wagga Wagga SF AFT 1	Proximal Fragment	Quartz	17	28	6	Flake scar	Broad		Tertiary	
4	Wagga Wagga SF AFT 1	Core	Quartz	22	53	46				Secondary	40% vein cortex 2 plat 2 scars
5	Wagga Wagga SF AFT 1	Broken Flake	Quartz	18	15	6	Flake scar	Focal	Feather	Tertiary	
6	Wagga Wagga SF AFT 1	Flake	Quartz	23	13	12	Crushed	Focal	Feather	Tertiary	
7	Wagga Wagga SF AFT 2	Core	Quartz	17	15	7				Tertiary	1 plat 1 neg flake scar on elevated sandy loam rise associated
8	Wagga Wagga SF AFT 2	Flake	Quartz	21	23	6	Flake scar	Broad	Feather	Tertiary	

9	Wagga Wagga SF AFT 2	Hammerstone	Basalt	144	70	50					East of quartz flakes at top of rise, pitting throughout, 2 poss ground surfaces
10	Wagga Wagga SF AFT 2	Core	Quartz	28	74	42				Secondary	20% vein cortex on spurline 1 plat 1 scar
11	Wagga Wagga SF AFT 2	Proximal Fragment	Quartz	22	11	6	Ridge			Tertiary	
12	Wagga Wagga SF AFT 2	Flake	Quartz	21	15	5	Ridge	Focal	Feather	Tertiary	
13	Wagga Wagga SF AFT 3	Proximal Fragment	Quartz	26	11	10	Flake scar	Broad		Tertiary	In ploughed paddock on slope 50m north of dam and drainage line
14	Wagga Wagga SF AFT 3	Flake	Quartz	15	6	4	Ridge	Focal	Feather	Tertiary	
15	Wagga Wagga SF AFT 4	Flake	Quartz	31	24	9	Flake scar	Broad	Feather	Tertiary	In vehicle track south of drainage line
16	Wagga Wagga SF AFT 4	Proximal Fragment	Quartz	22	12	10	Flake scar	Focal		Tertiary	
17	Wagga Wagga SF IF 1	Flake	Quartz	16	12	3	Ridge	Focal	Feather	Tertiary	On eastern edge of drainage line

18	Wagga Wagga SF IF 2	Core	Quartz	50	52	32				Secondary	10% vein cortex 2 plat 2 scars on fenceline
19	Wagga Wagga SF IF 3	Flake	Quartz	12	10	5	Flake scar	Broad	Feather	Tertiary	
20	Wagga Wagga SF IF 4	Proximal Fragment	Quartz	18	27	10	Flake scar	Broad		Secondary	10% Pebble Cortex
21	Wagga Wagga SF IF 5	Core	Quartz	30	25	23				Secondary	In vehicle track 50 m east of testing area, 20m south of drainage line, 40% Pebble Cortex 3 plat, 4 scars

APPENDIX D ARCHAEOLOGICAL SITE DESCRIPTIONS

A.1 ARCHAEOLOGICAL SITES – ARTEFACT SCATTERS

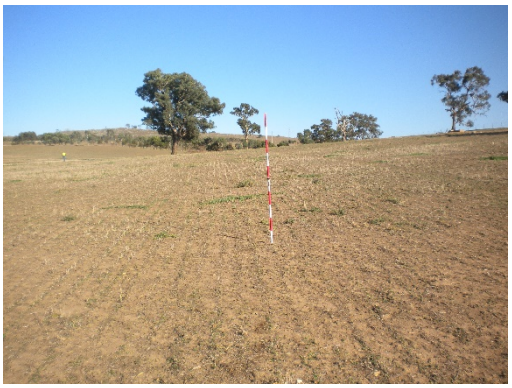
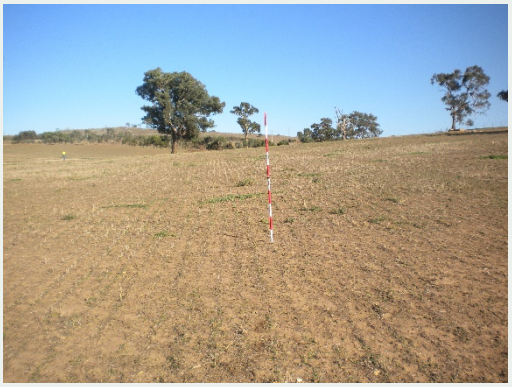
AHIMS #	Site Name	Comments	Pictures
56-1-0605	Wagga Wagga SF AFT 1	The site consisted of at least six quartz artefacts including two broken flakes, two flakes and two cores. The assemblage was identified along a northern facing slope interspersed with granite outcropping. Ground surface visibility at the site was 40% in the exposure surrounding the outcropping.	
56-1-0604	Wagga Wagga SF AFT 2	The site consisted of at least five quartz artefacts and one basalt hammerstone, including one broken flake, two flakes and two cores. The assemblage was identified along an east-west running spurline that dissects the central portion of the proposal area. Ground surface visibility at the site was 40% in the exposures along the flattest and highest part of the spurline.	
56-1-0603	Wagga Wagga SF AFT 3	The site consisted of at least two quartz artefacts, including one broken flake and one flake. The site was identified along a southerly facing slope approximately 95 m east of a man-made dam in a ploughed paddock. Ground surface visibility was 10%.	

56-1-0602	Wagga Wagga SF AFT 4	The site consisted of at least two quartz artefacts, including one broken flake and one flake. The assemblage was identified along the south western edge of a vehicle access track and 50 m from the edge of an ephemeral drainage line. The ground surface visibility was 15%.	
56-1-0601	Wagga Wagga SF AFT 5	The site consisted of at least six quartz subsurface artefacts, including broken flakes and flakes. The assemblage was identified during a subsurface testing program of six PADs. The artefacts were located in two of four test pits in the top two spits to a depth of 15-20cm within a reddish brown gritty sandy loam.	
56-1-0600	Wagga Wagga SF AFT 6	The site consisted of at least nine quartz subsurface artefacts, including broken flakes, flakes and flaked pieces. The assemblage was identified during a subsurface testing program of six PADs. The artefacts were located in two of five test pits in the top two spits to a depth of 15-20cm within a reddish brown gritty sandy loam.	
56-1-0599	Wagga Wagga SF AFT 7	The site consisted of at least four quartz subsurface artefacts, including broken flakes and flakes. The assemblage was identified during a subsurface testing program of six PADs. The artefacts were located in three of four test pits in the top two spits to a depth of 15-20cm within a reddish brown gritty sandy loam.	

56-1-0598	Wagga Wagga SF AFT 8	The site consisted of at least five quartz subsurface artefacts, including broken flakes and flakes. The assemblage was identified during a subsurface testing program of six PADs. The artefacts were located in five of 12 test pits in the top two spits to a depth of 15-20cm within a reddish brown gritty sandy loam.	

A.2 ARCHAEOLOGICAL SITES- ISOLATED FINDS

AHIMS #	Site Name	Comments	Pictures
56-1-0597	Wagga Wagga SF IF 1	The site contains a white quartz flake, measuring 16 x 12 x 3 mm and at the tertiary stage of reduction. The flake was identified on the eastern edge of a north west to south east running drainage line in an area of 75% ground surface visibility.	 

56-1-0596	Wagga Wagga SF IF 2	The site contains a white quartz core, measuring 50 x 52 x 32 mm and at the secondary stage of reduction, with 10% vein cortex, two platforms, 2 negative flakes scars. The flake was identified on the western side of a north to south running fenceline in an area of 45% ground surface visibility.	
56-1-0595	Wagga Wagga SF IF 3	The site contains a white quartz flake, measuring 12 x 10 x 5 mm and at the tertiary stage of reduction. The flake was identified on the southerly facing slope surrounded by areas of granite outcropping. The ground surface visibility was 30%.	
56-1-0594	Wagga Wagga SF IF 4	The site contains a white quartz broken flake, measuring 18 x 27 x 10 mm and at the secondary stage of reduction, with 10% pebble cortex. The broken flake was identified on the southerly facing slope in between two ephemeral drainage lines. The ground surface visibility was 5%.	
56-1-0593	Wagga Wagga SF IF 5	The site contains a white quartz core, measuring 30 x 25 x 23 mm and at the secondary stage of reduction, with 40% pebble cortex, 3 platforms and 4 negative flake scars. The core was identified on the main vehicle access track in the southernmost paddocks. The ground surface visibility was 85% along the track.	

APPENDIX E SUBSURFACE ARTEFACT DATA

Subsurface Find #	Site Name	Test Pit #	Spit #	Type	Raw Material	Length	Width	Thickness	Weight	Platform surface	Platform type	Termination	Reduction stage	Comments
1	Wagga Wagga SF AFT 5	1	3	flake	quartz	10	9	3	0.34	ridge	focal	feather	tertiary	
2	Wagga Wagga SF AFT 5	2	1	proximal flake	quartz	9	6	4	0.31	flake scar	focal		tertiary	
3	Wagga Wagga SF AFT 5	2	1	flake	quartz	14	7	7	1.13	crushed	focal	hinged	secondary	30% riverine cortex
4	Wagga Wagga SF AFT 5	2	2	flake	quartz	13	13	7	1.37	ridge	focal	feather	tertiary	coarse grained material
5	Wagga Wagga SF AFT 5	2	2	proximal flake	quartz	7	7	3	0.25	flake scar	focal		tertiary	
6	Wagga Wagga SF AFT 5	2	2	distal fragment	quartz	7	9	3	0.35			step	tertiary	
7	Wagga Wagga SF AFT 6	6	1	distal fragment	quartz	7	9	3	0.23			feather	tertiary	

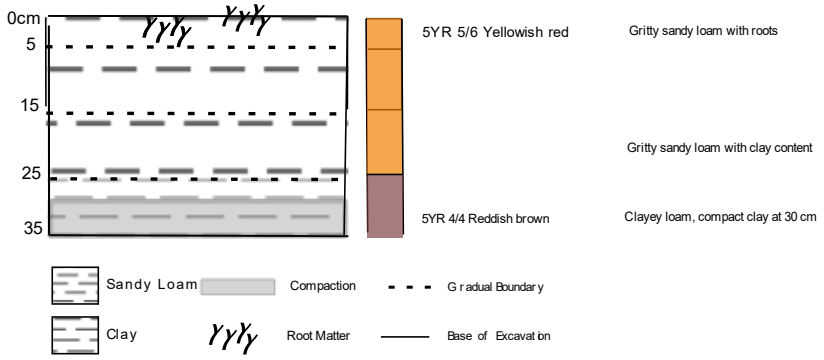
8	Wagga Wagga SF AFT 6	6	1	flake	quartz	18	12	4	0.95	ridge	focal	step	second ary	20% terrestrial cortex
9	Wagga Wagga SF AFT 6	6	1	flake	quartz	24	13	8	3.02	flake scar	broad	feather	tertiary	edge damage on right lateral margin for 11mm
10	Wagga Wagga SF AFT 6	6	1	proximal flake	quartz	9	12	4	0.65	flake scar	broad		tertiary	
11	Wagga Wagga SF AFT 6	6	1	flake	quartz	14	7	5	0.51	flake scar	focal	feather	tertiary	
12	Wagga Wagga SF AFT 6	6	1	flake	quartz	28	29	17	12.3	flake scar	broad	feather	second ary	40% riverine, edge damage right lateral margin
13	Wagga Wagga SF AFT 6	6	1	flake	quartz	25	23	11	7.29	flake scar	broad	feather	tertiary	
14	Wagga Wagga SF AFT 6	6	1	flake	quartz	8	7	2	0.22	flake scar	focal	feather	second ary	5% terrestrial cortex
15	Wagga Wagga SF AFT 6	9	1	flake	quartz	10	16	5	1.14	flake scar	broad	feather	second ary	20% terrestrial cortex
16	Wagga Wagga SF AFT 2	22	1	flake	crystal quartz	9	8	3	0.2	flake scar	broad	feather	second ary	5% terrestrial cortex

17	Wagga Wagga SF AFT 2	23	1	flake	quartz	16	11	4	1.15	flake scar	broad	feather	second ary	5% riverine cortex
18	Wagga Wagga SF AFT 8	28	1	flake	quartz	32	22	17	17.45	flake scar	broad	feather	second ary	15% terrestrial cortex
19	Wagga Wagga SF AFT 8	30	2	flake	quartz	23	12	5	2.15	flake scar	focal	feather	second ary	30% terrestrial cortex
20	Wagga Wagga SF AFT 8	32	1	flake	quartz	14	14	4	0.98	flake scar	broad	feather	second ary	60% terrestrial cortex
21	Wagga Wagga SF AFT 8	34	1	flake	quartz	10	8	6	0.64	flake scar	broad	feather	tertiary	
22	Wagga Wagga SF AFT 8	35	1	flake	quartz	11	9	2	0.36	flake scar	focal	feather	tertiary	
23	Wagga Wagga SF AFT 2	40	1	distal fragment	quartz	10	17	5	1.06			feather	tertiary	
24	Wagga Wagga SF AFT 2	41	2	flake	quartz	16	13	9	1.95	flake scar	broad	feather	tertiary	
25	Wagga Wagga SF AFT 2	43	1	flake	quartz	16	10	3	0.81	flake scar	focal	feather	tertiary	

26	Wagga Wagga SF AFT 2	44	2	flaked piece	quartz	10	9	2	0.3				tertiary	recovered from very top of spit 2
27	Wagga Wagga SF AFT 2	45	1	flake	quartz	11	10	2	0.38	flake scar	crushed	feather	tertiary	
28	Wagga Wagga SF AFT 2	45	1	flake	quartz	20	18	8	4.37	flake scar	focal	feather	tertiary	
29	Wagga Wagga SF AFT 2	45	2	flaked piece	quartz	10	12	5	0.63				tertiary	
30	Wagga Wagga SF AFT 2	45	2	flaked piece	quartz	8	6	1	0.11				tertiary	
31	Wagga Wagga SF AFT 7	46	1	flake	crystal quartz	11	12	4	0.55	flake scar	broad	feather	tertiary	
32	Wagga Wagga SF AFT 7	47	2	flake	crystal quartz	17	10	3	0.66	crushed	crushed	feather	secondary	10% terrestrial cortex
33	Wagga Wagga SF AFT 7	48	1	flake	quartz	17	16	8	3.7	flake scar	focal	feather	tertiary	edge damage on left lateral margin
34	Wagga Wagga SF AFT 7	48	1	flake	crystal quartz	14	28	10	5.24	flake scar	broad	feather	tertiary	20% terrestrial cortex

APPENDIX F STRATIGRAPHIC SOIL PROFILES

Wagga Wagga SF
Pit # 001



Wagga Wagga SF
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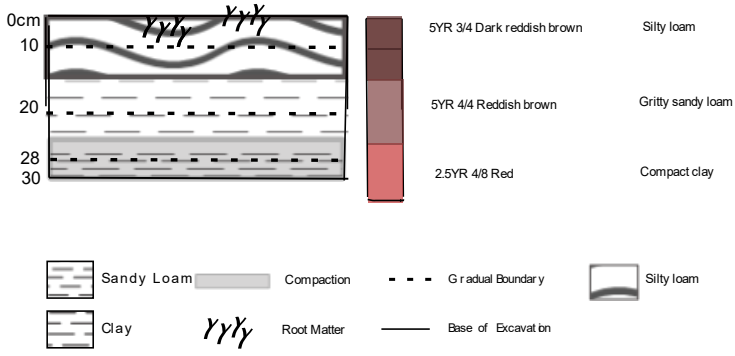

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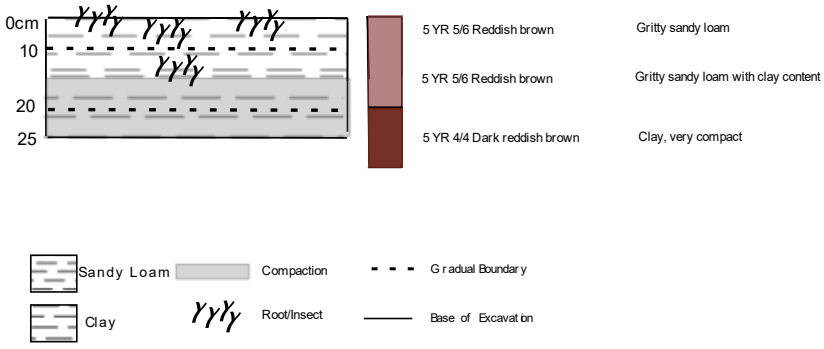

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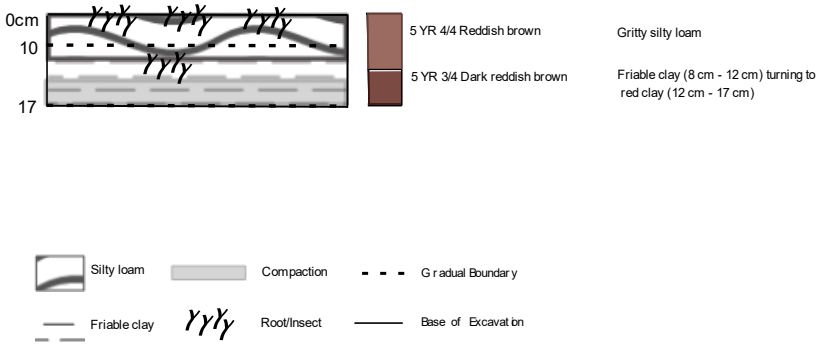

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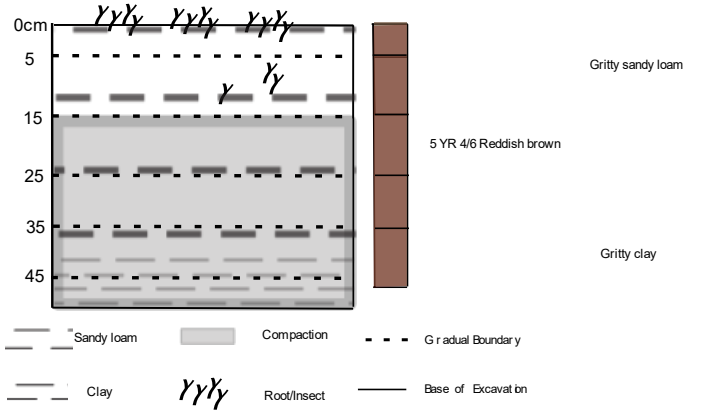

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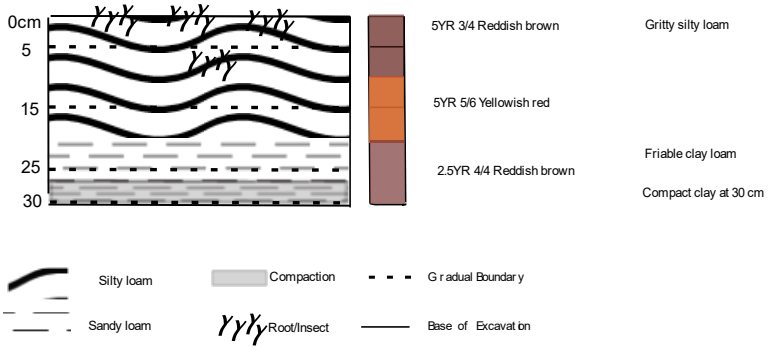

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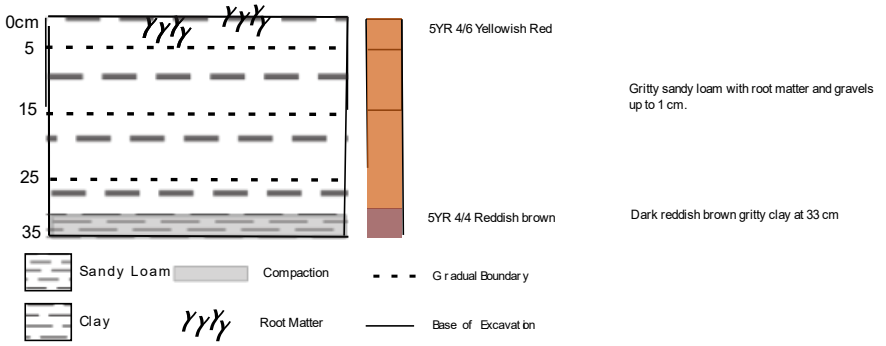

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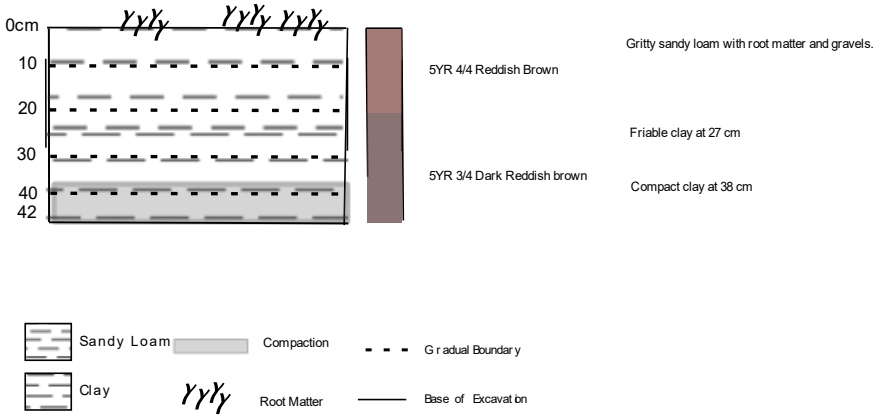

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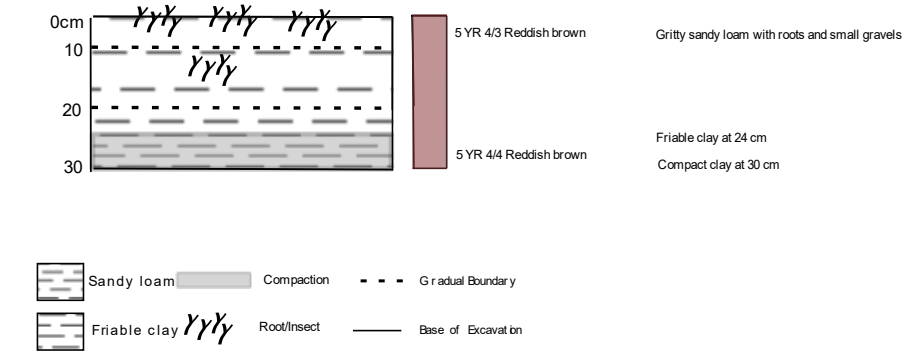

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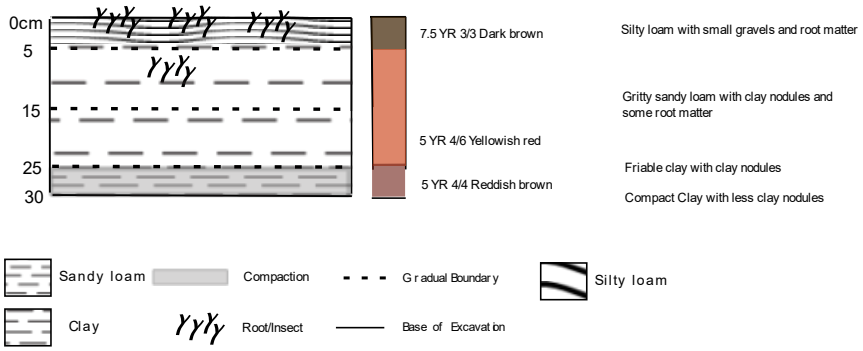

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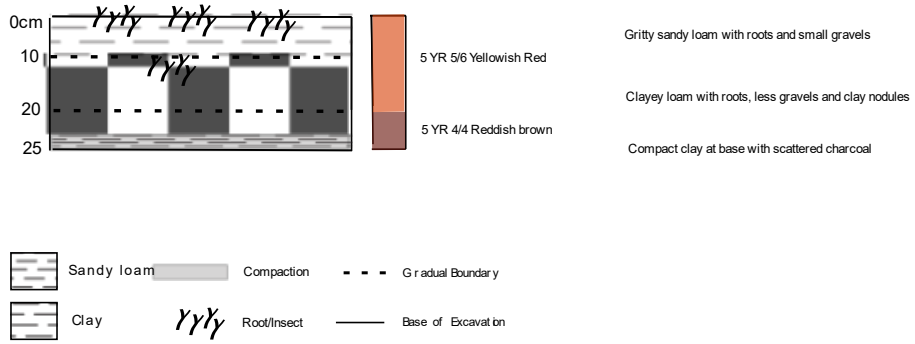

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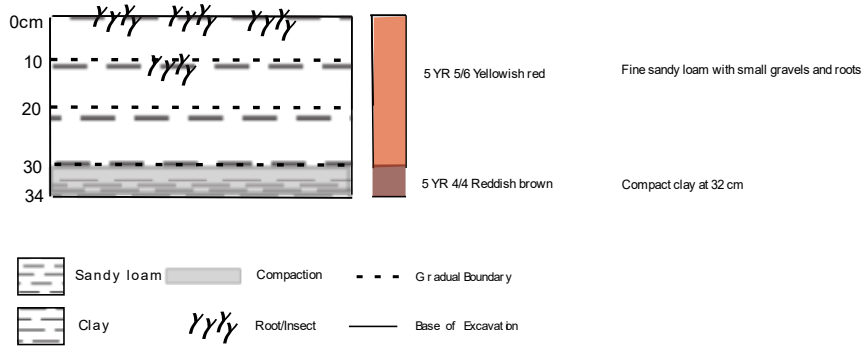

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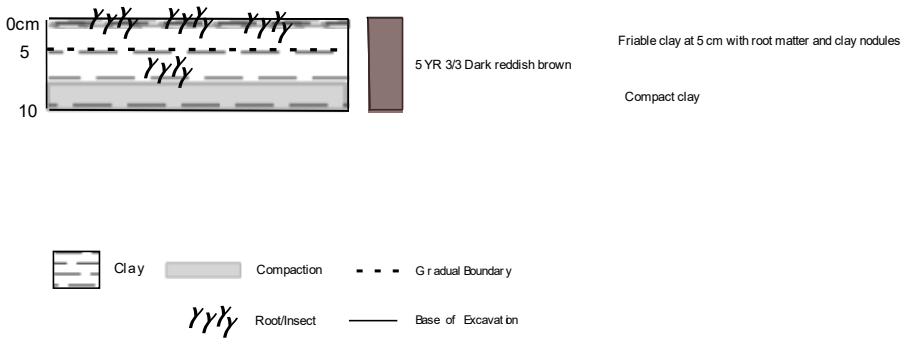

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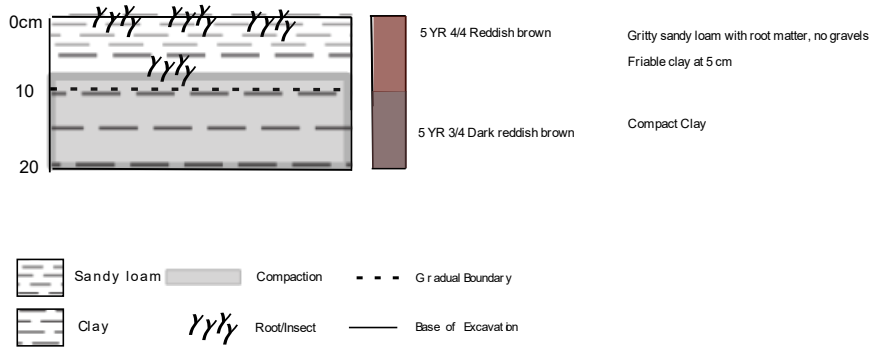

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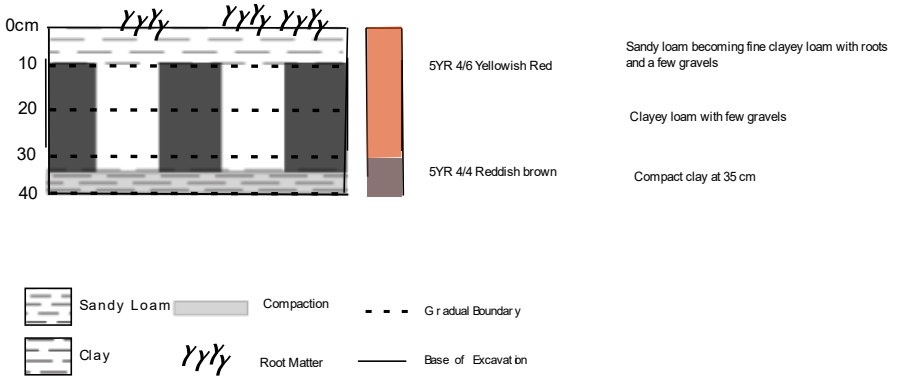

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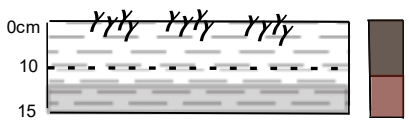


7.5 YR 3/4 Dark brown

5 YR 3/4 Reddish brown

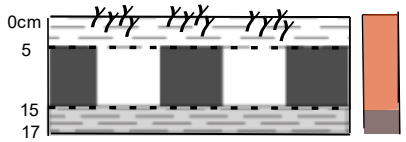
Gritty sandy loam with clay nodules, root matter and small gravels

Friable clay at 13 cm
Compact clay

Sandy loam — Compaction — Gradual Boundary

Clay — Root/Insect — Base of Excavation

Wagga Wagga SF
Pit # 017



5YR 4/6 Yellowish Red

5YR 4/4 Reddish brown

Sandy loam becoming fine clayey loam with roots and a few gravels

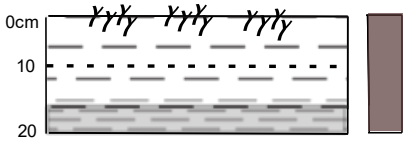
Clayey loam with few gravels

Compact clay at 15 cm

Sandy Loam — Compaction — Gradual Boundary

Clay — Root/Insect — Base of Excavation

Wagga Wagga SF
Pit # 018



5 YR 3/4 Reddish brown

5 YR 4/4 Reddish brown

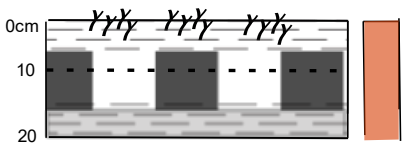
Gritty sandy loam with root matter and clay nodules

Compact clay at 19 cm

Sandy Loam — Compaction — Gradual Boundary

Clay — Root/Insect — Base of Excavation

Wagga Wagga SF
Pit # 019



5YR 4/6 Yellowish Red

Gritty sandy loam with root matter and clay nodules

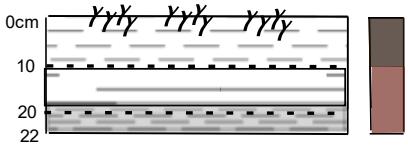
Clayey loam with few gravels

Compact clay at 19 cm

Sandy Loam | Compaction | Gradual Boundary | Clayey loam

Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 020



7.5 YR 4/4 Brown

5 YR 4/4 Reddish brown

Gritty sandy loam with root matter and clay nodules

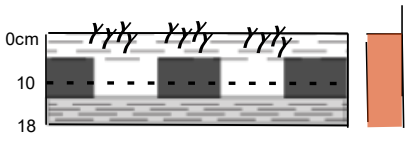
Gritty sandy clay with small gravels and no roots

Compact clay at 20 cm

Sandy Loam | Compaction | Gradual Boundary | Sandy clay

Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 021



5YR 4/6 Yellowish Red

Fine sandy loam with root matter and few gravels

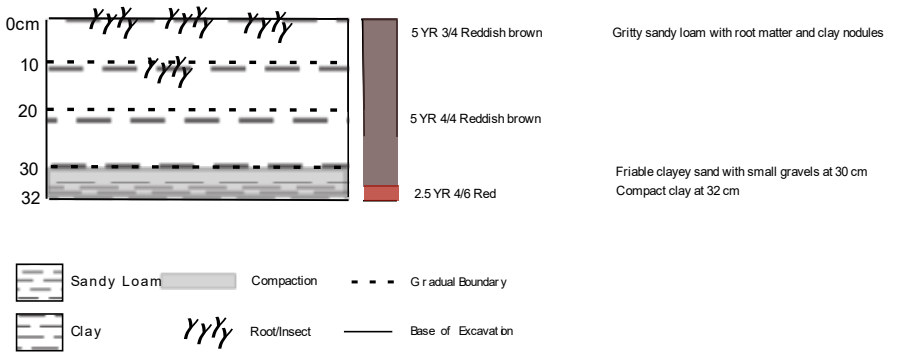
Clayey loam with small gravels and roots

Compact clay at 18 cm

Sandy Loam | Compaction | Gradual Boundary | Clayey loam

Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 022



Wagga Wagga SF
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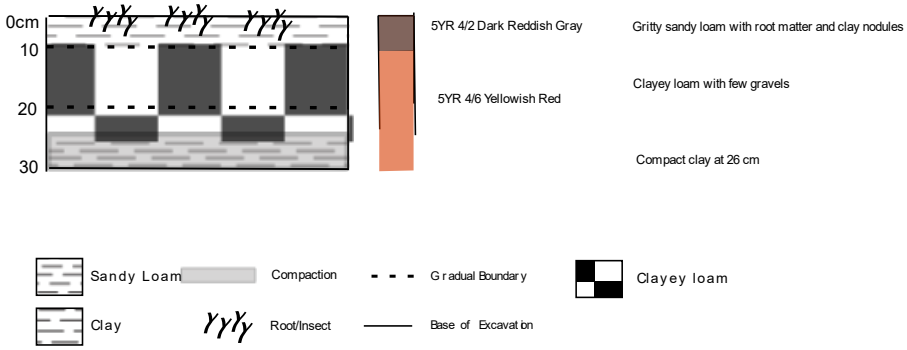

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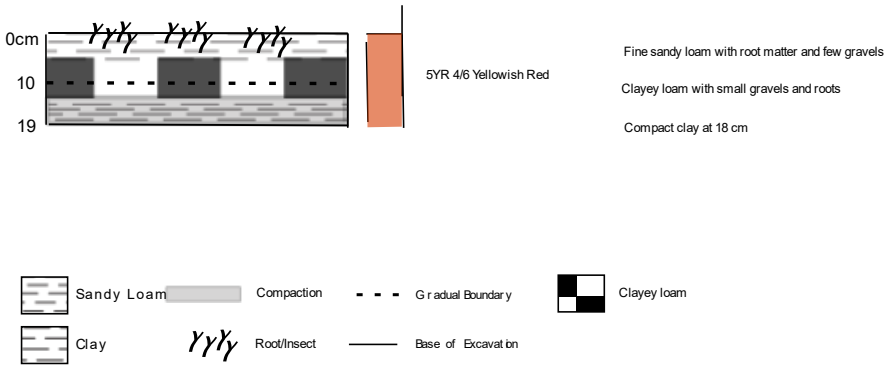
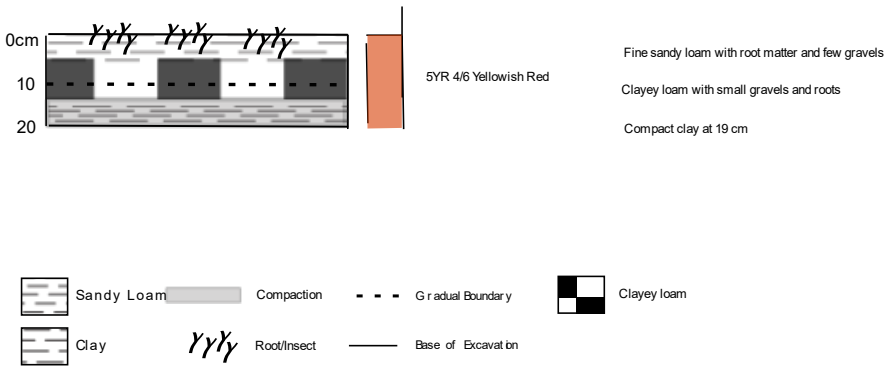


Wagga Wagga SF
Pit # 025



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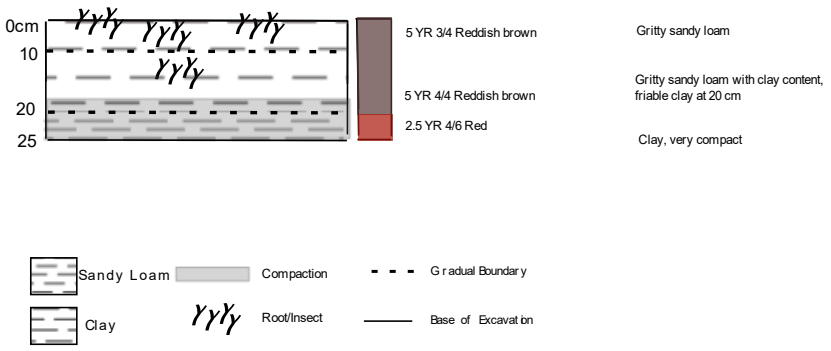

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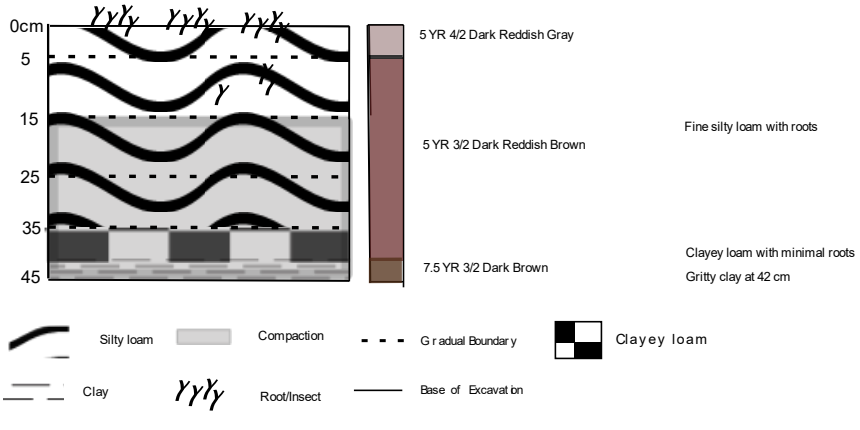

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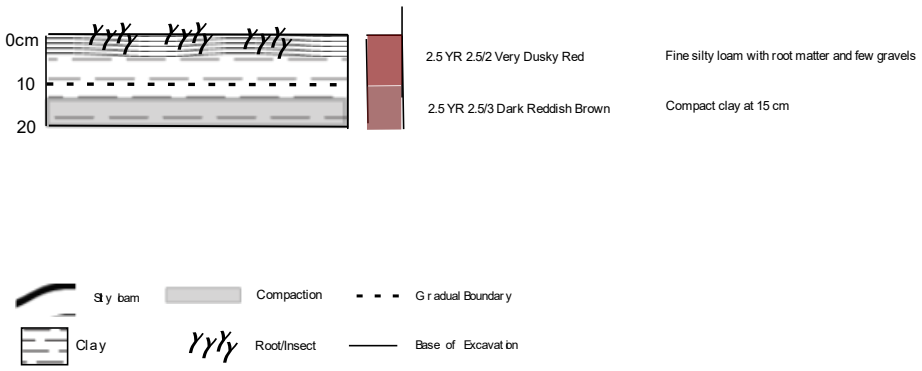

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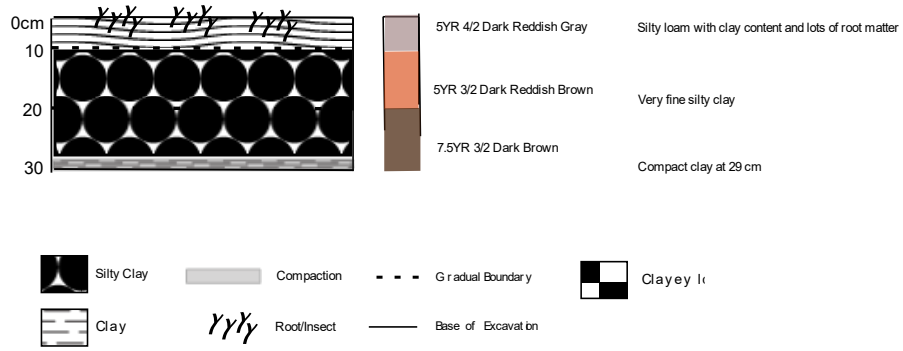

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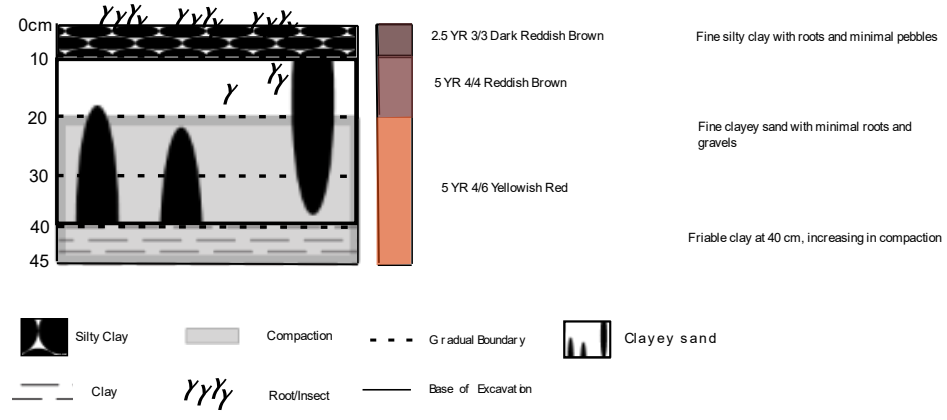

Wagga Wagga SF
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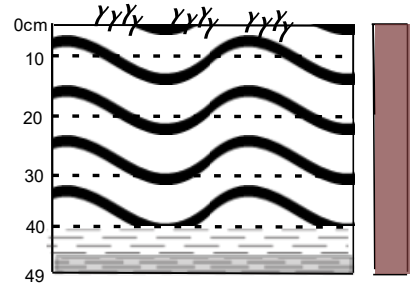


5 YR 4/6 Reddish brown

Very fine silty loam with roots and minimal gravels

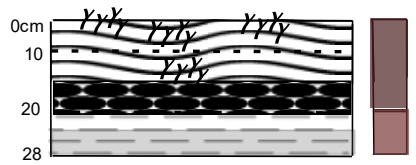
Gritty sandy loam with some gravels at 40 cm

Gritty clay at 47 cm

Sandy loam | Compaction | Gradual Boundary | Silty loam

Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 032



2.5 YR 3/3 Dark reddish brown

5 YR 3/4 Reddish brown

Very fine silty loam with roots and minimal gravels

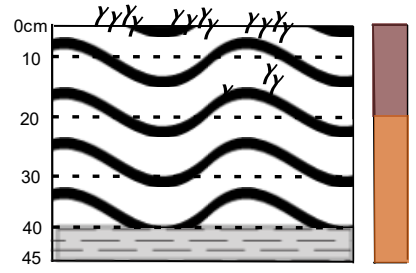
Silty clay with minimal gravels and no roots

Friable clay at 20 cm
Clay, very compact

Sandy Loam | Compaction | Gradual Boundary | Silty Clay

Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 033



5 YR 4/6 Reddish brown

5 YR 5/6 Yellowish Red

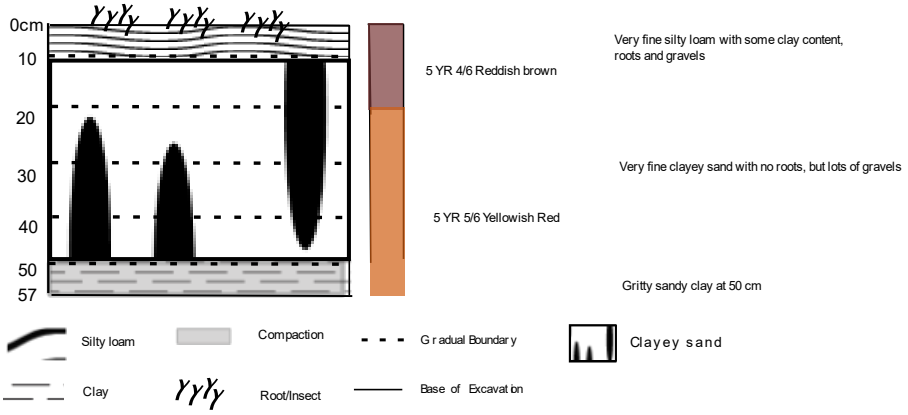
Very fine silty loam with some clay content, roots and gravels

Gritty sandy clay at 43 cm

Silty loam | Compaction | Gradual Boundary

Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 034



Wagga Wagga SF
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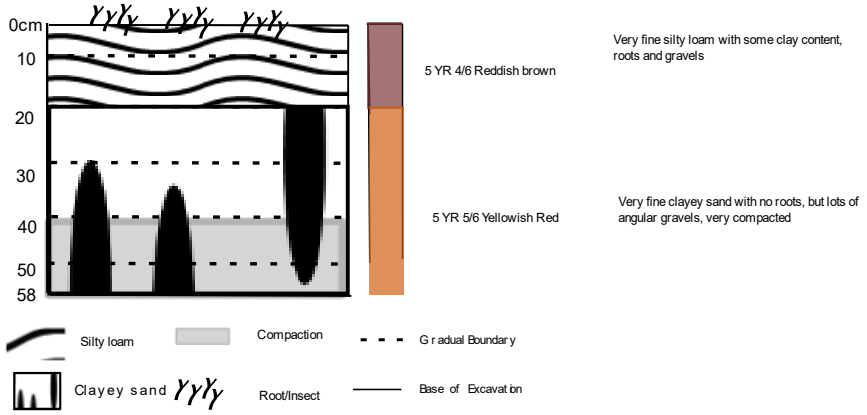

Wagga Wagga SF
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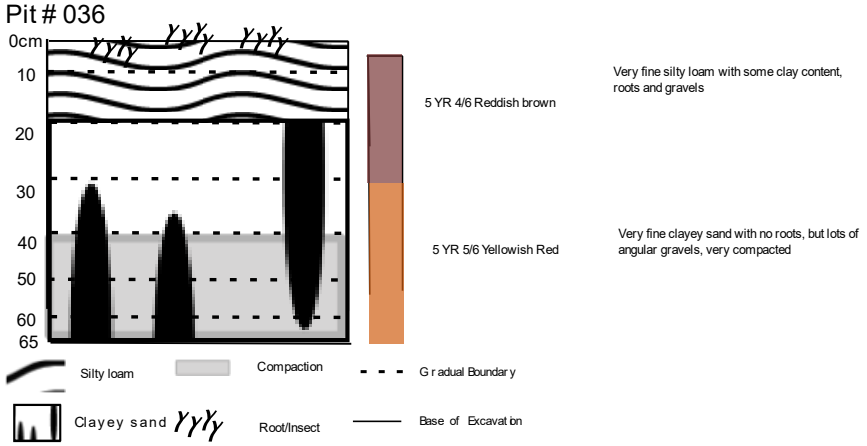

Wagga Wagga SF
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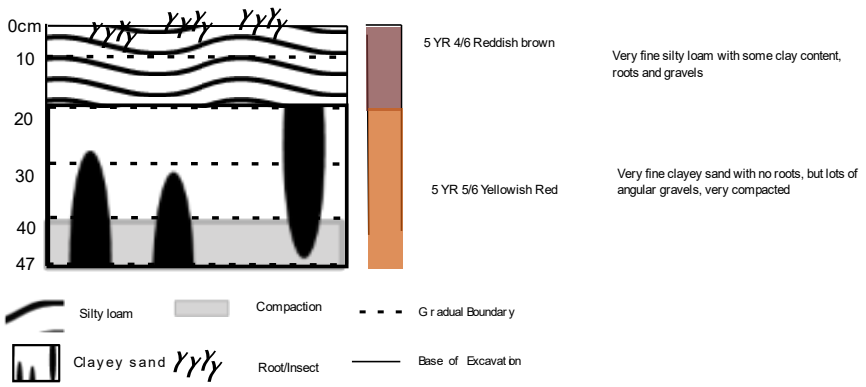
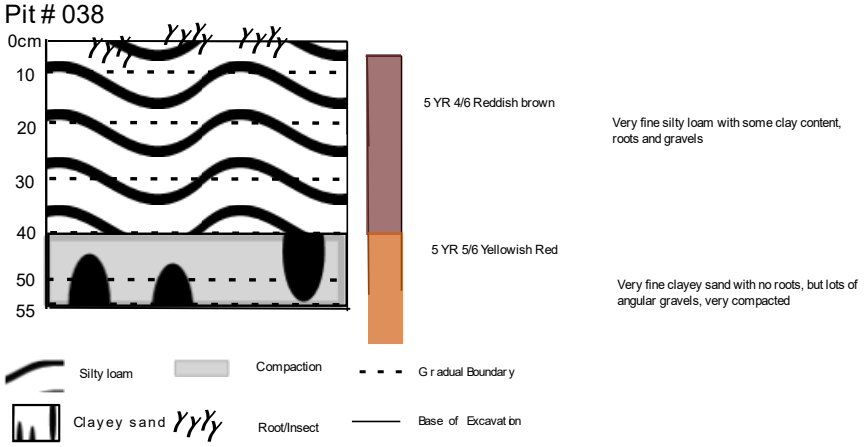
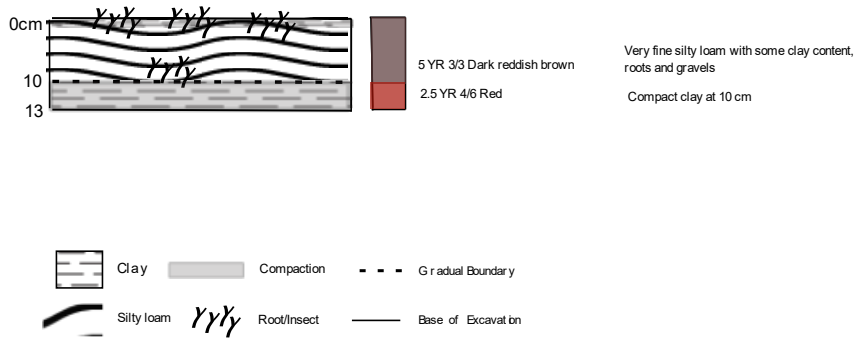


Wagga Wagga SF
Pit # 038



Wagga Wagga SF
Pit # 039



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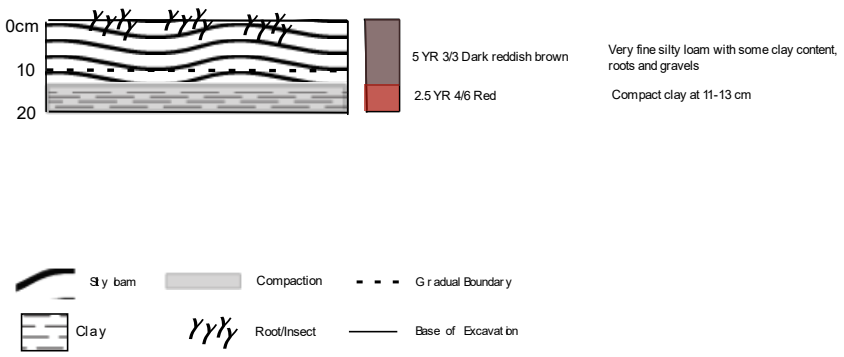
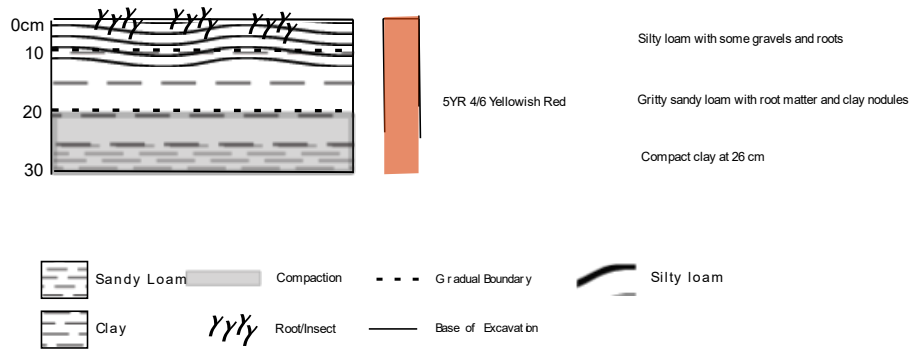
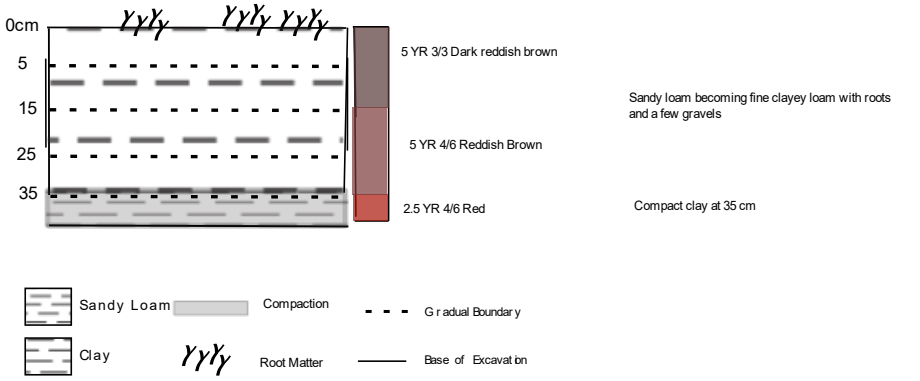


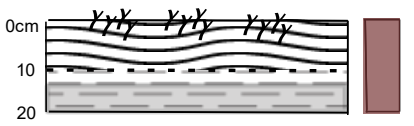
Wagga Wagga SF
Pit # 041



Wagga Wagga SF
Pit # 042



Wagga Wagga SF
Pit # 043



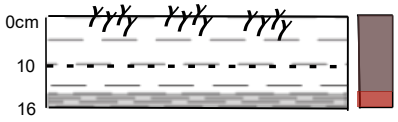
5 YR 4/6 Reddish Brown

Very fine silty loam with some clay content, roots and gravels

Compact clay at 18 cm

Silty loam | Compaction | Gradual Boundary
Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 044



5 YR 3/3 Dark reddish brown

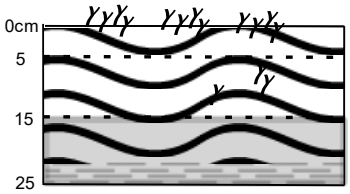
2.5 YR 4/6 Red

Fine sandy loam with root matter and few gravels

Compact clay at 14-15 cm

Sandy Loam | Compaction | Gradual Boundary
Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 045



5 YR 4/3 Reddish Brown

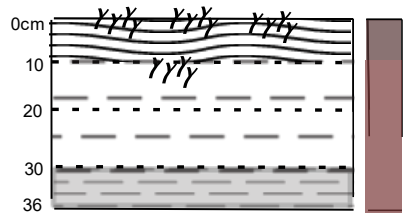
5 YR 4/4 Reddish Brown

Fine silty loam with roots

Gritty clay at 24 cm

Silty loam | Compaction | Gradual Boundary
Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 046



5 YR 3/3 Dark Reddish brown

5 YR 4/4 Reddish brown

Fine silty loam with roots and minimal small gravels and pebbles

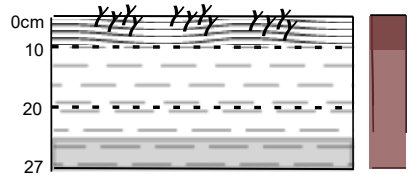
Gritty sandy loam with root matter and gravels

Very compact, gravelly bedrock at 30 cm

Silty loam | Compaction | Gradual Boundary

Bedrock | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 047



5 YR 3/3 Dark Reddish brown

5 YR 4/4 Reddish brown

Silty loam with some gravels and roots

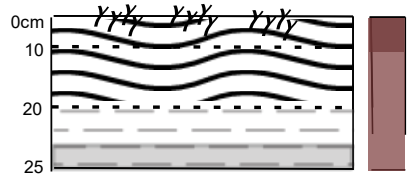
Gritty sandy loam with root matter and clay nodules

Compact clay at 25 cm

Sandy Loam | Compaction | Gradual Boundary | Silty loam

Clay | Root/Insect | Base of Excavation

Wagga Wagga SF
Pit # 048



5 YR 3/3 Dark Reddish brown

5 YR 4/4 Reddish brown

Silty loam with some gravels and roots

Compact clay at 23 cm

Silty loam | Compaction | Gradual Boundary

Clay | Root/Insect | Base of Excavation

APPENDIX G TEST EXCAVATION PIT DATA

Pit no	Grid Reference	Spit number	Depth (cm)	Soil Description	Artefacts
1	539333	1	1-5	Reddish brown gritty sandy loam with roots. Low compaction due to recent ploughing. pH = 5	
	6118540	2	5-15	Reddish brown gritty sandy loam with few roots and no gravel inclusions. pH= 5	
		3	15-25	Reddish brown gritty sandy loam with clay content starting at base of spit and compaction increasing with depth. pH = 5	1
		4	25-35	Deep reddish brown gritty clayey loam becomes a compact reddish clay at 30 cm. pH=5.5	
2	539342	1	1-10	Brown silty loam topsoil with root and small gravel inclusions. PH=5.5	2
	6118544	2	10-20	Brown silty loam with small quartz gravel inclusions. Very moist and lots of root inclusions. pH= 5	3
		3	20-28	Friable red clay increasing in compaction with depth. Bright red sticky clay at base. pH=5.5	
 Pit 1 Spit 4				 Pit 2 Spit 3	
3	539352	1	0-10	Reddish brown gritty sandy loam with grass roots and low compaction to 5 cm and compaction increasing with depth. Some isolated charcoal smears. pH= 5	
	6118547	2	10-20	Reddish brown gritty sandy loam with clay content and compaction increasing with depth. Very compact at base of spit with clay appearing. pH=5	
		3	20-25	Dark reddish brown very compacted clay. pH=5.5	

4	539361	1	0-10	Reddish brown gritty sandy loam with grass root and small quartz gravel inclusions. Compacted clay appearing at 8cm depth. pH= 5.5	
	6118551	2	10-17	Friable dark reddish-brown clay to 12 cm depth. Compact red clay 12-17 cm depth. pH= 6	
 Pit 3 Spit 3				 Pit 4 Spit 2	
5	539522	1	0-5	Reddish brown gritty sandy clay loam with grass root inclusions. pH= 5	
	6118486	2	5-15	Reddish brown gritty sandy clay loam with grass root inclusions, compaction increasing with depth. pH= 5	
		3	15-25	Reddish brown gritty sandy clay loam with grass root inclusions, compaction increasing with depth. pH= 5	
		4	25-35	Reddish brown gritty sandy clay loam with grass root inclusions, compaction increasing with depth. pH= 5	
		5	35-45	Reddish brown gritty sandy clay loam with grass root inclusions, compaction increasing with depth. pH= 5	
		6	45-50	Deep reddish brown gritty compacted clay. pH= 5	
6	539537	1	1-10	Reddish brown gritty sandy clay loam with grass root and high-density gravel inclusions. pH= 5.5	8
	6118474	2	10-20	Gritty sandy yellowish red loam to 20 cm depth. Clay appearing at base of spit with lots of quartz gravel inclusions. pH= 6	
		3	20-30	Friable clay loam to 28cm. Compact reddish-brown clay to 30 cm. pH= 5.5	

 Pit 5 Spit 6				 Pit 6 Spit 3	
7	539556	1	0-10	Reddish brown gritty sandy clay loam with grass root inclusions and gravels present up to 1 cm. pH= 5	
	6118463	2	10-20	Light reddish brown gritty sandy clay loam with grass root inclusions decreasing. Compaction and clay content increasing with depth pH= 5	
		3	20-30	Light reddish brown gritty sandy clay loam with grass root inclusions decreasing. Compaction and clay content increasing with depth pH= 5	
		4	30-35	Reddish brown gritty sandy clay loam that becomes a dark reddish-brown gritty clay at 33 cm. pH= 5	
8	539572	1	1-10	Reddish brown moist gritty sandy clay loam with grass root inclusions and gravels. pH=5	
	6118452	2	10-20	Dark reddish brown moist gritty sandy clay loam with less grass root inclusions, but gravel density increasing. pH= 6.5	
		3	20-28	Friable dark reddish-brown clay loam at 27cm. pH= 6.5	
		4	30-40	Compact dark reddish-brown clay at 38cm. pH= 6.5	
		5	40-42	Compact dark reddish-brown clay. pH= 6	

Pit 7 Spit 4

Pit 8 Spit 5

9	539589	1	0-10	Reddish brown moist gritty sandy clay loam with grass root inclusions and gravels. pH= 6	1
	6118442	2	10-20	Dark reddish brown moist gritty sandy clay loam with fewer grass root inclusions, but gravels increasing in size and density. Compaction increasing with depth. pH= 5.5	
		3	20-30	Reddish brown gritty sandy loam with less gravels and no roots, becomes friable clay loam at 24cm. Compact red clay at 30cm. pH= 5.5	
10	539608	1	0-5	Dark brown silty loam with small gravels and lots of root inclusions. Moist but loose compaction with some clay nodules present. pH= 6	
	6118260	2	5-15	Yellowish red gritty sandy loam with clay nodules density increasing and less root inclusions. pH = 6	
		3	15-25	Yellowish red gritty sandy loam with clay nodules to 25cm. Reddish brown clay appearing at base of spit. pH = 6	
		4	25-30	Reddish brown compact clay with less clay nodules. pH= 6	

Pit 9 Spit 3

Pit 10 Spit 4

11	539588	1	0-10	Reddish brown moist gritty sandy clay loam with grass root, gravel and some clay nodule inclusions. pH= 5.5	
	6118260	2	10-20	Reddish brown clayey loam with large gravels and clay nodules. Large tree roots throughout spit. Compaction and clay content increasing with depth. pH= 5.5	
		3	20-25	Reddish brown clayey loam with scattered charcoal throughout becoming a reddish-brown compact clay at base of spit. pH= 5.5	
12	539568	1	0-10	Fine reddish-brown sandy loam with few gravel and grass root inclusions. pH= 5.5	
	6118261	2	10-20	Fine reddish-brown sandy loam with few gravel and grass root inclusions. Compaction and clay content increasing with depth. pH= 5.5	
		3	20-30	Fine reddish-brown sandy loam with few gravel and grass root inclusions. Compaction and clay content increasing with depth. pH= 5.5	
		4	30-34	Compact reddish-brown clay at 32cm. pH= 5.5	
 Pit 11 Spit 3				 Pit 12 Spit 4	
13	539547	1	0-10	Dark reddish-brown sandy loam with root inclusions becoming a friable clay at 5 cm. Compact dark reddish-brown clay at base of spit. pH= 5.5	
	6118261				
14	539528	1	0-10	Reddish brown sandy loam with lots of root inclusions. Friable clay at 5 cm. pH = 5.5	
	6118261	2	10-20	Dark reddish-brown clay becoming more compacted with depth. No inclusions. pH= 6	

 Pit 13 Spit 1				 Pit 14 Spit 2	
15	539507	1	0-10	Yellowish red sandy loam becoming a fine silty clay at 5cm with minimal gravel inclusions.	
	6118261	2	10-20	Yellowish red clayey loam with minimal gravels. Compaction and clay content increasing with depth. pH= 5.5	
		3	20-30	Yellowish red clayey loam with minimal gravels. Compaction and clay content increasing with depth. Root disturbance in south west corner. pH= 5.5	
		4	30-40	Reddish brown very compacted clayey loam with clay content and compaction increasing with depth. Compact clay appearing at 35cm, across base of spit by 40 cm. pH= 5	
16	539710	1	0-10	Dark brown gritty sandy clay with high density clay nodules and small gravels. Root matter throughout and very compacted. pH= 5.5	
	6118145	2	10-15	Friable reddish-brown sandy clay to 13 cm. Compact reddish-brown clay at 15cm. pH= 5	
 Pit 15 Spit 4				 Pit 16 Spit 2	
17	539690	1	0-5	Reddish brown sandy loam with some small gravel and root inclusions. pH= 5.5	

	6118144	2	5-15	Reddish brown sandy clay loam with clay content and compaction increasing with depth. Some large roots present in spit. pH = 5.5	
		3	15-17	Dark reddish-brown clay at 15 cm. pH = 5.5	
18	539670	1	0-10	Reddish brown compacted gritty sandy loam with roots and clay nodules throughout. pH = 6	
	6118144	2	10-20	Reddish brown compacted gritty sandy loam with roots and clay nodules throughout. Compact clay at 19cm. pH = 5.5	
 Pit 17 Spit 3				 Pit 18 Spit 2	
19	539649	1	0-10	Reddish brown sandy loam with some roots that becomes clayey loam at <5cm. Compaction and clay content increasing with depth. pH= 5.5	
	6118144	2	10-20	Reddish brown clayey loam that becomes a dark reddish-brown compact clay at 19 cm. pH= 5.5	
20	539631	1	0-10	Brown moist sandy loam with loose compaction and lots of root inclusions. Minimal quartz gravels present. pH = 6	
	6118145	2	10-20	Reddish brown gritty sandy clay compacted in ground but friable in sieve. Small gravel inclusions. pH = 5.5	
		3	20-22	Compact reddish-brown clay at 20 cm. pH= 5.5	

 Pit 19 Spit 2				 Pit 20 Spit 3	
21	539611	1	0-10	Reddish brown sandy loam with some small gravel and root inclusions. pH= 5.5	
	6118145	2	10-18	Very compact reddish-brown clayey loam with roots and few gravels. Becomes very compact clay at 18cm and unable to excavate further by hand. pH= 5.5	
22	539592	1	0-10	Reddish brown moist gritty sandy loam with roots and clay nodules throughout. Loos compaction pH = 6	1
	6118143	2	10-20	Reddish brown partially cemented loamy sand with medium-density quartz gravels and less root matter. pH= 5.5	
		3	20-30	Reddish brown friable clayey sand with clay content increasing with depth. Gravel inclusions. Clay appearing at 30 cm. pH+ 5.5	
		4	30-33	Reddish brown sandy clay with some clay nodules. Compacted red clay at 32cm. pH= 5	
 Pit 21 Spit 2				 Pit 22 Spit 4	
23	539572	1	0-10	Dark reddish grey sandy loam with root inclusions. Becomes a reddish-brown clayey loam at base of spit. pH= 5.5	1
	611814	2	10-20	Reddish brown clayey loam with clay content and compaction increasing with depth. Minimal root and gravel inclusions. pH= 5.5	

		3	20-30	Reddish brown clayey loam becoming very compact clay at 26 cm. pH= 5.5	
24	539551	1	0-10	Fine reddish-brown sandy loam with root and gravel inclusions that becomes a compacted clayey loam at 5 cm. pH= 5.5	
	6118143	2	10-19	Very compacted reddish-brown clayey loam with minimal root and gravel inclusions. Very compact clay at 18 cm. pH= 5.5	
 Pit 23 Spit 3				 Pit 24 Spit 2	
25	539531	1	0-10	Reddish brown sandy loam with root and gravel inclusions. Becomes more compacted and more clay content at 5 cm. pH= 5.5	
	6118144	2	10-20	Reddish brown clayey loam with come root and gravel inclusions and a large tree root in the north west corner. Compacted clay reached at 19 cm. pH= 5.5	
26	539510	1	0-10	Reddish brown loosely compacted gritty sandy loam with low-density quartz gravels and root matter throughout. pH = 6	
	6118142	2	10-20	Reddish brown gritty sand becoming more cemented with depth. Less root matter, but quartz gravels increasing in size. pH = 5.5	
		3	20-26	Friable reddish-brown clay at 20 cm. Continued to 25cm and compacted red clay with large low-density gravels. pH = 5.5	

 Pit 25 Spit 2				 Pit 26 Spit 3	
27	539850	1	0-5	Fine greyish brown silty loam with few grass roots. pH = 6	
	6118176	2	5-15	Dark reddish brown very fine silty clayey loam with few roots and gravels. pH = 7	
		3	15-25	Dark reddish brown very fine silty clayey loam with few roots and gravels. pH = 7	
		4	25-35	Very fine dark reddish brown silty clayey loam with few root inclusions. pH = 7	
		5	35-45	Gritty greyish brown compact clay at 42 cm. pH = 7	
28	539866	1	0-10	Very dusky red very fine silty loam with lots of root matter and minimal very small gravels. pH = 5	1
	6118163	2	10-20	Dark reddish-brown silty loam with clay content increasing with depth. Compacted clay reached at 15 cm. pH = 5	
 Pit 27 Spit 5				 Pit 28 Spit 2	
29	539881	1	0-10	Fine dark reddish grey silty loam with some clay content and lots of root matter. Small friable chunks with no gravel inclusions. pH = 5.5	

	6118150	2	10-20	Very fine greyish brown clayey silt becoming more compact and clay content increasing with depth. pH = 7	
		3	20-30	Very fine greyish brown silty clay becomes a compacted gritty clay at 29 cm. pH = 7	
30	539894	1	0-10	Fine dark reddish-brown silty clay with root matter and minimal small pebbles. Loose compaction. pH = 6	
	6118136	2	10-20	Fine reddish brown loosely compacted clayey sand with minimal root matter, but gravels increasing in density. pH = 5.5	1
		3	20-30	Yellowish red fine clayey sand with clay content increasing with depth. Gravels increasing in density but decreasing in size. pH = 5.5	
		4	30-40	Friable yellowish red clay at 40 cm, continued excavation to compacted clay at 45 cm. pH = 5	
		5	40-45	Compacted yellowish red clay with no inclusions. pH = 5	
 Pit 29 Spit 3				 Pit 30 Spit 5	
31	539909	1	0-10	Very fine reddish brown silty clayey loam with gravel and root inclusions. pH = 6	
	6118121	2	10-20	Fine reddish brown silty clayey loam with gravel and root inclusions. Compaction and clay content increasing with depth. pH = 6	
		3	20-30	Reddish brown gritty sandy clay loam with gravel inclusions at 25 cm. pH = 5.5	
		4	30-40	Reddish brown gritty sandy clay loam with gravel inclusions and loos compaction. pH = 5.5	
		5	40-49	Yellowish brown gritty clay reached at 47 cm. pH = 5.5	
				Dark reddish brown fine silty clayey loam with	1

32	539924	1	0-10	root matter and minimal gravels. pH = 6	
	6118110	2	10-20	Dark reddish brown fine silty clay to 15 cm. Friable silty clay between 18-20 cm. pH = 5.5	
		3	20-28	Compacted plastic reddish brown clay reached between 25-28 cm. No inclusions. pH = 5.5	
 Pit 31 Spit 5				 Pit 32 Spit 3	
33	539886	1	0-10	Very fine reddish-brown silty clay loam with few root and gravel inclusions. pH 5.5	
	6118134	2	10-20	Very fine reddish-brown silty clay loam with few root and gravel inclusions. Becoming a gritty sandy clayey loam at base of spit. pH = 5.5	
		3	20-30	Yellowish red gritty sandy clayey loam with some gravels. pH = 5.5	
		4	30-40	Yellowish red gritty sandy clayey loam with some gravels. Compaction increasing with depth pH = 5.5	
		5	40-45	Very compacted gritty sandy clay at 43 cm. Unable to manually excavate further. pH = 5.5	
34	539877	1	0-10	Reddish brown fine silty clayey loam with root matter and minimal gravels. Loose compaction. pH = 6.5	1
	6118131	2	10-20	Reddish brown gritty clayey sand with no roots and gravels increasing in density. Loose compaction. pH = 6	
		3	20-30	Reddish brown gritty clayey sand with no roots and clay nodules. Compaction and clay content increasing with depth. pH = 6	
		4	30-40	Reddish brown gritty clayey sand with no roots and clay nodules. Compaction and clay content increasing with depth. pH = 6	
		5	40-50	Compacted yellowish red clay at 50 cm. pH = 6	

		6	50-57	Very compacted yellowish red clay. pH = 6	
 Pit 33 Spit 5				 Pit 34 Spit 6	
35	539867	1	0-10	Very fine reddish brown silty clayey loam with root and gravel inclusions. Compaction increasing with depth. pH = 5.5	1
	6118129	2	10-20	Very compacted reddish brown very fine silty clayey loam with root and gravel inclusions becoming a yellowish red gritty sandy clayey loam at base of spit. pH = 5.5	
		3	20-30	Yellowish red gritty sandy clayey loam with gravels. Loose compaction pH = 5.5	
		4	30-40	Yellowish red gritty sandy clayey loam with gravels. Clay content and compaction increasing with depth. pH = 5.5	
		5	40-50	Yellowish red gritty sandy clayey loam with gravels. Clay content and compaction increasing with depth. Some leaching resulting in lighter very compacted soils. pH = 5.5	
		6	50-58	Very compacted strong brown gritty sandy clayey loam. Unable to manually excavate further. pH = 5.5	
36	539857	1	0-10	Fine dark reddish brown silty clayey loam with some root and gravel inclusions. Loose compaction. pH = 6	
	6118126	2	10-20	Fine dark reddish brown silty clayey loam with some root and gravel inclusions. Loose compaction and sand content increasing with depth. pH = 6	
		3	20-30	Reddish brown gritty clayey sand with clay nodules and compaction increasing with depth. pH = 6.5	
		4	30-40	Yellowish brown gritty clayey sand with clay nodules and compaction increasing with depth. pH = 6.5	

		5	40-50	Yellowish brown gritty clayey sand with clay nodules and compaction increasing with depth. pH = 6.5	
		6	50-60	Very cemented strong brown fine sand with lots of small singular gravels and clay nodules. pH = 7	
		7	60-65	Continued excavation until unable to manually excavate further. Increase in angular gravel inclusions. pH = 7	
	 Pit 35 Spit 6			 Pit 36 Spit 7	
37	539846	1	0-10	Very fine compacted reddish brown silty clayey loam with roots and insect activity. pH = 5.5	
	6118124	2	10-20	Gritty yellowish red less compacted sandy clayey loam at 19-20 cm. pH = 5.5	
		3	20-30	Fine gritty yellowish red loosely compacted sandy clayey loam with small gravels. pH = 6	
		4	30-40	Yellowish red cemented sand at 35-38 cm with high density angular gravel inclusions. pH = 6	
		5	40-47	Yellowish red cemented sand with high density angular gravel inclusions. Gravels and cementation increasing with depth. pH = 6	
38	539837	1	0-10	Fine dark reddish brown silty clayey loam with lots of root matter and small gravels. Loose compaction. pH = 6	
	6118120	2	10-20	Less root matter and gravels, but clay content increasing. Yellowish red sand appearing at base of spit. pH = 6.5	
		3	20-30	Fine reddish brown silty sandy with no roots and minimal gravels. Some clay content. Compaction increasing with depth. pH = 6.5	
		4	30-40	Loosely compacted brown gritty sand with no inclusions. pH = 6.5	
		5	40-50	Angular gravel inclusions appearing at 48 cm and compaction increasing. pH = 6.5	

		6	50-55	Angular gravels increasing in compacted sand. Minimal quartz gravels. pH = 6.5	
 Pit 37 Spit 5				 Pit 38 Spit 6	
39	539731	1	0-10	Fine dark reddish-brown silty loam with some clay content. Minimal gravel inclusions and lots of root matter. Red compact clay appearing at base of spit. pH = 5.5	
	6118102	2	10-13	Red compacted clay with minimal quartz gravels. pH = 6	
40	539732	1	0-10	Fine dark reddish-brown silty loam with root matter and minimal gravels. pH = 5.5	1
	6118113	2	10-20	Compact red clay at 11-13 cm. No inclusions. Possible yellow ochre in centre of test pit at base of spit. pH = 6	
 Pit 39 Spit 2				 Pit 40 Spit 2	
41	539734	1	0-10	Reddish brown sandy silty loam with some gravels and roots. Damp from recent rain activity. pH = 5.5	
	6118123	2	10-20	Reddish brown sandy silty loam with clay content increasing with depth. Compact clay appearing at base of spit. pH = 5.5	1
		3	20-30	Dark red compacted clay. pH = 5.5	

42	539735	1	0-5	Fine dark reddish brown friable sandy loam with root matter and minimal small gravels. Moist but loose compaction. pH = 5.5	
	6118133	2	5-15	Fine dark reddish-brown sandy loam becoming gritty sand with some quartz gravels and root matter at 15 cm. pH = 5.5	
		3	15-25	Yellowish red gritty sand with less root matter and gravel inclusions. pH = 5.5	
		4	25-35	Compacted red clay appearing at 35 cm with no inclusions. pH = 6	
		5	35-40	Compacted red clay across entire base. pH = 6	
 Pit 41 Spit 3				 Pit 42 Spit 5	
43	539739	1	0-10	Reddish brown sandy silty clayey loam with root and gravel inclusions. Clay content and compaction increasing with depth from 6 cm. pH = 5.5	1
	6118141	2	10-20	Compacted red silty clay at 18 cm. Unable to manually excavate further due to compaction. pH = 5.5	
44	539740	1	0-10	Fine dark reddish brown silty sandy loam with root matter and minimal gravels. Loos compaction. pH = 5.5	
	6118151	2	10-16	Red clayey sand with no roots and minimal quartz gravels and pebbles. Compacted red clay at 14 cm-16 cm. pH = 6	1

 Pit 43 Spit 2				 Pit 44 Spit 2	
45	539742	1	0-5	Reddish brown silty loam with some gravels and roots. pH = 6.5	2
	611816	2	5-15	Reddish brown silty clayey loam with gravels and some roots. pH = 6.5	2
		3	15-25	Dark red compacted clay at 24 cm. pH = 6.5	
46	53962	1	0-10	Fine dark reddish-brown silty loam with root matter and some small gravels and pebbles. pH = 6.5	1
	6118717	2	10-20	Reddish brown gritty loamy sand with high density pebbles and gravels. Large boulder in the southern baulk. Loose compaction. pH = 6.5	
		3	20-30	Reddish brown gritty loamy sand with high density pebbles and gravels. Large boulder in the southern baulk. Loose compaction. pH = 6.5	
		4	30-36	Bedrock appearing at 30 cm, continued excavation until all exposed. Very gravelly content. pH = 6.5	
 Pit 45 Spit 3				 Pit 46 Spit 4	

47	539619	1	0-10	Fine dark reddish-brown silty loam with root matter and gravels. Loose compaction. pH = 6.5	
	6118720	2	10-20	Fine reddish brown gritty loamy sand with moderate density gravels and pebbles and compaction increasing with depth. pH = 6.5	1
		3	20-27	Friable reddish-brown clay appearing at 25 cm. Compact clay with small gravels across base of spit by 27cm. pH = 6.5	
48	539610	1	0-10	Reddish brown silty loam with grass roots and gravel inclusions. pH = 6.5	2
	6118721	2	10-20	Reddish brown silty clayey loam with angular gravels and roots. pH = 6.5	
		3	20-25	Reddish brown silty clayey loam with angular gravels and clay content increasing. Dark red compacted clay at 23 cm. pH = 7	
 Pit 47 Spit 3				 Pit 48 Spit 3	
49	539600	1	0-10	Reddish brown silty loam with grass roots and gravel inclusions. pH = 6.5	
	6118723	2	10-20	Reddish brown silty clayey loam with angular gravels and roots. pH = 6.5	
		3	20-25	Reddish brown silty clayey loam with angular gravels and clay content increasing. Dark red compacted clay at 23 cm. pH = 7	

Pit 49 Spit 3

APPENDIX H SITE CARDS

Culturally sensitive information withheld