Appendix G Archaeology Assessment

Proposed Manildra Photovoltaic Solar Farm
Archaeological and Cultural Heritage Assessment

A report to nghenvironmental
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1. SUMMARY

1.1 Introduction

New South Wales Archaeology Pty Ltd has been commissioned by nghenvironmental to undertake an Indigenous archaeological and cultural heritage assessment of the proposed Manildra Solar Farm. The Solar Farm will be located ca. 1.5 kilometres northeast of the township of Manildra on a property fronting the Molong Manildra Road.

The proposed Manildra Solar Farm is defined as a Major Project (Critical Infrastructure) under Part 3A of the Environmental Planning and Assessment Act 1979. This Indigenous archaeological and heritage assessment has been prepared to form a component of an Environmental Assessment for the proposal.

1.2 Partnership with Aboriginal Communities

This assessment has been conducted in accordance with consultation process as outlined in the NSW Department of Environment, Climate Change and Water (NSW DECCW) Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRP) (NSW DECCW 2010). Eight groups and/or individuals have registered an interest in the project (see Section 3).

The field survey of the proposal area has been undertaken with the assistance of Chad Morgan and Ian Bell of the Orange Local Aboriginal Land Council (OLALC).

1.3 Description of Impact

Infigen Suntech Australia Pty Ltd (Infigen) proposes to construct a 50 megawatt capacity photovoltaic solar farm (solar farm) at Manildra.

The solar farm would comprise a series of photovoltaic modules (PV arrays) mounted on fixed frames located within an envelope of approximately 200 hectares. The Manildra Solar Farm would connect to the existing Manildra 132kV substation which is located adjacent to the study area.

Project infrastructure for the proposed solar farm would include:

- A fixed photovoltaic solar module array (PV array), arranged in a series of rows between 1 and 3-4 metres above the ground, angled for maximum efficiency and supported by steel framing on steel posts fixed in the ground.
- Electrical connections between PV array and central inverters via underground or frame secured cabling.
- A series of central inverters and kiosk transformers distributed throughout the PV array.
- Electrical connection into the existing 132kV substation via an overhead or underground transmission line, including any required switchyard and substation augmentation.
- Internal access tracks and upgrades to existing roads, where required.
- Fencing and landscaping around the solar farm.
- Site office and Operations and Maintenance building.
- Additional temporary construction infrastructure such as a site compound and equipment laydown area.

The proposed works entail ground disturbance and accordingly the construction of the solar farm has the potential to cause impacts to any Aboriginal objects which may be present within the zones of direct impact. However, the proposed impacts are discrete in nature and will occupy a

relatively small footprint within the overall area; accordingly impacts to the archaeological resource across the landscape can be considered to be partial in nature, rather than comprehensive.

1.4 Objectives and Methods

The study has sought to identify and record Aboriginal objects, to assess the archaeological potential of the landscape and to formulate management and mitigation strategies based on the results of background research, a field survey and significance assessment.

The investigation has included sites searches, a literature review, field survey and analysis of results. Field work was undertaken in August 2010.

The approach to archaeological recording in the current study has been a 'nonsite' methodology: the elementary unit recorded is an artefact (described as artefact locales) rather than a site. It is assumed that stone artefacts will be distributed across the landscape in a continuum, which in the study is expected to be in very low density. While cultural factors will have informed the nature of land use, and the resultant artefact discard, environmental variables are those which can be utilised archaeologically in order to record and analyse archaeological variability across the landscape.

A landscape based approach has been implemented during this study; the proposal area is comprised of twelve landform units, comprised of crests, simple slopes, a lower slope and open depression. These landforms are conceptualised as Survey Units and are utilised as a framework of recording, analysis and the formulation of management and mitigation strategies.

The New South Wales National Parks and Wildlife Service has prepared a draft document which provides a series of guidelines regarding the assessment and management of Aboriginal cultural heritage in New South Wales. This report has been prepared in accordance with these draft guidelines (NSW NPWS 1997). Additionally the study has been conducted in accordance with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (NSW DEC July 2005) which have been prepared specifically for development applications assessed under Part 3A of the Environmental Planning and Assessment Act 1979.

1.5 Heritage Context

A review of previous investigations in the area has been undertaken in order to define the existing information relating to Indigenous archaeology and heritage and to provide an analytical context to the assessment. In addition consultation has been undertaken with relevant NSW DECCW staff in regard to the archaeological context and potential of the study area.

A search of the NSW DECCW Aboriginal Heritage Information Management System (AHIMS) has indicated that there are no previously recorded Aboriginal objects located within the proposed impact area (AHIMS #30668). The search area measured 36 km^2 and encompassed eastings 657000 – 663000, and northings 6325000 – 6331000. While no previously recorded Aboriginal objects are listed on AHIMS to be present in the proposal area, three sites are listed in the site search, all of which are located to the south.

There are no previous archaeological studies known to have been conducted within the proposal area itself and few have been undertaken within the immediate local area. The construction of a relevant predictive model of Aboriginal site type and location is therefore based on a review of research conducted across the broader region. This review suggests that the most common Aboriginal object recordings in the region are distributions of stone artefacts and scarred trees. In the region a general correlation between different types of watercourses and the nature of the evidence of past Aboriginal occupation is evident. Higher artefact density sites are located near to permanent water sources and low density artefact distributions are found elsewhere. Rare site

types include rock shelters, quarry and procurement sites, burials, stone arrangements, carved trees, contact sites and traditional story or other ceremonial places.

1.6 Results and Impact Assessment

The proposal area has been divided into twelve Survey Units, comprised of crests, simple slopes, a lower slope and an open depression. At its closest point the western boundary of the study area is located c 0.35 kilometres east of Mandagery Creek, where it flows as a transitory 2nd order stream. The proposal area surveyed during the assessment measures approximately 200 hectares in area. The majority of this area had been recently ploughed and sown to pasture at the time of the field survey. It is estimated that approximately 109 hectares of that area was subject to survey inspection. Ground exposures inspected are estimated to have measured approximately 22 hectares in area. Of that ground exposure area, archaeological visibility (the potential artefact bearing soil profile) is estimated to have been 6.5 hectares. Effective Survey Coverage is therefore moderate and is calculated to have been 3.3% of the study area.

Two Aboriginal object locales were recorded during the field survey, one comprised of a single stone artefact and the other a low density artefact scatter consisting of five stone artefacts located within a large area of ground exposure. The Effective Survey Coverage for the surveyed area is assessed to have been moderate at the time of survey, with moderate levels of archaeological visibility distributed throughout the study area. These conditions have enabled a reasonable characterisation of artefact distribution within the proposal area.

As noted above, the Aboriginal object locales recorded in the proposal area are an isolated stone artefact and a low density artefact scatter; these are assessed to be of low archaeological significance. Undetected or subsurface stone artefacts are assessed to be present in very low density. The Effective Survey Coverage achieved during the survey is considered to have been sufficient to characterise the nature of artefact distribution in the study area. The survey results are therefore assessed to be a relatively accurate reflection of the artefact density in the proposal area. Accordingly, based on the relevant predictive model of site distribution for the area, and the results of the field survey, artefact density in the study area is assessed to be very low. The proposal area is assessed to be low archaeological potential and significance.

The construction of the Solar Farm will result in physical impacts to any Aboriginal objects which may be located within direct impact areas - irrespective of their archaeological significance. That is, any Aboriginal object situated within an area of direct impact will be comprehensively disturbed, and/or destroyed during construction. As with any development the chances of impacting Aboriginal objects, particularly stone artefacts, is high given that they are present in a continuum across the landscape and located on or within ground surfaces. The Manildra Solar Farm is no exception in this regard and it would be impossible to have a development of this nature without causing direct physical impact. However the proposed impacts relating to construction will be discrete in area and not comprehensive.

Given that both the two recorded Aboriginal object locales and the predicted undetected and subsurface artefacts are assessed to be of low significance, the impacts can be viewed as being of correspondingly low significance. This assessment forms the basis for the formulation of recommendations relating to the proposal. It is noted however that artefact scatter SU5/L1 is located outside the proposed impact area and will not be impacted during construction.

1.7 Mitigation and Management Strategies

Details of archaeological sensitivity, suitable management strategies and accompanying rationale for the proposal area are outlined in Section 11 of this report.

The Aboriginal object locales recorded in the proposal area do not surpass scientific significance thresholds which would act to preclude the construction of the proposed solar farm.

Based on a consideration of the predictive model applicable to the environmental context in which impacts are proposed, and the results of the study, it is concluded that the proposed impact areas do not warrant further investigation such as subsurface test excavation. The environmental context in which the impacts are proposed is not predicted to contain artefact densities sufficient to warrant test excavation. It is considered that subsurface testing is unlikely to produce results which would differ significantly to predictions made in respect of the archaeological potential of the landforms in question.

Given the nature and density of the artefact locales recorded in the proposal area and the low scientific significance rating they have been accorded, unmitigated impacts is considered appropriate; a strategy of impact avoidance is not warranted in regard to these locales.

1.8 Recommendations

Management and mitigation strategies are outlined and justified in Sections 11 and 12 of this report. The following recommendations are provided in summary form:

- The proposal area does not warrant further archaeological investigation such as subsurface test excavation; the Effective Survey Coverage achieved during the field survey is be considered to have been generally adequate for the purposes of determining the archaeological status of the proposal area.

- The two recorded Aboriginal object locales and the predicted very low density subsurface artefact distribution in the proposal area do not surpass archaeological significance thresholds which would act to preclude proposed impacts.

- The two recorded Aboriginal object locales are assessed to be representative of a very low density distribution of stone artefacts. The archaeological significance of these locales is assessed to be low. Accordingly unmitigated impact is considered to be appropriate. It is noted however that artefact scatter SU5/L1 is located outside the proposed impact area and will not be impacted during construction.

- There are no identified Indigenous archaeological and heritage constraints relating to the proposal.

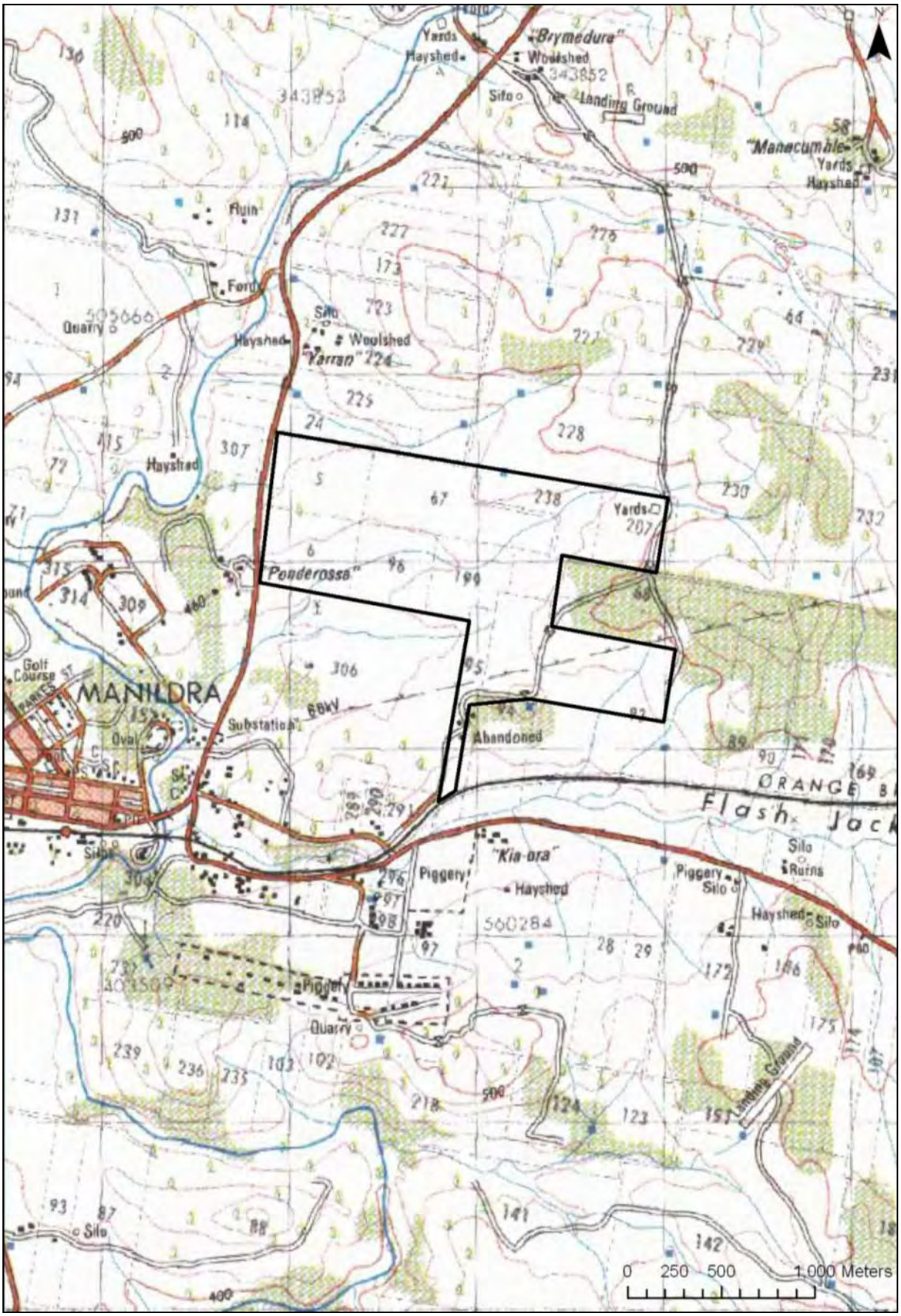

Figure 1. Location of the proposed Manildra Solar Farm (Molong 8631-N 1st ed 1:50 000 topographic map).

2. INTRODUCTION

2.1 Introduction

New South Wales Archaeology Pty Ltd has been commissioned to undertake an archaeological and heritage assessment of the proposed Manildra Solar Farm. The Solar Farm would be located northeast of the township (Figure 1).

The proposed Solar Farm is defined as a Major Project (Critical Infrastructure) under Part 3A of the Environmental Planning and Assessment Act 1979. The Director General, Department of Planning has issued requirements for the preparation of an Environmental Assessment in which it is stated that an archaeological and cultural heritage assessment is required to be prepared which addresses the potential impact of the proposal on Aboriginal heritage values.

In accordance with the NSW NPWS guidelines for archaeological reporting (NSW NPWS 1997) and the NSW DECCW Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (NSW DEC 2005) this report aims to document:

- The Aboriginal consultation process undertaken for the project and the involvement in the project of the Aboriginal community (Section 3);
- A description of the proposal and whether or not it has the potential to result in impacts to Aboriginal cultural heritage (Section 4);
- A description of the impact history of the proposal area (Section 4);
- The methodology implemented during the study (Section 5);
- The landscape and natural resources of the study area in order to establish background parameters (Section 6);
- A review of archaeological and relevant literature and heritage listings on the NSW DECCW Aboriginal Heritage Information Management System (Section 7);
- A synthesis of local and regional archaeology (Section 7);
- A predictive model of Aboriginal object type and location relevant to the proposal area (Section 7);
- The cultural and archaeological sensitivity of the landforms subject to proposed impacts (Section 7);
- The field survey results (Section 8);
- The legislative context (Section 9);
- The significance of Aboriginal objects (Section 10);
- An assessment of the impact of the proposal on Aboriginal objects (Section 8);
- A description and justification of the proposed management and mitigation strategies (Section 11); and
- A series of recommendations based on the results of the investigation (Sections 11 and 12).

This project has been managed by Julie Dibden. The field work component of this project has been conducted by Andrew Pearce, NSW Archaeology Pty Ltd, and Chad Morgan and Ian Bell of the Orange Local Aboriginal Land Council. This report has been written by Julie Dibden and Andrew Pearce.

We gratefully acknowledge the assistance provided to NSW Archaeology Pty Ltd during the course of this project by the following people:

- Phil Purcell and Paul Houston: NSW DECCW – Dubbo;
- Annette Steele, Chad Morgan and Ian Bell: Orange Local Aboriginal Land Council;
- Chris McGrath: Infigen; *and*
- Amy Webb, Nick Graham-Higgs and Kate Carroll: nghenvironmental.

3. PARTNERSHIP WITH THE ABORIGINAL COMMUNITY

The NSW DECCW manages Aboriginal cultural heritage in NSW in accordance with the National Parks and Wildlife Act 1974. Part 6 of the Act provides specific protection for Aboriginal objects and Aboriginal places by administering offences for harming them without authorisation. When an activity is likely to impact Aboriginal objects or declared Aboriginal Places, approval of the Director-General of the NSW DECCW is required, issued in the form of an AHIP under s90 and/or s87 of the NPW Act. It is noted that given this project is a Part 3A Major Project s90 and s87 of the NPW Act does not apply. This project has however been conducted in accordance with the NSW DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRP) (NSW DECCW 2010).

NSW DECCW requires effective consultation with Aboriginal people because it recognises that:

- Aboriginal people should have the right to maintain culture, language, knowledge and identity;
- Aboriginal people should have the right to directly participate in matters that may affect their heritage; and
- Aboriginal people are the primary determinants of the cultural significance of their heritage.

The purpose of the NSW DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents document (NSW DECCW 2010) is to facilitate positive Aboriginal cultural heritage outcomes by:

- affording an opportunity for Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) in the area of the proposed project to be involved in consultation so that information about cultural significance can be provided to NSW DECCW to inform decisions regarding applications for an AHIP; and

- providing Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) in the area of the proposed project with the opportunity to participate in decision-making regarding the management of their cultural heritage by providing proponents information regarding cultural significance and inputting into management options (NSW DECCW 2010).

The decision as to whether or not to issue an AHIP *or general terms of approval* is based on the supply by a proponent of adequate information to the NSW DECCW so as to enable the Director-General to make an informed decision with regard to the Aboriginal heritage values of Aboriginal object(s) and/or place(s) potentially harmed by an activity. As part of this process proponents must provide the opportunity for Aboriginal persons who hold cultural knowledge relevant to the proposed project area to be involved in consultation so that they may provide information relating to the cultural significance of objects or places that may be impacted (NSW DECCW 2010).

When evaluating an AHIP application DECCW will consider, amongst other things, the:

- cultural and scientific significance of the Aboriginal object(s) and/or place(s);
- potential or likely impact of the proposal on the Aboriginal object(s) and/or place(s);
- adequacy of any proposed measures to avoid or reduce impacts; and
- the results of consultation with Aboriginal people (NSW DECCW 2010).

The DECCW ACHCRP requirements outline four main consultation stages to be implemented in the course of consultation undertaken with Aboriginal people. In order to fulfil these consultation

requirements NSW Archaeology Pty Ltd, on behalf of the proponent, has followed the following procedure:

Stage 1: Informing Aboriginal people about the nature and scope of the proposal.

The proponent has actively sought to identify stakeholder groups or people wishing to be consulted about the project and has invited them to register their interest.

Written notification dated 16th June 2010, requesting a list of Aboriginal groups or persons who may have an interest in this project, has been forwarded to the following bodies:

- DECCW ECP Dubbo office
- Orange Local Aboriginal Land Council
- the Registrar, Aboriginal Land Rights Act 1983,
- the National Native Title Tribunal, requesting a list of registered native title claimants, native title holders and registered Indigenous Land Use Agreements
- Native Title Services Corporation Limited (NTSCORP Limited)
- Cabonne Shire Council
- the Central West Catchment Management Authority, requesting contact details for any established Aboriginal reference group.

In addition an advertisement was placed in the 17 June 2010 edition of the Central Western Daily newspaper.

The closing date for registration of interest was noted as 1 July 2010.

In response to the notifications outlined above, eight groups or individuals including the Orange Local Aboriginal Land Council registered an interest in the project. However, because several parties did not wish their details to be generally disclosed they are not listed in this report. Instead their details have been forwarded to DECCW in correspondence dated 5th August 2010.

Stage 2 and 3. Presentation of information in regard to the project and gathering information about cultural significance.

In accordance with the DECCW ACHCRP an outline of the scope of the project (including mapping), the proposed cultural heritage assessment process and the heritage assessment methodology was forwarded to the various parties and/or individuals on varying dates, immediately following receipt of their registration of interest. In these documents Registered Aboriginal Parties were invited to provide cultural knowledge relevant to the proposal area and project. The latest date that these items were sent being 14th July 2010. Several responses have been received in regard to the Aboriginal consultation process (see below and Appendix 1).

One written response is marked 'confidential' and this has not accordingly been included in Appendix 1. However this Registered Aboriginal Party requested further information in regard to Part 3a guidelines which was duly forwarded, and in response to the proposed methodology indicated the difficulty in commenting unless meetings are held on site or at a suitable location and unless a field survey is conducted. It is noted that two Registered Aboriginal Parties, Ms Eva Coe (telephone: 20/9/10) and Wellington Valley Wiradjuri Aboriginal Corporation (see Appendix 1), have expressed concern that they were not included in the archaeological field survey which has been conducted for this project. In light of these comments all Registered Aboriginal Parties were informed that a site visit would be arranged if required (see below). However no requests were made and accordingly this has not occurred.

Stage 4. Reviewing the report.

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For review and comment, a copy of this draft report has been forwarded to the registered parties. The DECCW ACHCRP requirements provide a period of 28 days for registered Aboriginal parties to comment on the draft report. In addition registered parties were provided with the opportunity, if they wished, to attend the proposal area so that they may have the opportunity to contribute information that will assist in determining the cultural significance of the Aboriginal objects within the proposed project area. The closing date for submissions regarding the draft report was the 25th October 2010. As of 3rd November 2010 two written responses have been received, both of which are from the Wellington Valley Wiradjuri Aboriginal Corporation. These letters are included in Appendix 1.

4. DESCRIPTION OF IMPACT

The information contained in this section of the report is provided in accordance with the NSW NPWS (1997) guidelines for archaeological survey reporting. A full description of the proposal and its potential impact on the landscape and heritage resource is described below. This information includes a summary of the impact history of the study area. These prior and existing land uses have caused significant changes to geomorphological processes in the area, with an associated effect on the archaeological resource.

Potential impacts to archaeology and heritage during the construction phase of the solar farm proposal relate to site preparation, operation of vehicles and machinery and the installation of infrastructure. This may involve earthworks and excavations and vegetation clearing. It is noted however that remnant woodland located in the proposal area will not be impacted.

4.1 Impact History

The proposal area is predominantly cleared, with a sparse scattering of generally isolated trees. The site has been highly modified by past clearance and subsequent agricultural activities including stock grazing and the regular cultivation of crops. At the time of field survey almost the entire study area had recently been ploughed and sown. Native vegetation is virtually non-existent in the majority of areas, with the exception of the aforementioned trees and some native grasses and sparse acacia located in the western section.

The sites has localised areas of disturbance in the form of the installation of an electricity substation, house construction with various outbuildings, silo and water tank construction, graded vehicle tracks, fencing, water diversion channel construction, drainage depression infilling and excavated dams.

4.2 Proposed Impacts

Infigen proposes to construct a 50 megawatt capacity photovoltaic solar farm at Manildra (Figure 2). The solar farm would comprise a series of photovoltaic modules (PV arrays) mounted on fixed frames, and would occupy approximately 100 hectares within the 200 ha project site. The Manildra Solar Farm would connect to a recently constructed 132kV substation which is located within the study area.

Project infrastructure for the proposed solar farm would include:

- A fixed photovoltaic solar module array (PV array), arranged in a series of rows between 1 and 3-4 metres above the ground, angled for maximum efficiency and supported by steel framing on steel posts fixed in the ground.
- Electrical connections between PV array and central inverters via underground or frame secured cabling.
- A series of central inverters and kiosk transformers distributed throughout the PV array.
- Electrical connection into the existing 132kV substation via an underground transmission line, including any required switchyard and substation augmentation.
- Internal access tracks and upgrades to existing roads, where required.
- Fencing and landscaping around the solar farm.
- Site office and Operations and Maintenance building.
- Additional temporary construction infrastructure such as a site compound and equipment laydown area.

The PV panel mounting structures would not require any significant earthworks or modification of landforms prior to installation. There are two options for the installation of the array support posts:

- approximately 50,000 steel posts would be installed to a depth of 2 to 3 metres using a pile driver; or
- approximately 30,000 steel posts with precast concrete footings would be installed on the natural ground surface or in shallow excavations.

A module mounting structure would be attached to the pylons to provide a solid support for the panels to be fixed to. Electrical cabling from each panel would be underslung beneath the panels to the end of each row.

Approximately twenty string distribution cabinets (DCUVs) would be located in each array block to receive and house electrical cabling from the panel rows, with one DCUV installed at ground level at the end of every two to three rows on average. Each array block would also contain approximately two main distribution cabinets (DCHVs), each receiving cabling from 10 DCUVs before connecting to one of the array block's inverters at the central inverter and kiosk transformer site. Access would be provided to each inverter/kiosk transformer site via a gravel track.

The PV panel system would produce power at a maximum of 1000 volts in direct current (DC). The power produced by the panels would need to be converted to alternating current (AC) before being fed into the electricity grid, which operates in AC. Inverters would be therefore be needed to convert the DC power generated to AC and transformers would be required to step up the voltage before feeding into the grid.

A total of approximately 64 inverters and 32 kiosk transformers would be installed at the site in groups (likely two) inverters and one kiosk transformer at the centre of each array block. Internal gravel access tracks would be provided to all inverter/kiosk transformer locations.

The inverters would be installed at the centre of each of the solar farm's array blocks. The inverters would convert the DC power produced by the PV panels to a low voltage 350V AC current, and feed it to an adjacent kiosk transformer. The inverters would be approximately 2.5 metres long and 1 metre wide. The inverters would be installed on a concrete slab of approximately the same length and width.

A kiosk transformer would be installed adjacent to the inverters in each array block. The purpose of the kiosk transformers would be to step up the voltage from 350V to a reticulation voltage of between 11 and 33kV. Transformers would be approximately 4.3 metres long by 2.2 metres wide and would be installed in an outdoor enclosure on a concrete slab with an oil containment bund.

To export power it is necessary to electrically connect the solar farm to the NSW electricity grid. Electrical works for the proposal would include:

- Low voltage DC power cabling from PV panels to inverters and kiosk transformer in each array block;
- Underground power reticulation cabling from kiosk transformers to the Manildra 132kV substation at between 11,000 and 33,000V (11 to 33kV), via a switching station and control room;
- Onsite control and communications cabling;
- An onsite control room housing control and communications equipment.

The power produced by the PV panels would be transferred at a maximum of 1000V in DC along electrical cabling underslung beneath the panels of each row. From the end of each row, DC

cabling would enter one of 20 string distribution cabinets, run underground to one of two main distribution cabinets, and then on to one of two inverters in each array block. The inverters would convert the DC power supply to AC before connecting to the kiosk transformer via further underground electrical cabling. The kiosk transformer would step up the voltage from 350V to reticulation voltage of between 11 and 33kV.

Trenches approximately 0.4 metres wide and 0.8 metres deep would be dug to lay the underground DC cabling between panel row ends, DCUVs, DCHVs and inverters. Each kiosk transformer must be connected together at reticulation voltage, and then connected to the substation via switching gear and the control room. These connections would be made using underground reticulation cabling within the boundary of the solar farm and underground or overhead cabling from the solar farm to the substation.

Cable trenches would, where reasonable, be dug within or adjacent to the onsite roads to minimise any related ground disturbance. Underground 11 to 33kV cables would require a trench of approximately 0.4 metres wide and 0.8 metres deep.

A Construction Site Office would include several demountable buildings, and an amenities block located on site for the duration of construction. The site facilities would cover an area of 500m2 and would be fenced independent of the PV array site. A car parking area used for construction car parking would measure approximately 750m2.

An Operations and Maintenance Building incorporating a control room would be located at the north western corner of the PV array. These facilities would provide an office area for the site manager and house communications and control equipment, maintenance stores and staff amenities. The O&M building would be constructed on a concrete slab approximately 20 metres by 20 metres.

The proposal involves the construction of 13 kilometres of up to 8 metre wide hard packed gravel roads and 4 hectares of laydown areas that would also be hard packed with gravel.

The proposed works entail ground disturbance and accordingly the construction of the solar farm has the potential to cause impacts to any Aboriginal objects which may be present within the zones of direct impact. Given the nature of the proposed installation of the solar modules, the proposed impacts are discrete in nature and will occupy a relatively small footprint within the overall area; accordingly impacts to the archaeological resource across the landscape can be considered to be partial in nature, rather than comprehensive.

4.3 Potential Impacts

Impacts will be located on land currently utilised crop cultivation. Previous land use has resulted in relatively significant environmental impacts and a generally highly degraded landscape. European activated geomorphological processes and other natural processes associated with land degradation will have caused significant prior impacts to Aboriginal objects within the proposal area.

However irrespective of prior impacts the proposed works entail ground disturbance and accordingly the project has the potential to cause additional impacts to any Aboriginal objects which may be present within the individual components of the proposal.

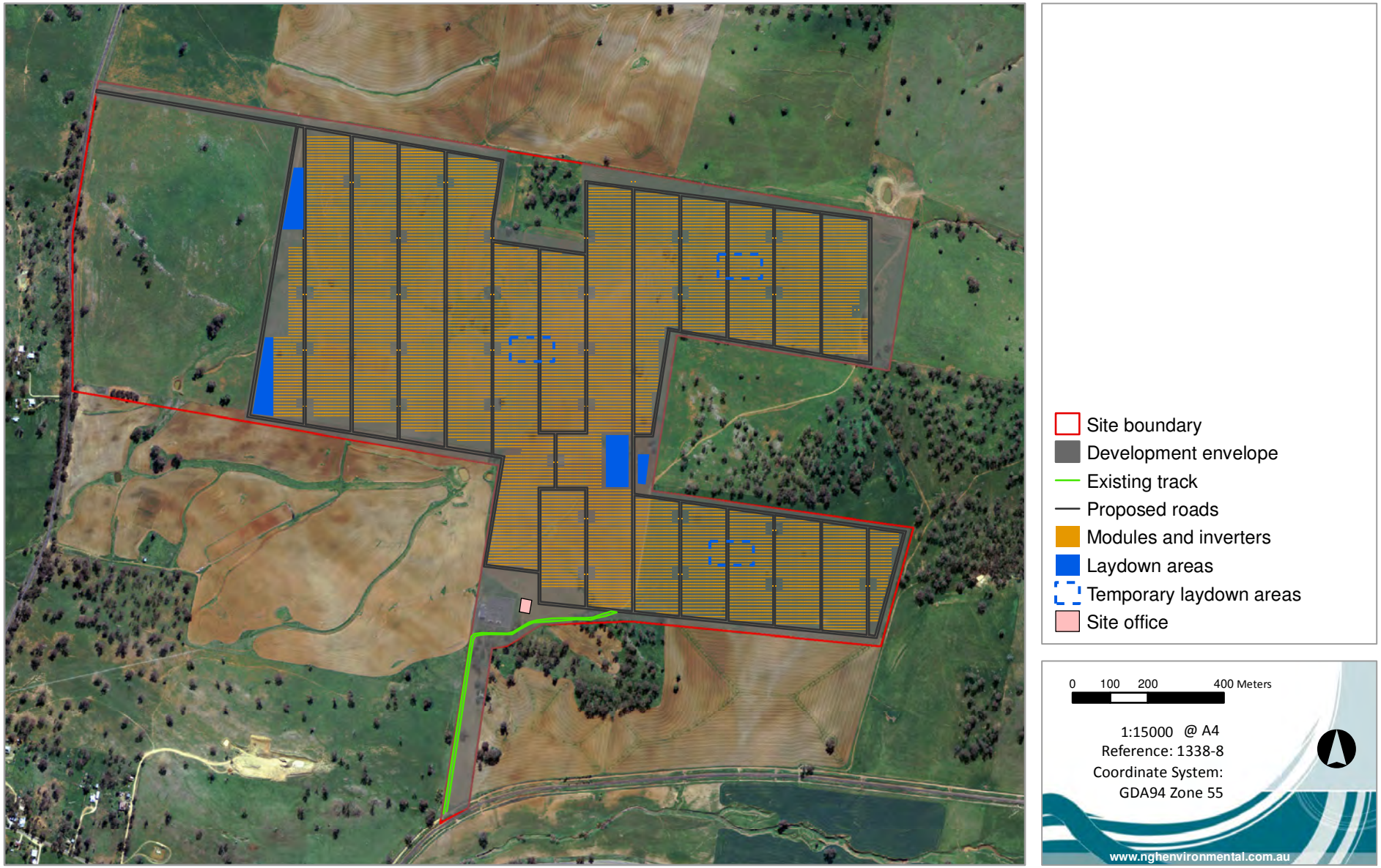

Figure 2. Proposed development layout (supplied by client).

5. STUDY METHODOLOGY

This archaeological and cultural heritage study has included the following components:

- A NSW DECCW Aboriginal Heritage Information Management System site search to determine whether or not previously recorded Aboriginal objects are present in the proposal area and to give consideration to the type of sites known to be present within the local area.
- A review of local and regional archaeological reports and other relevant documents in order to provide a contextual framework to the study and heritage management process.
- An historical overview of the region and local area.
- A review of impacts relating to the construction of the Solar Farm aimed at determining the potential nature and extent of impacts to any potential Aboriginal objects which may be present.
- A comprehensive field survey of the proposal area aimed at locating Aboriginal objects and cultural values, recording survey coverage data and assessing the archaeological potential of the landform present.
- Documentation of survey results.
- A discussion of survey results.
- A site significance assessment.
- The formulation of management and mitigation strategies ensuing from the above.

5.1 Literature Review

Background research has been conducted to determine if known Aboriginal objects and Non-Indigenous items are located in the proposal area and to assist in the construction of a relevant model of site type and location.

The following information sources were accessed for this study:

- NSW DECCW Aboriginal Heritage Information Management System;
- Relevant archaeological reports;
- Relevant topographic maps; and
- Mapping relating to proposed impacts.

5.2 Field Survey and Methodology

The field survey entailed a comprehensive pedestrian survey and was undertaken over a three day period. Survey coverage is described in Section 8 of this report.

The field survey was aimed at locating Aboriginal objects. An assessment was also made of prior land disturbance, survey coverage variables (ground exposure and archaeological visibility) and the potential archaeological sensitivity of the land. All trees located within the areas of direct impact were inspected for evidence of scarring.

Field survey was designed to assess the archaeological sensitivity of the entire proposal area. The survey methodology entailed walking parallel transects across individual paddocks with each surveyor situated ca. 20 - 30 metres apart. Each Survey Unit was surveyed until the entire area had been systematically inspected. This methodology enabled direct visual inspection of as much of the ground surface of the proposal area as practicable.

The approach to recording in the current study has been a 'nonsite' methodology: the elementary unit recorded is an artefact rather than a site (*cf* Dunnell 1993; Shott 1995). The rationale behind this approach is that artefacts may be directly observed however 'sites' are a construction within an interpretative process. Given that it can be expected that full archaeological visibility will not be encountered during the survey the process of identifying site boundaries (if they exist at all) will not be possible.

The density and nature of the artefact distribution will vary across the landscape in accordance with a number of behavioural factors which resulted in artefact discard. While cultural factors will have informed the nature of land use, and the resultant artefact discard, environmental variables are those which can be utilised archaeologically in order to analyse the variability in artefact density and nature across the landscape. Accordingly in this study while the artefact is the elementary unit recorded it is the Survey Unit which is utilised as a framework of recording, analysis, and management (*cf* Wandsnider and Camilli 1992). The study area has been encompassed one Survey Unit only which has been defined according to a broad landform morphological type.

In order to ensure consistency in data collection all field records were made in survey forms formulated specifically for the project. Two separate forms were used for recording Survey Unit data and Aboriginal Object data. The data collected forms the basis for the documentation of survey results outlined in Section 8. The variables recorded are defined below:

Survey Unit Variables

Landscape variables utilised are conventional categories taken from the *Australian Soil and Land Survey Field Handbook* (McDonald *et al.* 1998). The following landform variables were recorded:

Morphological type:
- Crest: - element that stands above all or almost all points in the adjacent terrain – smoothly convex upwards in downslope profile. The margin is at the limit of observed curvature.
- Simple slope: - element adjacent below crest or flat and adjacent above a flat or depression.
- Lower slope:- slope element not adjacent below a crest or flat but adjacent above a flat or depression.
- Open depression:- landform element that stands below all, or almost all points in the adjacent terrain. Concave upwards, the margin is at the limit of observed curvature.
- Flat: - planar element, neither crest nor depression and is level or very gently inclined.

Slope class and value:
- Very gentle 1 - 3%.
- Gentle 3 – 10%.

Geology
The type of geology has been recorded and as well the abundance of rock outcrop – *as defined below*. The level of visual interference from background quartz shatter was noted.
- No rock outcrop - no bedrock exposed.
- Very slightly rocky - <2% bedrock exposed.

Soil
Soil type and depth was recorded. The potential for soil to contain subsurface archaeological deposit (based on depth) was recorded. This observation is based solely on the potential for soil to contain artefacts; it does not imply that artefacts will be present or absent.

Survey coverage variables were also recorded; these are described further below in Section 5.3. The archaeological sensitivity of the Survey Unit was defined according to assessed artefact density.

Previous Landuse Impacts
The nature and extent of prior disturbance was recorded.

Aboriginal Object Recording

For the purposes of defining the artefact distribution in space it has been labeled as a locale (eg. Survey Unit 1/Locale 1). GPS referenced locational information was captured as WGS84 readings (GDA).

Locale specific assessments of survey coverage variables have been made. The prior disturbance to the locale has been noted. Artefact numbers in each locale have been recorded and a prediction of artefact density estimated, based on observed density taking into consideration Effective Survey Coverage, and a consideration of the environmental context.

Artefact density has been defined in an arbitrary category as follows;

- Very low: <5 artefacts per square metre.

5.3 Survey Coverage Variables

Survey Coverage Variables are a measure of ground surveyed during the study and the type of archaeological visibility present within that surveyed area. Survey coverage variables provide a measure with which to assess the effectiveness of the survey so as to provide an informed basis for the formulation of management strategies.

Specifically, an analysis of survey coverage is necessary in order to determine whether or not the opportunity to observe stone artefacts in or on the ground was achieved during the survey. In the event that it is determined that ground exposures provided a minimal opportunity to record stone artefacts it may be necessary to undertake archaeological test excavation for determining whether or not stone artefacts are present. Conversely, if ground exposures encountered provided an ideal opportunity to record the presence of stone artefacts, the survey results may be considered to be adequate and accordingly no further archaeological work may be required.

The survey coverage data includes an estimate of the area surveyed within a Survey Unit, that is, the area subject to actual inspection; the surveyed area is always less than the Survey Unit in area given that not all parts of a Survey Unit are visually examined.

Two variables were used to measure ground surface visibility during the study; the area of ground exposure encountered and the quality and type of ground visibility (archaeological visibility) within those exposures. The survey coverage variables estimated during the survey are defined as follows:

Ground Exposure – an estimate of the total area inspected which contained exposures of bare ground; and

Archaeology Visibility – an estimate of the average levels of potential archaeological surface visibility within those exposures of bare ground. Archaeological visibility is generally less than ground exposure as it is dependent on adequate breaching of the bare ground surface which provides a view of the subsurface soil context.

Based on the two visibility variables as defined above, an estimate (Net Effective Exposure) of the archaeological potential of exposure area within a Survey Unit has been calculated. The Effective Survey Coverage (ESC) calculation is a percentage estimate of the proportion of the Survey Unit which provided the potential to view archaeological material.

6. LANDSCAPE CONTEXT

A consideration of the landscape is necessary in archaeological work in order to characterise and predict the nature of Aboriginal occupation across the land (NSW NPWS 1997). In Aboriginal society landscape could be both the embodiment of Ancestral Beings and the basis of a social geography and economic and technological endeavour. The various features and elements of the landscape are/were physical places that are known and understood within the context of social and cultural practice.

Given that the natural resources that Aboriginal people harvested and utilised were not evenly distributed across landscapes Aboriginal occupation and the archaeological manifestations of that occupation will not be uniform across space. Therefore, the examination of the environmental context of a study area is valuable for predicting the type and nature of archaeological sites which might be expected to occur. Factors which typically inform the archaeological potential of a landform include the presence or absence of water, animal and plant foods, stone and other resources, the nature of the terrain and the cultural meaning associated with a place.

Additionally, geomorphological and humanly activated processes need to be defined as these will influence the degree to which archaeological sites may be visible and/or conserved. Land which is heavily grassed will prevent the detection of archaeological material while land which has suffered disturbance may no longer retain artefacts or stratified deposits. A consideration of such factors is necessary in formulating site significance and mitigation and management recommendations.

The following sections provide information in regard to the landscape context of the study area.

6.1 Topography, Geology and Vegetation

The proposal area is located approximately 1.5 kilometres northeast of the township of Manildra and immediately on the eastern side of the Molong Manildra Road. The landform elements present generally slope westerly or southerly as the broader terrain drops away from elevated ridgelines located to the northeast, to the more planar landforms which lie to the south. The terrain is very gentle to gently sloping; the highest elevation is ca. 500 m AHD at the northeastern end of the study area, while the lowest point is ca. 450 m AHD at the western boundary.

The broader landscape in which the areas of impact are situated is predominantly comprised of gently rolling hills incised by a single 1st order drainage line that flows from the northeastern corner to the southwest. The landforms present in the study area are an open depression, simple slopes, a lower slope and crests, which have gradients that range between very gentle to moderate.

The broader geology underlying the study area is of the late Silurian Goonigal Group, comprised primarily from feldspar-lithic volcaniclastic sandstone, siltstone, shale and chert. The study area itself overlies geology of the Wansey Formation, made up of clastic sedimentary andesitic lithic tuffs and richly fossiliferous arenite, with shale, conglomerate and breccia. The conglomerate component of this geology manifests as a distribution of small rounded pebbles across the study area. Immediately to the east of the study area the geology shifts to the Burgoon Formation which is formed from pyritic, lithic and feldspathic tuffs, interbedded with cherts (Mineral Resources NSW 1:250 000 Statewide Geology 2003). Cobbles of this chert material, which is moderately dark greyish-green in colour, are evident within the study area although more prevalent towards the eastern section. In areas where ploughing has taken place chert rocks are present which have been mechanically fractured over time through impact with ploughshares.

This has produced a distribution of chert country rock fragments, some of which have superficial resemblance to artefactual material.

Stone cobbles and low outcrops occur within the proposal area, primarily scattered over the prominent crests. Soils within the proposal area silty loams, which are moderately eroded as the result of the history of agricultural exploitation.

One very minor drainage depression runs through the study area, running southwest from the northeastern corner to the western boundary. This is a 1st order stream with a catchment area of c. four kilometres square. It is believed that prior to European clearance this would have been an ephemeral drainage line, only holding water after times of rain. At present sections of this drainage depression have been infilled and contoured. The most reliable watercourse in the immediate district is Mandagery Creek, located 0.35 kilometres west of the western boundary of the proposal area at its closest point. In this area Mandagery Creek is a relatively minor 2nd order stream, but nearer to the Manildra township, c 1.3 kilometres west of the study area, Manildra Creek converges to create a more reliable stream.

The proposal area is situated on land which prior to European occupation would have been open woodland. Currently the majority of the area is cultivated with crops, although there is a scattering of sparse eucalypts, acacia and kurrajong (*Brachychiton populneum*), most of which stand as isolated trees.

Summary

The proposal area is located on land which prior to European occupation was open woodland and accordingly possessed low biodiversity values. Potable water would have been generally absent from the study area, although available for most of the year from Mandagery Creek located to the west. In an Aboriginal landuse context the area is likely to have been utilised by Aboriginal people for a limited range of activities which may have included hunting and gathering and travel through country. Such activities are likely to have resulted in low levels of artefact discard. The nature of stone artefacts discarded can be expected to have been correspondingly limited in terms of artefact diversity and complexity. Areas containing established trees will not be impacted in respect of the proposal and accordingly any potentially scarred trees in those areas will not be affected by the development.

7. ARCHAEOLOGICAL CONTEXT - INDIGENOUS

7.1 Social Geography

On the basis of archaeological research it is known that Aboriginal people have occupied Australia for at least 40,000 years and possibly as long as 60,000 years (Mulvaney and Kamminga 1999: 2). By 35,000 years before present (BP) all major environmental zones in Australia, including periglacial environments of Tasmania, were occupied (Mulvaney and Kamminga 1999:114).

At the time of early occupation Australia experienced moderate temperatures. However, between 25,000 and 12,000 years BP (a period called the Last Glacial Maximum) dry and either intensely hot or cold temperatures prevailed over the continent (Mulvaney and Kamminga 1999: 114). At this time the mean monthly temperatures on land were 6 - 10ºC lower; in southern Australia coldness, drought and winds acted to change the vegetation structure from forests to grass and shrublands (Mulvaney and Kamminga 1999: 115-116).

During the Last Glacial Maximum at about 24 - 22,000 years ago, sea levels fell to about 130 m below present levels and accordingly, the continent was correspondingly larger. With the cessation of glacial conditions, temperatures rose with a concomitant rise in sea levels. By ca. 6000 BP sea levels had more or less stabilised to their current position. With the changes in climate during the Holocene Aboriginal occupants had to deal not only with reduced landmass, but changing hydrological systems and vegetation; forests again inhabited the grass and shrublands of the Late Glacial Maximum. As Mulvaney and Kamminga (1999: 120) have remarked:

> *When humans arrived on Sahul's shores and dispersed across the continent, they faced a continual series of environmental challenges that persisted throughout the Pleistocene. The adaptability and endurance in colonising Sahul is one of humankinds' inspiring epics.*

The study area is situated within land which today is seen as having traditionally been occupied by the Wiradjuri peoples. This attribution of group relationship was made by Tindale (1974) based on notions of affiliation due to a shared language throughout a broadly distributed Aboriginal population. The Wiradjuri inhabited a widespread area which extended from the Great Dividing Range west to the Macquarie, Lachlan and the Murrumbidgee rivers (Coe 1989). In so doing, their country encompassed three distinct geosystems: the tablelands in the east, the central western slopes, and to the west the southwest plains.

Aboriginal occupation in the Darling Basin, which encompasses part of the Wiradjuri territory to the west, has been dated to 40,000 years (Haglund 1985). Closer to the study area, archaeological excavations in the western Blue Mountains have shown Aboriginal occupation to 12,000 years BP (Lourandos 1997), with the earliest dated occupation in the immediate region being just over 7,000 years BP at Granites 2 shelter, about 50km northeast of Manildra (Pearson 1981). A similar date was derived from the dating of the skeletal remains of a male individual found in a cave near Cowra (Pardoe and Webb 1986).

Numerous studies have been undertaken, both in an academic and consultancy context, in the broader Manildra region of the Western Slopes and adjoining plains region of NSW. Consideration of a predictive model of site type and site location within a geographical context relevant to the study area can be made through recourse to these previous studies. From this a contextual and relevant assessment of the archaeological potential of the study area can be formed.

Although no academic investigations have been conducted that specifically examine the Manildra district, some academic research studies have been undertaken within the broader

central west region. These focus on regions reasonably near to the study area, and encompass areas that possess comparable environmental and topographic contexts. Accordingly, the results of these studies may be applied to the current study as corollaries for inferred patterns of Aboriginal land usage prior to European occupation.

Pearson (1981) conducted a comprehensive study of the upper Macquarie region in relation to his PhD dissertation. In addition to carrying out extensive research of historical sources and reviewing ethnographic data, Pearson (1981) excavated three rock shelters and compiled information about other known archaeological sites in his study area. He determined that the Wiradjuri functioned primarily in small groups of variable size, dependent on the season. These groups were comprised of immediate relations, the smallest being the basic family unit, but groupings could coalesce to form a collective band of between 80-150 people during feasting in times of plentiful food, or for ceremony.

Between them, in smaller groups of up to 20 people, they exploited the resources of a common territory which had a radius of up to 65 km, but which was generally centred on a particular home base location that possessed a reliable watercourse (Pearson 1981). Pearson (1981) suggests that there may have been three distinct band territories in the local region, centred on Bathurst, Wellington and Mudgee/Rylstone. From this it may be deduced that the Manildra area formed one locale within the range of a single Wiradjuri band. However, given the generally ephemeral nature of the local catchments and creek lines, the locus of that bands' place of habitation would be closer to a more permanent source of water.

Pearson (1981) developed a pattern of Aboriginal occupation through the analysis of site location attributes in relation to just over 40 recorded open campsites within four sample areas in the region. He found that archaeological sites could be grouped into two main types, occupation sites, and non-occupation sites, the latter including scarred or carved trees, ceremonial sites, grinding grooves and burial sites. Through analysis of the location of these sites he proposed the following model for the prediction of site location (Pearson 1981):

- The distance of sites from water ranged from 10 to 500 m. However larger sites were generally located nearer to water (Pearson's average distance from water being 90 m);
- Both good soil drainage and views over watercourses were important site location factors;
- Level ground, shelter from prevailing winds, and elevation above cold air (Pearson's average elevation being 9.1 m) also influenced site location;
- The majority of sites were situated in places that would originally have been comprised of open woodlands in order to source adequate fuel;
- Burial sites and grinding grooves were located as close to habitation as possible. However grinding grooves occur only where there is suitable outcropping sandstone, and burial sites are generally found in areas where soils are of sufficient depth and penetrability for the purposes of interment;
- Ceremonial sites such as earth rings were situated away from campsites;
- Similarly, stone arrangements were also located away from campsites, in isolated places, and were more likely to be located on small hills or knolls, although they can also occur on flat land;
- Scarred or carved trees were distributed with no obvious patterning other than their proximity to watercourses, and in areas more frequently used for camps;
- Quarry sites were located where known outcrops of serviceable stone were reasonably accessible;
- Pearson suggests that Aboriginal campsites were rarely used for longer than three nights and that sites with evidence of extensive archaeological deposit probably represent accumulations of material over a series of short visits.

To the north of the study area Koettig (1985) undertook a comprehensive study relating to Aboriginal occupation of the Dubbo area. Following a desktop review, Koettig (1985) commenced a systematic survey of a variety of landform units and stream orders so as to

ascertain the relationship of site type and site location to specific environmental settings within three principal physiographic zones.

As a result of this study Koettig (1985) proposed that:

- Aboriginal sites will be distributed throughout all landscape units;
- Open artefact scatters, scarred or carved trees and grinding grooves are the most common site types;
- The location and comparative size of sites is principally determined by environmental and social influences. While site location dictated by social determinants cannot be predicted, some modelling of site type and site location in relation to environmental factors may be made. Those factors include:

  Proximity to water:- although sites were found in all landscape settings including hills and ridges distant from water, the largest campsites were located close to permanent watercourses.

  Availability of food resources:- While the widest range of foods was found along major watercourses in association with the available permanent water, some foods were seasonal and located away from permanent watercourses.

  Geological formation:- Certain site types occur in particular settings. Grinding grooves are located where there are suitable sandstone outcrops, while quarries are found where there is a useable and accessible stone resource. Burials are most likely to be found in sandy deposits such as those that exist on alluvial flats.

7.2 Previously Recorded Aboriginal Objects

A search of the NSW DECCW Aboriginal Heritage Management Information System has been conducted for this project on the 21st June 2010 (AHIMS #30668). The search area measured 36 km^2 and encompassed eastings 657000 –663000, and northings 6325000 –6331000.

Three Aboriginal objects are recorded on AHIMS as being present within the site search area. However, there are no Aboriginal objects listed as being present within the study area itself. The AHIMS register only includes sites which have been reported to NSW NPWS/DECCW. Generally, sites are only recorded during targeted surveys undertaken in either development or research contexts. Accordingly, this search cannot be considered to be an actual or exhaustive inventory of Aboriginal objects situated within the local area or indeed within the study area itself. The Aboriginal objects on AHIMS for the site search area are listed below in Table 1, and the location of those sites nearest to the study area is shown in Figure 3. It should be noted that sites recorded in AGD have been converted to GDA.

Site ID	Site name	Easting GDA	Northing GDA	Recorder	Site type
44-1-0050	A1	658743	6327284	Navin Officer	Artefact/s
44-1-0075	MC-OS1	657918	6325759	Benton	Artefact/s
44-1-0093	Parkes Manildra - Isolated Find 1	660598	6325567	OzArk	Artefact

Table 1. Aboriginal objects listed on NSW DECCW AHIMS search.

The most common Aboriginal object recordings in the region are distributions of stone artefacts and scarred or carved trees. Rare site types include quarries and stone procurement sites, burials, stone arrangements, and traditional story or other ceremonial places. The distribution of each site type is related at least in part to variance in topography and ground surface geology.

The following discussion in Section 7.3 will present a review of previous archaeological work in the region for the purposes of producing a predictive model of site type and location relevant to the study area.

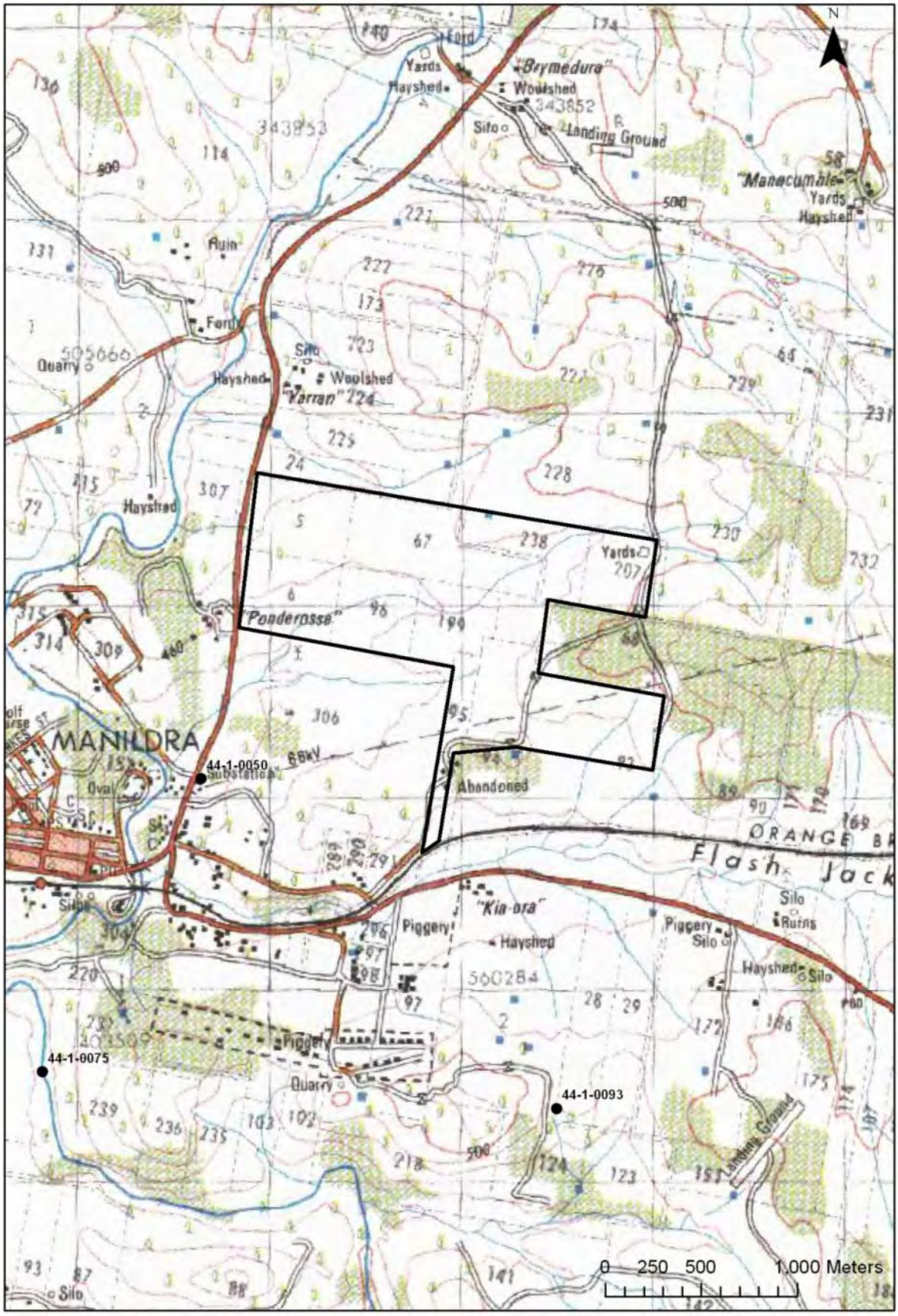

Figure 3. Location of AHIMS search sites in relation to the proposed solar farm.

7.3 Archaeology – The local area

The majority of archaeological investigations in the broader Manildra area have taken place in association with development proposals.

Navin Officer (2001a; 2001b; 2002; 2003) undertook several studies between 2001 and 2003 in relation to the proposed Molong to Manildra 132kV electricity transmission line. The initial study surveyed various corridor options for the transmission line and recorded recording four Aboriginal sites immediately to the east of Manildra, comprised of three open artefact scatters and one isolated find. One of the recorded sites (44-1-0050), located adjacent to the Manildra Molong Road and west of the study area, is listed on the subject AHIMS site search results.

Navin Officer thereafter conducted further survey in relation to the transmission line corridor, Stage 1 extending south and east of Molong (Navin Officer 2002) and Stage 2 ran from Manildra to Molong (Navin Officer 2003). During the Stage 2 survey thirteen Aboriginal sites were recorded including one area of Potential Archaeological Deposit (PAD), seven artefact scatters - three with predicted areas of PAD, and six isolated finds-one with associated PAD.

OzArk (2003) undertook a survey in relation to a proposed pipeline route extending from Gray's Hill Reservoir at Cudal, to Manildra Reservoir. Over a c 8.25 km route one widespread open camp site was recorded immediately adjacent to Mandagery Creek. In conditions affording good ground surface visibility this site extended 200 – 300 m in length along the line of the creek and extended back 30-50 m in width. Of the artefact scatter 19 stone artefacts were recorded, made from a variety of raw materials including chert, quartz and at two types of fine-grained volcanic stone.

OzArk (2009) surveyed a 132kV electricity transmission line route from Manildra to Parkes. Eighteen Aboriginal sites were recorded along the route, comprised of two scarred trees, two isolated finds and fourteen open sites in association with Potential Archaeological Deposit. Open site PM-OS4, located c. Six kilometres southwest of Manildra, is comprised of over 100 artefacts situated adjacent to a confluence of Mackeys Creek and an unnamed tributary. With a maximum artefact density of 3 / m^2 and an average density of 0.5 / m^2, the site extended 150 x 150 m, with artefact density decreasing with distance from the creekline and an increase in gradient. Artefactual raw material included chert, greywacke, quartz, quartzite, silcrete and fine grained siliceous.

During the same survey OzArk (2009) also recorded Parkes Manildra - Isolated Find 1 (44-1-0093) in a gully at the edge of a drainage line 2.5 km southeast of Manildra. This site is listed on the AHIMS site search results and is comprised of a hand axe made from fine grained volcanic stone. OzArk's (2009) overall survey results were found to conform to a predictive model that proposes that sites are likely to be to be located in close association with watercourses. All sites that were recorded in this survey were situated close to watercourses, a few of which were ephemeral in nature.

Kelton (1998) conducted an archaeological assessment in relation to the proposed upgrade of Main Road 61, between Parkes and Manildra. During the field survey two Aboriginal sites were recorded near the Bindogandri Creek Bridge. A scarred tree (white box - E. albens) with steel axe marks indicating the possibility that was not of Aboriginal origin was recorded, as well as an open camp site comprised of a low-density artefact scatter. The artefacts were made of chert and fine-grained metamorphosed siltstone.

Davies (1993) surveyed a 192 km long Telecom optic fibre cable route that extended from Orange to Narromine. During the survey five artefact scatters, one artefact scatter associated with a scarred tree, one scarred tree and three isolated finds were recorded.

Lance (1985) undertook a survey in relation to a proposed transmission line that extended 145 km from Wellington to Forbes. Two scarred trees, 14 isolated finds and 16 open camp sites were

recorded. While over half the sites (58%) were comprised of 10 artefacts or less, 12% of the sites were made up of scatters of over 100 stone artefacts.

Based on the above review and a consideration of the elevation, geology, hydrology and topography of the study area the type of sites known to occur in the region and the potential for their presence within the study area are described in Section 7.4 below.

7.4 Predictive Model of Site Type and Location

Stone artefact scatter sites, scarred or carved trees and grinding grooves are the most common site type found within the region. (Koettig 1985) found that larger and more complex sites are likely to occur in association with permanent watercourses, while sparse artefact scatters and evidence of intermittent and infrequent occupation will be located on landforms which are removed from permanent water sources, such as ridge tops or lower order ephemeral creeks. While this assertion was based on limited survey and analysis, it is possible that it is nevertheless generally correct.

The type of sites known to occur in the region and the potential for their presence within the study area are listed as follows:

Stone Artefacts

Stone artefacts are found either on the ground surface and/or in subsurface contexts. Stone artefacts will be widely distributed across the landscape in a virtual continuum, with significant variations in density in relation to different environmental factors. Artefact density and site complexity is expected to be greater near reliable water and the confluence of a number of different resource zones. The detection of artefacts during a surface survey depends on whether or not the potential archaeological bearing soil profile is visible.

Given the environmental context of the proposed Manildra Solar Farm, at its closest point 0.35 kilometres away from a relatively reliable watercourse, stone artefacts are predicted to be present in very low densities across the study area.

OzArk's (2003) survey for the proposed pipeline route from Gray's Hill Reservoir to Manildra Reservoir identified a broad open camp site adjacent to Mandagery Creek and it is predicted that this watercourse, located outside the study area, would have been a focal point for habitation in the immediate region.

Grinding Grooves

Grinding grooves are found in rock surfaces and result from the manufacture and maintenance of ground edge tools. Grinding grooves are only found on sedimentary rocks such as sandstone. Given the absence of suitable rock exposures in the study area grinding groove sites are unlikely to be present.

Burials sites

The potential for burials to be present in the proposal area is considered to be low given the high levels of previous disturbance related to agriculture.

Rock Shelter Sites

Rock shelters sites are unlikely to be present in the study area given the absence of large vertical stone outcrops.

Scarred and Carved Trees

Scarred and carved trees result from either domestic or ceremonial bark removal. Carved trees associated with burial grounds and other ceremonial places have been recorded in the wider region. In an Aboriginal land use context this site type would most likely have been situated on flat or low gradient landform units in areas suitable for either habitation and/or ceremonial purposes.

Bark removal by European people through the entire historic period and by natural processes such as fire blistering and branch fall make the identification of scarring from a causal point of view very difficult. Accordingly, given the propensity for trees to bear scarring from natural causes their positive identification is impossible unless culturally specific variables such as stone hatchet cut marks or incised designs are evident and rigorous criteria in regard to tree species/age/size and it specific characteristics in regard to regrowth is adopted.

The likelihood of trees bearing cultural scarring remaining extant and in situ is low given events such as land clearance and bushfires. Generally scarred trees will only survive if they have been carefully protected (such as the trees associated with Yuranigh's grave at Molong where successive generations of European landholders have actively cared for them).

Nevertheless scarred trees are a common site type in the local area. There is accordingly potential for this site type to be present if trees of adequate age are present.

Stone Quarry and Procurement Sites

A lithic quarry is the location of an exploited stone source (Hiscock & Mitchell 1993:32). Sites will only be located where exposures of a stone type suitable for use in artefact manufacture occur. Quarries are rare site types in the region. While chert forms a component of the bedrock geology situated to the east, within the study area itself the underlying geology is clastic sedimentary which is comprised of stone material unsuited to the manufacture of artefacts. A stone quarry is therefore unlikely to be recorded during the current study although it is possible.

Ceremonial Grounds

In southeastern Australia ceremonial grounds were used in maturity rites associated with initiation of youths. Bora grounds generally consisted of one or more circular rings defined by mounded earth, sand and/or rocks. This is a rare site type given the nature of the materials used in there construction. Agricultural practices and land clearing is likely to remove surface evidence of these places. The identification of ceremonial grounds is often dependent on Aboriginal oral tradition and historical records. This site type is unlikely to be present in the proposal area.

8. SURVEY RESULTS

8.1 Survey Coverage

The proposal area has been divided into 12 Survey Units. These Survey Units are described in Table 2; their location is shown in Figure 4. The environmental context of the Survey Units is discussed below.

The study area is comprised of a gently undulating hill system. The landform elements present generally slope westerly or southerly as the broader terrain drops away from elevated ridgelines to the northeast, inclining down to the more planar landforms which lie to the south. From the crest that forms Survey Unit 3, Survey Units 1 and 2 incline to the south, while the remaining Survey Units form a gently undulating topography that slopes westerly.

The landforms present in the study area are simple slopes, a lower slope, crests and an open depression which have gradients that range between very gentle to moderate. The open depression is an ephemeral 1st order drainage depression that drains southwest, eventually converging with Mandagery Creek at a point ca. 0.9 kilometres southwest of the study area. A substantial sections of the drainage depression has been infilled and contoured, while in other areas it has been heavily scoured and eroded by water.

The majority of the study area is currently under pasture, although there are some minor stands of scattered trees and a number of isolated trees throughout. Prior to European occupation this area would have been open woodland which has since been subsequently cleared. The site possesses evidence of minor wind and water erosion on crests and hillslopes, and ground surfaces are disturbed as a result of a long history of clearance, grazing and extensive ploughing. At the time of the field survey much of the proposal area had been recently ploughed.

The underlying geology is comprised of the Wansey Formation, which is formed from clastic sedimentary andesitic lithic tuffs and richly fossiliferous arenite, with shale, conglomerate and breccia. Soils are silty loams.

During field survey the majority of the proposal area had been recently ploughed and sown to pasture. As a result ground visibility and accompanying archaeological visibility was relatively high, with many areas of consistent ground exposure. Generally, those areas which at the time of survey had not been recently ploughed and accordingly afforded a lesser degree of visibility, lay to the west of the proposal area and in locations where impacts are not planned.

The proposed impacts are assessed to represent a low level of disturbance to the archaeology. The landforms present are generally amorphous features with low biodiversity values and an absence of any immediate reliable potable water. These landforms are likely to have been utilised by Aboriginal people on occasional and generally limited basis for activities such as hunting and gathering forays and travel through country. Such activities are likely to have resulted in the discard of isolated and discrete clusters of stone artefacts in very low densities only.

SU	Landform	Environmental context	Slope	Aspect	Geology	Abundance Rock	Quartz Background	Soil	Deposit Potential	Geomoph-ology	Agents	Disturbance Levels	Predicted Artefact Density
SU1 (Plate 1)	simple slope	low biodiversity - originally open woodland; 2 km from reliable water in Mandagery Ck.	gently inclined	ESE	clastic sedimentary; some cobbles	no rock outcrop	low	silty loam	Yes	eroded	wind; precipitation	moderate	very low
SU2 (Plate 2)	simple slope	low biodiversity - originally open woodland; 2.2 km from reliable water in Mandagery Ck.	gently inclined	S	clastic sedimentary; some cobbles including chert	no rock outcrop	low	silty loam	Yes	eroded	wind; precipitation	moderate	very low
SU3 (Plate 3)	crest	low biodiversity - originally open woodland; 2 km from reliable water in Mandagery Ck.	very gently inclined	open	clastic sedimentary; some cobbles and gravels	very slightly rocky	moderate; poor quality	silty loam	Yes	eroded	wind; precipitation	moderate	very low
SU4 (Plate 4)	simple slope	low biodiversity - originally open woodland; 1.9 km from reliable water in Mandagery Ck.	gently inclined	WNW	clastic sedimentary; some cobbles and gravels	no rock outcrop	low	silty loam	Yes	eroded	wind; precipitation	moderate	very low
SU5 (Plate 5)	simple slope	low biodiversity - originally open woodland; 0.5 km from reliable water in Mandagery Ck.	gently inclined	SSE	clastic sedimentary; outcrops, some cobbles and gravels	very slightly rocky	low	silty loam	Yes	eroded	wind; precipitation	moderate	very low
SU6 (Plate 6)	simple slope	low biodiversity - originally open woodland; 1.4 km from reliable water in Mandagery Ck.	gently inclined	ESE	clastic sedimentary; some cobbles and gravels	no rock outcrop	low	silty loam	Yes	eroded	wind; precipitation ;	moderate	very low
SU7 (Plate 7)	simple slope	low biodiversity - originally open woodland; 1.6 km from reliable water in Mandagery Ck.	gently inclined	WNW	clastic sedimentary; some gravels	no rock outcrop	low	silty loam	Yes	eroded	wind; precipitation	moderate	very low
SU8 (Plate 8)	crest	low biodiversity - originally open woodland; 0.9 km from reliable water in Mandagery Ck.	very gently inclined	W	clastic sedimentary; some gravels including many rounded pebbles	no rock outcrop	moderate; poor quality	silty loam	Yes	eroded	wind; precipitation ;	moderate	very low

SU	Landform	Environmental context	Slope	Aspect	Geology	Abundance Rock	Quartz Background	Soil	Deposit Potential	Geomoph-ology	Agents	Disturbance Levels	Predicted Artefact Density
SU9 (Plate 9)	open depressio n	low biodiversity - originally open woodland; 0.9 km from reliable water in Mandagery Ck.	very gently inclined	SW	clastic sedimentary; some gravels	no rock outcrop	low	silty loam	Yes	eroded; section mechanically infilled	wind; precipitation	moderate	very low
SU10 (Plate 10)	crest	low biodiversity - originally open woodland; 0.4 km from reliable water in Mandagery Ck.	very gently inclined	open	clastic sedimentary; outcrops and shatter with some cobbles and gravels	very slightly rocky	low	silty loam	Yes	eroded	wind; precipitation	moderate	very low
SU11 (Plate 11)	lower slope	low biodiversity - originally open woodland; 0.8 km from reliable water in Mandagery Ck.	very gently inclined	SW	clastic sedimentary; shatter with some cobbles and gravels	very slightly rocky	low	silty loam/ sand	Yes	eroded	wind; precipitation	moderate	very low
SU12 (Plate 12)	simple slope	low biodiversity - originally open woodland; 0.4 km from reliable water in Mandagery Ck.	very gently inclined	WNW	clastic sedimentary; shatter with some cobbles and gravels	no rock outcrop	low	silty loam	Yes	eroded	wind; precipitation	moderate	very low

Table 2. Survey Unit descriptions.

Plate 1. Survey Unit 1 looking west.

Plate 2. Survey Unit 2 looking east.

Plate 3. Survey Unit 3 looking east with substation fence to the left.

Plate 4. Survey Unit 4 looking west.

Plate 5. Survey Unit 5 looking east.

Plate 6. Survey Unit 6 looking north.

Plate 7. Survey Unit 7 looking southeast.

Plate 8. Survey Unit 8 looking northwest.

Plate 9. Contoured section of Survey Unit 9 looking southwest.

Plate 10. Survey Unit 10 looking southwest.

Plate 11. Survey Unit 11 looking northeast.

Plate 12. Survey Unit 12 looking west.

Survey Coverage

The development area surveyed during this assessment measured approximately 198 hectares (Table 3). It is estimated that approximately 115 hectares of that area was subject to survey inspection. Ground exposures inspected are estimated to have been approximately 22.25 hectares in area. Of that ground exposure area archaeological visibility (the potential artefact bearing soil profile) is estimated to have been 6.65 hectares. Overall Effective Survey Coverage is therefore calculated to have been 3.35 % of the total survey area.

SU	SU Area	Area Inspected %	Area Inspected sq m	Ground Exposure %	Ground Exposure sq m	Visibility %	Net Effective Exposure sq m	Effective Survey Coverage %
SU1	57735	60	34641	15	5196	15	779	1.35
SU2	161722	60	97033	15	14555	25	3639	2.25
SU3	191659	65	124578	15	18687	20	3737	1.95
SU4	235335	60	141201	40	56480	35	19768	8.4
SU5	363609	45	163624	25	40906	30	12272	3.38
SU6	30462	80	24370	35	8529	35	2985	9.8
SU7	172164	60	103298	20	20660	35	7231	4.2
SU8	213990	60	128394	20	25679	35	8988	4.2
SU9	41664	70	29165	15	4375	25	1094	2.63
SU10	361440	60	216864	7	15180	15	2277	0.63
SU11	83102	70	58171	15	8726	35	3054	3.68
SU12	70174	50	35087	10	3509	20	702	1
Total	**1983056**	-	**1156427**	-	**222482**	-	**66526**	**3.35**
Total ha	**198.3**	-	**115.6**	-	**22.25**	-	**6.65**	

Table 3. Survey Coverage Data.

8.2 Aboriginal Object Recordings

The following Aboriginal object locales were recorded during the survey; their location is shown in Figure 4:

Survey Unit 5/Locale 1 659087e 6328047n GDA

Five stone artefacts were recorded in an area of bare earth exposure adjacent to a fence line in the western end of the study area (Plate 13). The broad area measures 50 x 15 m, of which 95% was ground exposure, possessing 70% archaeological visibility. The effective survey coverage is relatively high and given that five artefacts were recorded, with an artefacts density of 1/142 m^2, artefact density is very low.

The recorded artefacts are:

- brown volcanic flake; size class 4 (less than 4 cm in overall dimensions);
- grey chert flake; size class 4;
- black, mottled, volcanic flake; size class 5;
- brown chert flake; size class 3; and
- milky quartz flake; size class 4.

The locale is likely to contain additional artefacts in a subsurface context in very low densities. Given the area and quality of this exposure, the artefact density calculation is considered to be a reasonably accurate reflection of the archaeology of the broader Survey Unit.

No impacts are intended in this western end of the proposal area and accordingly this locale will not be impacted as a result of the development.

Plate 13. Survey Unit 5/Locale 1 looking east.

Survey Unit 9/Locale 1 660720e 6328571n GDA

One stone artefact was recorded in an area of exposure created by ploughing adjacent to a fence line (Plate 14). The exposure has been created by mechanical contouring of the Survey Unit. The broad area measures 30 x 5 m, of which 90% was ground exposure, possessing 75% archaeological visibility. The effective survey coverage is relatively high and given that one artefact only was recorded artefact density is assessed to be very low.

The recorded artefact is a grey chert flake; size class 6 (less than 6 cm in overall dimensions). It should be noted that the artefact is of differing chert material to that which is present as a component of the background geology.

The locale is likely to contain additional artefacts, both in a subsurface context and across the entire Survey Unit, in very low densities and in a disturbed context.

This artefact locale is located within the proposed impact area. It is however very close to the boundary and may not be impacted by the development.

Plate 14. Survey Unit 9/Locale 1 looking west.

8.3 Impact Assessment

Two Aboriginal object locales were recorded during the field survey. The Effective Survey Coverage for the surveyed area is considered to have been more than adequate for the purposes of assessing the archaeological nature of the study area. The area possessed many extensive areas of good ground exposure with reasonable archaeological visibility. These exposures enabled a reasonable characterisation of artefact distribution within the proposal area.

As noted above, the Aboriginal object locales recorded in the proposal area include one isolated stone artefact and one very low density (1/142 m^2) artefact scatter consisting of five stone artefacts; these are assessed to be of low archaeological significance. It should also be noted that the latter lies outside the area of proposed impacts. Undetected or subsurface stone artefacts are assessed to be present in very low density. The Effective Survey Coverage achieved during the survey is considered to have been sufficient to characterise the nature of artefact distribution in the study area. The survey results are therefore assessed to be a relatively accurate reflection of the artefact density in the proposal area. Accordingly, based on the relevant predictive model of site distribution for the area, and the results of the field survey, artefact density in the study area is assessed to be very low. The proposal area is assessed to be of low archaeological potential and significance.

The construction of the Solar Farm will result in physical impacts to any Aboriginal objects which may be located within direct impact areas - irrespective of their archaeological significance. That is, any Aboriginal object situated within an area of direct impact will be comprehensively disturbed, and/or destroyed during construction. As with any development the chances of impacting Aboriginal objects, particularly stone artefacts, is high given that they are present in a continuum across the landscape and located on or within ground surfaces. The Manildra Solar Farm is no exception in this regard and it would be impossible to have a development of this nature without causing direct physical impact. However given that the proposed impacts relating to construction will occupy a small foot print, impacts to the archaeological resource can be considered to be correspondingly low.

Given that the two recorded Aboriginal object locales and the predicted undetected and subsurface artefacts are assessed to be of low significance, the impacts can be viewed as being of correspondingly low significance. This assessment forms the basis for the formulation of recommendations relating to the proposal.

Figure 4. Survey Units and recorded Aboriginal object locales.

9. STATUTORY CONTEXT

The Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act), its regulations, schedules and guidelines provides the context and requirement for environmental impact assessments to be undertaken during land use planning (NPWS 1997).

Part 3A of the Environmental Planning and Assessment Act 1979

On 9 June 2005 the NSW Parliament passed the Environmental Planning and Assessment Amendment (Infrastructure and Other Planning Reform) Bill. The Act was assented to on 16 June 2005 and commenced on 1 August 2005. This amendment contains key elements of the NSW Government's planning system reforms and makes major changes to both plan-making and major development assessment.

A key component of the amendments is the insertion of a new Part 3A (Major Projects) into the EP&A Act. The new Part 3A consolidates the assessment and approval regime for all major developments which previously were addressed under Part 4 (Development Assessment) or Part 5 (Environmental Assessment).

Part 3A applies to all major State government infrastructure projects, developments previously classified as State significant and other projects, plans or programs of works declared by the Minister. The amendments aim to provide a streamlined assessment and approvals regime and also to improve the mechanisms available under the EP&A Act to enforce compliance with approval conditions of the Act.

The current report has been compiled for inclusion within an Environmental Assessment Report.

Under the terms of Part 3A of the Environmental Planning and Assessment Act 1979 the following authorizations are not required for an approved project (and accordingly the provisions of an Act that prohibit an activity without such an authority do not apply):

- a permit under section 87 or a consent under section 90 of the ***National Parks and Wildlife Act 1974;***
- an approval under Part 4, or an excavation permit under section 139, of the ***Heritage Act 1977***.

10. SIGNIFICANCE ASSESSMENT

The information provided in this report and the assessment of significance provides the basis for the proponent to make informed decisions regarding the management and degree of protection which should be undertaken in regard to the Aboriginal objects located within the study area.

10.1 Significance Assessment Criteria

The NPWS (1997) defines significance as relating to the meaning of sites: "meaning is to do with the values people put on things, places, sites, land". The following significance assessment criteria are derived from the relevant aspects of ICOMOS Burra Charter and NSW Department of Urban Affairs and Planning's 'State Heritage Inventory Evaluation Criteria and Management Guidelines'.

Aboriginal archaeological sites are assessed under the following categories of significance:

- cultural value to contemporary Aboriginal people,
- archaeological value,
- aesthetic value,
- representativeness, and
- educational value.

Aboriginal cultural significance
The Aboriginal community will value a place in accordance with a variety of factors including contemporary associations and beliefs and historical relationships. Most heritage evidence is highly valued by Aboriginal people given its symbolic embodiment and physical relationship with their ancestral past.

Archaeological value
The assessment of archaeological value involves determining the potential of a place to provide information which is of value in scientific analysis and the resolution of potential archaeological research questions. Relevant research topics may be defined and addressed within the academy, the context of cultural heritage management or Aboriginal communities. Increasingly, research issues are being constructed with reference to the broader landscape rather than focusing specifically on individual site locales. In order to assess scientific value sites are evaluated in terms of nature of the evidence, whether or not they contain undisturbed artefactual material, occur within a context which enables the testing of certain propositions, are very old or contain significant time depth, contain large artefactual assemblages or material diversity, have unusual characteristics, are of good preservation, or are a part of a larger site complex. Increasingly, a range of site types, including low density artefact distributions, are regarded to be just as important as high density sites for providing research opportunities.

Representativeness
Representative value is the degree to which a "class of sites are conserved and whether the particular site being assessed should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole" (NPWS 1997). Factors defined by NPWS (1997) for assessing sites in terms of representativeness include defining variability, knowing what is already conserved and considering the connectivity of sites.

Educational value
The educational value of cultural heritage is dependent on the potential for interpretation to a general visitor audience, compatible Aboriginal values, a resistant site fabric, and feasible site access and management resources.

Aesthetic value
Aesthetic value relates to aspects of sensory perception. This value is culturally contingent.

10.2 Significance Value of the Aboriginal Objects in the Study Area

The scientific significance of the recorded Aboriginal artefact locales in the project area are listed below in Table 4:

Table 4. Archaeological significance assessment of recorded Aboriginal object locales.

SU	Locale	Artefact Number	Predicted Density	Integrity	Subsurface potential at site	Subsurface potential away from site	Significance	Criteria
SU5	L1	5	very low	moderately disturbed; eroding	Yes	Yes	Low local scientific significance	Common Aboriginal object and site type Low educational value Low aesthetic value Low research potential: predicted very low artefact density in Survey Unit
SU9	L1	1	very low	moderately disturbed; eroding	Yes	Yes	Low local scientific significance	Common Aboriginal object and site type Low educational value Low aesthetic value Low research potential: predicted low artefact density in Survey Unit

11. MITIGATION AND MANAGEMENT STRATEGIES

The aim of this study has been to identify Aboriginal objects and to predict the archaeological potential within each Survey Unit, to assess site significance and thereafter, to consider the potential impact of the proposal upon this heritage.

In the following section a variety of strategies that can be considered for the mitigation and management of development impact to Aboriginal objects and Survey Units (including those without Aboriginal object recordings) are listed and discussed.

11.1 Management and Mitigation Strategies

Further Investigation

The field survey has been focused on recording artefactual material present on visible ground surfaces. Further archaeological investigation would entail subsurface excavation undertaken as test pits for the purposes of identifying the presence of artefact bearing soil deposits and their nature, extent, integrity and significance.

Further archaeological investigation in the form of subsurface test excavation can be appropriate in certain situations. Such situations generally arise when the proposed development is expected to involve ground disturbance in areas which are assessed to have potential to contain high density artefactual material and when the Effective Survey Coverage achieved during a survey of a project area is low due to ground cover, vegetation etc.

No Survey Units have been identified in the proposal area to warrant further archaeological investigation in order to formulate appropriate management and mitigation strategies. Based on a consideration of the predictive model of site type applicable to the environmental context in which impacts are proposed the archaeological potential of the proposed impact areas does not warrant further investigation.

The environmental contexts in which the proposed solar farm is situated are not predicted to contain artefact densities sufficient to warrant test excavation. Furthermore the proposed impacts are not broadscale, but of a nature that will substantially leave intact any archaeological deposit that may be present. It is considered that with regard to the archaeology itself, subsurface testing is unlikely to produce results much different to predictions made in respect of the subsurface potential of these landforms. Accordingly a program of subsurface testing is not considered to be necessary or warranted.

Conservation

Conservation is a suitable management option in any situation however, it is not always feasible to achieve. Such a strategy is generally adopted in relation to sites which are assessed to be of high cultural and scientific significance, but can be adopted in relation to any site type.

In the case at hand, avoidance of impacts (or minimisation of impacts) is considered to be desirable if at all possible. It is noted that SU5/L1 is located well away from proposed impact areas and accordingly is likely to be exempt from impacts.

Mitigated Impacts

Mitigated impact usually takes the form of partial impacts only (ie conservation of part of an Aboriginal artefact locale or Survey Unit) and/or salvage in the form of further research and archaeological analysis prior to impacts. Such a management strategy is generally appropriate when Aboriginal objects are assessed to be of moderate or high significance to the scientific and/or Aboriginal community and when avoidance of impacts and hence full conservation is not

feasible. Salvage can include the surface collection or subsurface excavation of Aboriginal objects and subsequent research and analysis.

It is assessed that the archaeological resource in the proposal area does not surpass significance thresholds which would warrant any form of impact mitigation.

Unmitigated Impacts

Unmitigated impact to Aboriginal objects can be given consideration when they are assessed to be of low archaeological and cultural significance and otherwise in situations where conservation is simply not feasible.

Avoidance of impacts (or minimisation of impacts) in regard to some artefacts locales is considered to be desirable *if at all possible*. However the Aboriginal object locales identified have been assessed to be of low archaeological significance. Given the nature and artefact density of the artefact locales recorded in the proposal area and the low scientific significance rating they been accorded, if impacts are proposed, unmitigated impact is appropriate.

Proposed management and mitigation strategies

The table below summarises the management and mitigation strategies considered to be relevant to proposal area. Management and mitigation strategies are addressed in relation to all Survey Units recorded during the study (noting that most Survey Units do not contain Aboriginal object locales) and also for individual locales located within each Survey Unit. The recommended management strategy listed for each Survey Unit (as highlighted in table) and Aboriginal object locale is selected from the various management options as discussed above. Finally the rationale behind each recommendation is outlined, taking into consideration the nature of the Aboriginal object and its archaeological significance rating.

The Aboriginal object locales recorded in the proposal area do not surpass scientific significance thresholds which would act to preclude the construction of the proposed solar farm. Based on a consideration of the predictive model applicable to the environmental context in which impacts are proposed, and the results of the study, it is concluded that the proposed impact area does not warrant further investigation such as subsurface test excavation. The environmental context in which the impacts are proposed is predicted to contain a very low artefact density throughout. It is considered that subsurface testing is unlikely to produce results different to predictions made in respect of the archaeological potential of the landform in question.

Given the nature of the artefact locales recorded in the proposal area and the low scientific significance rating they have been accorded, unmitigated impacts is considered appropriate if necessary; a strategy of impact avoidance is not warranted in regard to these locales.

Table 5. Recommended management strategies relating to Survey Units (as highlighted in left column) and Aboriginal object locales in the proposal area.

SU	Locale	Artefact density (predicted and as per analysis of ESC)	Impacts	Significance	Recommended management strategy	Rationale
SU1	Nil recordings	very low	Solar panel modules; transformers; gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU2	Nil recordings	very low	Solar panel modules; transformers; temporary laydown area;	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.

SU	Locale	Artefact density (predicted and as per analysis of ESC)	Impacts	Significance	Recommended management strategy	Rationale
			gravel road; boundary fence			
SU3	Nil recordings	very low	Construction site office and control room; cable trench; solar panel modules; transformers; laydown area; gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU4	Nil recordings	very low	Solar panel modules; transformers; temporary laydown area; gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU5	-	very low	Solar panel modules; cable trench; transformers; temporary laydown area; gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU5	L1	very low	NIL	Low local scientific significance	**n/a located outside impact area**	n/a however: Very low density artefact distribution. Archaeological significance assessed to be low.
SU6	Nil recordings	very low	Existing construction road	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU7	Nil recordings	very low	Solar panel modules; transformers; temporary laydown area; gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU8	Nil recordings	very low	Solar panel modules; cable trench; transformers; laydown area; gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU9	-	very low	Solar panel modules; cable trench; gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU9	L1	low	Solar panel modules	Low local scientific significance	No constraints to impacts in locale **Unmitigated impacts**	Very low density artefact distribution. Archaeological significance assessed to be low.
SU10	Nil recordings	very low	Solar panel modules; cable trench; transformers; laydown area; gravel road;	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.

SU	Locale	Artefact density (predicted and as per analysis of ESC)	Impacts	Significance	Recommended management strategy	Rationale
			boundary fence			
SU11	-	very low	Solar panel modules; transformers; cable trench; gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.
SU12	Nil recordings	very low	Gravel road; boundary fence	n/a	No constraints to impacts in SU **Unmitigated impacts**	Predicted very low density artefact distribution.

12. RECOMMENDATIONS

The following recommendations are made on the basis of:

- A consideration of the Part 3A amendment to the Environmental Planning and Assessment Act (see Section 9 Statutory Information).

- The results of the investigation as documented in this report.

- Consideration of the type of development proposed and the limited nature of proposed impacts.

Management and mitigation strategies are outlined and justified in Section 11 of this report. The following recommendations are provided in summary form:

- Management and mitigation recommendations are listed in respect of each Survey Unit and Aboriginal object locale in Section 11 of this report.

- No Survey Units have been identified in the proposal area to warrant further archaeological investigation such as subsurface test excavation.

- The recorded Aboriginal object locales and the predicted very low density subsurface artefact distribution in the proposal area does not surpass archaeological significance thresholds which would act to preclude proposed impacts. Accordingly there are no identified Indigenous archaeological constraints to the proposal.

- The recorded Aboriginal object locales are assessed to be representative of very low density distributions of stone artefacts. The archaeological significance of these locales is assessed to be low. Accordingly unmitigated impact is considered to be appropriate if necessary. It is noted however that artefact scatter SU5/L1 is located outside the proposed impact area and will not be impacted during construction.

- There are no identified Indigenous archaeological and heritage constraints relating to the proposal.

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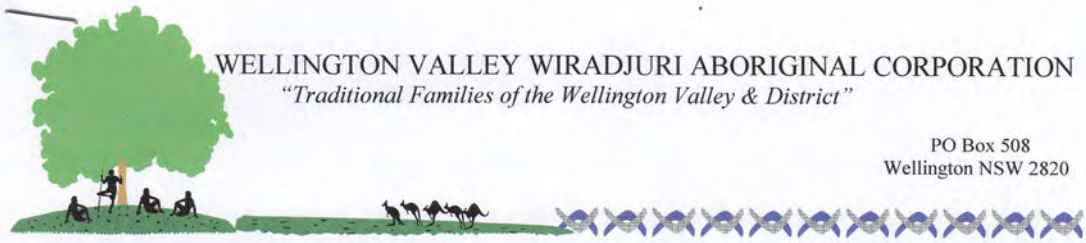
Appendix 1
Written communication received from the Wellington Valley Wiradjuri Aboriginal Corporation



WELLINGTON VALLEY WIRADJURI ABORIGINAL CORPORATION
"Traditional Families of the Wellington Valley & District"

PO Box 508
Wellington NSW 2820

New South Wales Archaeology Pty Limited
PO Box 2135
Central Tilba, NSW, 2546
Attention Andrew Pearce

24/9/10

Re: Proposed Manildra Photovoltaic Solar Farm

Dear Andrew

We have received a draft copy of the Archaeological and Cultural Heritage Assessment report for the proposed Manildra Photovoltaic Solar Farm dated September 2010. The arrival of the draft report is of major concern to our organization and we seek further explanation from New South Wales Archaeology Pty Limited regarding the processes followed, particularly the basis for the exclusion of representatives from the relevant (and only) registered Native Title Claim Group (Wellington Valley Wiradjuri ("WVW")) claimants from participation when compiling the draft report.

As detailed in Section 3, Partnership with Aboriginal Community, we note that the project is a Part 3A Major Project and conducted in accordance with the NSW DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRP) (NSW DECCW 2010).

We attach a copy of the following:

1. Letter from New South Wales Archaeology Pty Limited dated 2/7/10 inviting Gallanggabang Aboriginal Corporation to register our interest, closing 16/7/10

2. Our response from Mr. Stephen Parkes a Director of Wellington Valley Wiradjuri Aboriginal Corporation dated 8/7/10 detailing our relationship with Gallanggabang, our native title registration, confirmation of our apical ancestry, cultural knowledge and registering our interest in the project.

Unfortunately this was the end of the consultation process with our organization, as far as we are aware, until receipt of your draft report. We believe the DECCW consultative process is meant to **afford an opportunity for Aboriginal people who hold cultural knowledge** to provide such knowledge. However, the process that appears to have been followed in this matter falls far short of meeting obligations under the ACHCRP guidelines and Part 3A obligations. We advise we will be lodging objections with both the Department of Planning and DECCW to the draft report

Our native title claim registration provides confirmation that our Wellington Valley Wiradjuri ("WVW") claimants have met the rigid guidelines as required by the National Native Title Tribunal pursuant to the Native Title Act (Cwlth), prior to the further consideration of the WVW native title

WELLINGTON VALLEY WIRADJURI ABORIGINAL CORPORATION
"Traditional Families of the Wellington Valley & District"

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Wellington NSW 2820

claim by the Federal Court of Australia. The ability of proponents to ignore the knowledge of original owners in their country also highlights the inadequacies of the current ACHCRP policy for those claimants who have retained their cultural knowledge.

Feel free to contact either Stephen on 0417742714 or myself on 0411060731, if required

Yours sincerely

John Riley
Director WVWAC

WELLINGTON VALLEY WIRADJURI ABORIGINAL CORPORATION
"Traditional Families of the Wellington Valley & District"

PO Box 508
Wellington NSW 2820

New South Wales Archaeology Pty Limited
PO Box 2135
Central Tilba, NSW, 2546
Attention Andrew Pearce

4/10/10

Re: Proposed Manildra Photovoltaic Solar Farm

Dear Andrew

We acknowledge receipt of your correspondence dated 30/9/10 and provide the following comment.

As detailed in our previous letter to New South Wales Archaeology Pty Limited and reconfirmed in our telephone conversation our objection is based on the flawed process adopted by NSWAPL. The deficiency is your failure to **afford an opportunity for Aboriginal people who hold cultural knowledge** to provide such knowledge during the survey process.

We believe your recent offer to attend site and review the information of a survey completed by others is inconclusive, counter productive and is not acceptable as a means of remedy to our exclusion. As such, the only comment we wish to offer regarding your draft report is a comment to assist you, is that it does not meet the standards acceptable to WVWAC.

Should NSWAPL wish to engage WVWAC to participate in a subsequent survey, we will forward our standard commercial agreement for your review.

Please advise at your earliest opportunity as we have deferred our official letter of objection to the Department of Planning, pending the resolution of an agreeable outcome. We will seek further advice regarding our position and brief our legal representatives on the 5/10/10, whilst in Sydney

Feel free to contact either Stephen on 0417742714 or myself on 0411060731, if required

Yours sincerely

John Riley
Director WVWAC