TERRAIN SOLAR

Claire Golder
Town Planner/Strategic Projects Officer
Temora Shire Council

Via: Email
Date: 10th October 2018

Dear Claire,

**Southern Joint Regional Planning Panel – Request for Further Information #2**

Terrain Solar received a request for further information (RFI), from the Southern Joint Regional Planning Panel (SJRPP) dated 31 August 2018. Terrain Solar have now responded to the RFI, with a package that includes:

1. A ***Site Design and Ground Cover Assessment*** that addresses the initial two requests from the SJRPP.

2. An addendum to the ***Visual Impact Assessment*** that includes:
    a. A photomontage component
    b. Updates to the Landscape Plan to include canopy trees and screening.

3. Updated ***Solar Farm Plans*** that include:
    a. Tracker spacing of 5m as committed to in the *Site Design and Ground Cover Assessment*
    b. A 10m vegetation buffer

Please feel free to contact me at any time if you have any questions on the supplied material.

Kind Regards,

Simon Ingram
Managing Director – Terrain Solar P/L

TERRAIN SOLAR

# JUNEE SOLAR FARM

## SITE DESIGN AND GROUND COVER ASSESSMENT

### INTRODUCTION

The purpose of this Assessment is to provide a response to the first two reasons for deferral of the Junee Solar Farm. The Southern Joint Regional Planning Panel (SJRPP) requested that Terrain Solar provide:

- Details in metres of the actual spacing between panels at the Mt. Majura solar farm, (which is used as evidence of appropriate ground cover), and similar details for a comparable (to Marinna) solar farm site.

- Details of the condition of ground cover over an extended period at the Mt. Majura site and any other comparable site (with single axis solar cells in similar layout and similar soil and climate to the proposed arrangement at Marinna). Details to demonstrate how ground cover condition has been monitored and managed over time to maintain cover and manage weeds and fire risk.

In providing a response to these requests, Terrain Solar assessed operational solar farms within the same climate that shared the same soil type and site design characteristics. Adopting this approach, it was determined that the Manildra Solar Farm, located in the central west region of NSW, was the most comparable solar farm site to the proposed Junee Solar Farm, due to the shared characteristics in land and soil capability[1], climate[2] and site design.

The Mount Majura was site was referenced in a previous letter to the SJRPP to visualise the grass condition beneath the panels of the Mt Majura Solar Farm. Whilst this ground cover is in good condition, considering the Mt Majura site is in a different climate zone, the focus of the assessment is on the comparison of the Manildra Solar Farm to the proposed Junee Solar Farm.

Section one of this of this report will addresses the spacing between panels at the Manildra Solar farm. This will include an assessment of how the proposed Junee Solar Farm compares to this site at a technical level.

Section two of the report will examine the current condition of the ground cover at the Manildra solar farm site in NSW and provide reports on how this ground cover is being managed including an assessment of how fire risk is managed.

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[1] The Junee Solar farm site and the Manildra solar farm site both are dominantly Class 3 land based on the Land and Soil Capability Assessment Scheme (NSW): https://www.environment.nsw.gov.au/soils/20120394lsc2spubslandingpage.htm.

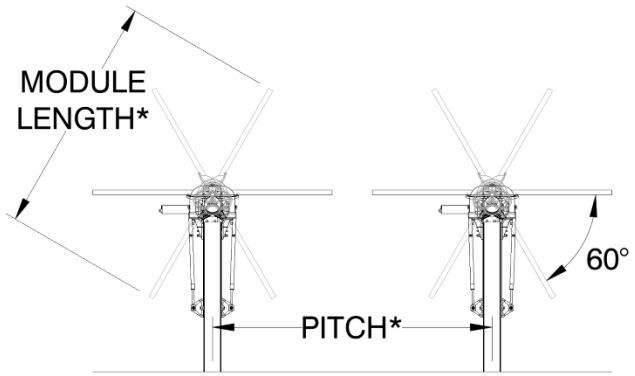
[2] The Junee Solar farm site and the Manildra solar farm site both exist in the temperate Climate as defined by the Bureau of Meteorology Climate Classification of Australia (Koppen – Major Classes) and Climate Zone 4 as defined by the Australian Building Codes Board Climate Zones: http://www.abcb.gov.au/RESOURCES/TOOLS-CALCULATORS/CLIMATE-ZONE-MAP-AUSTRALIA-WIDE.

## SECTION 1: TECHNICAL ASSESSMENT OF TRACKER AND PANEL SPACING.

There are four key design elements that are relevant to providing information on the panel spacing for the Junee Solar Farm. These are the tracker spacing, the width of the panels that sit on the trackers, the resulting ground cover ratio and ground sunlight percentage. The definitions of these four elements are as follows:

- Tracker Spacing (also known as Pitch): The distance between each tracker row (see image 1).
- Module Length: The length of the panels that sit on each tracker (see image 1)
- Ground Cover Ratio (GCR): The portion of the solar farm array that is covered with solar panels. This is calculated by dividing the panel area by the total area occupied by the solar system. This is determined by dividing the module length by the Pitch.
- Ground Sunlight Percentage: The modelled percentage of incoming sunlight that the ground receives underneath the solar farm based on a specific solar farm design.

**Image 1: Tracker Spacing (Pitch) & Module Length.**




### 1.1 Tracker Spacing and module length

In examining the technical details Manildra Solar Farms, tracker separation was first determined. As there is no publicly available data for this site, tracker spacing was determined via using ImageJ software. ImageJ is an image processing program developed at the National Institute of Health and the Laboratory for Optical and Computational Instrumentation (University of Wisconsin). The software can measure distances in imagery and is commonly used for scientific measurement applications. A cross section photograph from Manildra was calibrated in ImageJ and the measurements can be seen in images 2, 3 and 4. As determined by ImageJ, the tracker spacing at Manildra is 6 metres (noting that the total module length is 2.5m).

Having determind these measurements the Manildra Solar Farm was then compared to the Junee Solar Farm at both a 4.5m tracker separation and 5m tracker separation (noting that the module length for Junee is 2m).

**Image 2 : Manildra Solar Farm| Panel Calibration #1**


**Image 3 : Manildra Solar Farm| Panel Calibration #2**

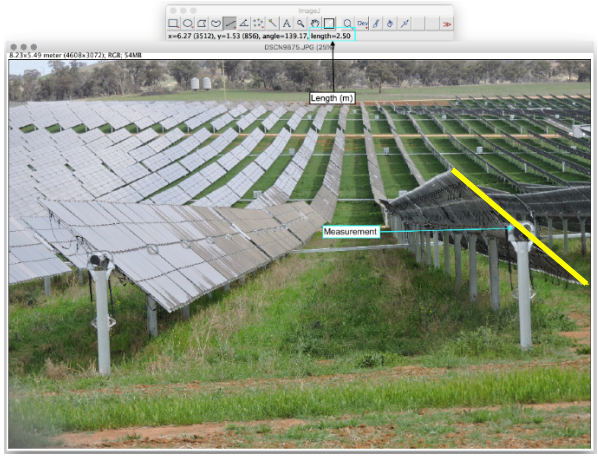



**Image 3: Manildra Solar Farm | Pitch Measurement**

### 2.1.2 Light Assessment

To determine the amount of light reaching the surface of the ground, each solar farm was then modelled in PVsyst, a software package used for the study, sizing, simulation and data analysis of complete Solar Photovoltaic systems. PVsyst determines a solar farm's energy output based on access to sunlight and solar farm design, which includes consideration of shading effects on modules to a level of certainty that inform financing decisions. As such, it is widely regarded as the standard for bankable projections of utility-scale solar farms.

Considering PVsyst's ability to examine light and shading, the software was used to examine the amount of incoming sunlight that reaches the surface of the ground under the various solar farm designs.

A model was created for the Manildra Solar farm as well as the proposed Junee Solar Farm with 4.5m & 5m tracker separation.

PVsyst was also used to create a sunlight model for the Junee solar farm (4.5m pitch) to show how direct light is distributed across the ground throughout the day. This has been included in Annexure 1 with the ground sunlight model outputs included in Annexure 2.

As seen in Table 1 below, the Junee Solar Farm sunlight model, with a tracker spacing of 5m, shows a slightly higher amount of sunlight reaching the ground (63%) than the Manildra sunlight Model (62.4%). The Junee Solar Farm sunlight model, with a spacing of 4.5m, has a slightly smaller amount of sunlight reaching the ground (61.3%) than the Manildra sunlight model.

**Table 1: Ground Sunlight Light Results**

| Item | Manildra Solar Farm | Junee Solar Farm (5m) | Junee Solar Farm (4.5m) |
|---|---|---|---|
| Shading on Trackers and Ground (%) | 39.8 | 39.2 | 41 |
| Shading on Trackers only (%) | 2.2 | 2.2 | 2.3 |
| Shading on Ground only (%) | 37.6 | 37 | 38.7 |
| incoming light reaching the ground (% of incoming light) | 62.4 | 63 | 61.3 |

### 2.1.3 Technical Comparison

The table below compares the three solar farm designs with reference to Tracker Separation, Module Length, GCR and Ground Sunlight.

It is determined that whilst Manildra's tracker separation is greater than the Junee Solar Farm tracker separatons, due to the panel sizing, the Junee 5m solar farm has a lower GCR and a higher amount of sunlight reaching the ground. The Junee 4.5m tracker separation has a higher GCR and lower amount of ground sunlight when compared to Manildra.

**Table 2: Technical Comparison of Junee Solar Farm to Manildra Solar Farm**

| Item | Manildra Solar Farm | Junee Solar Farm (5m) | Junee Solar Farm (4.5m) |
|---|---|---|---|
| **Tracker Separation (m)** | 6 | 5 | 4.5 |
| **Module Length (m)** | 2.5 | 2 | 2 |
| **GCR (%)** | 42% | 40% | 44% |
| **Ground Sunlight (%)** | 62.4 | 63 | 61.3 |

## SECTION 2: GROUNDCOVER CONDITION AND MANAGEMENT

This section addresses the request to provide details of the condition of groundcover on a comparable site to the Junee Solar Farm as well details on how ground cover condition has been monitored and managed over time to maintain cover and manage weeds and fire risk.

### 2.1 Ground Cover Condition

In providing evidence of the current ground cover condition of the Manildra Solar Farm, a photo survey was undertaken on the 22/09/2018.

As detailed in Section 1 of this report, Manildra receives very similar ground sunlight to the Junee Solar Farm (and slightly less than the Junee design at 5m tracker separations). It was evident from the photo survey that the ground cover is in good condition and is thriving even during a drought declared period with winter frosts.

Image Set 1 shows photos that provide the evidence of ground condition as at 22 September 2018.

**Image Set 1 : Manildra Solar Farm Ground Cover:**

**2.2 Ground Cover Management and Fire Risk Management**

In providing details to demonstrate how ground cover condition has been monitored and managed over time to maintain cover, manage weeds and manage fire risk, the Operations Environmental Management plan (OEMP) for the Manildra Solar Farm has been included in Annexure 3. The OEMP was developed after development consent had been granted and was approved by the Department of Planning and Environment prior to the commencement of the Operations of the Manildra Solar Farm.

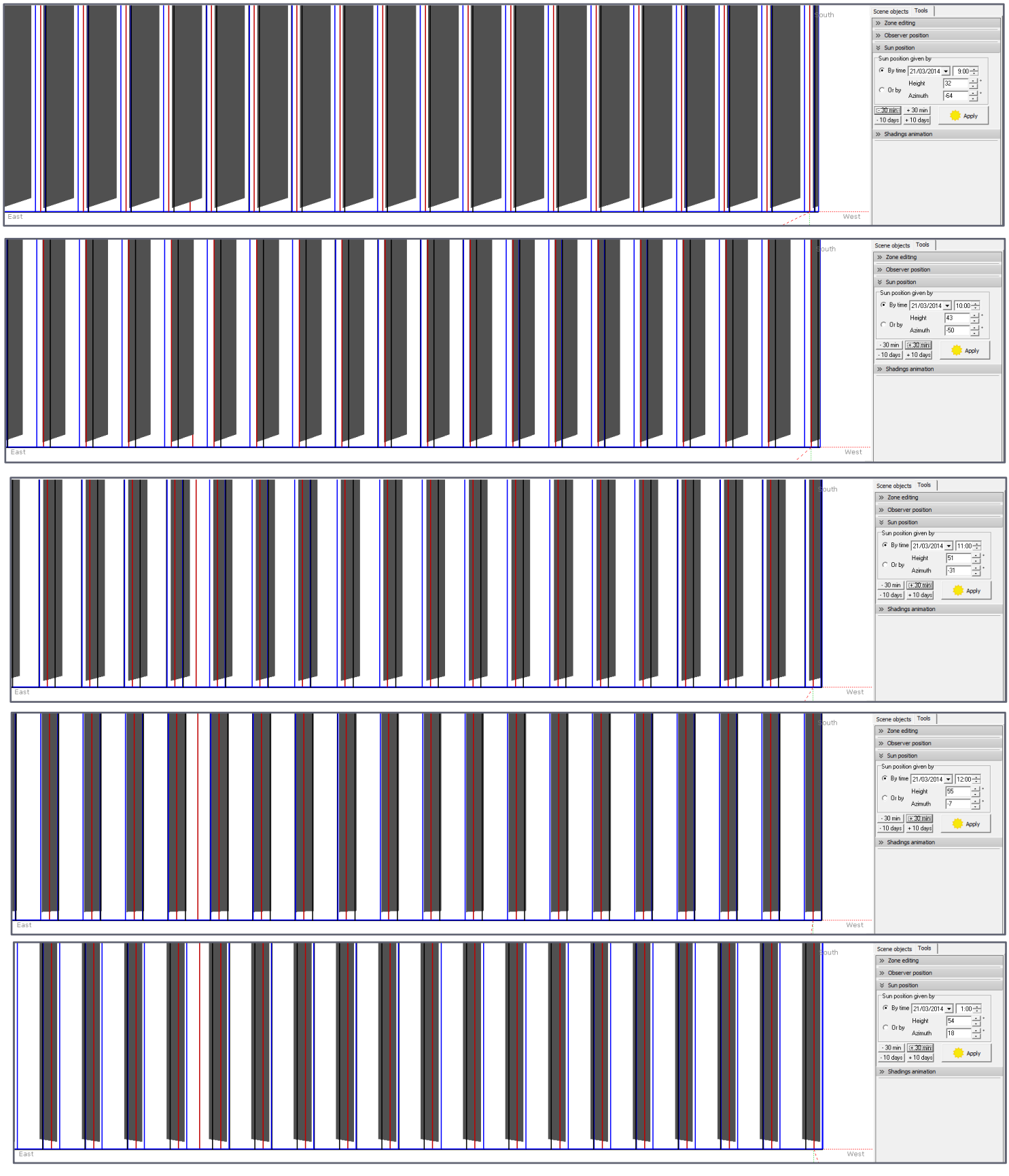
## CONCLUSION

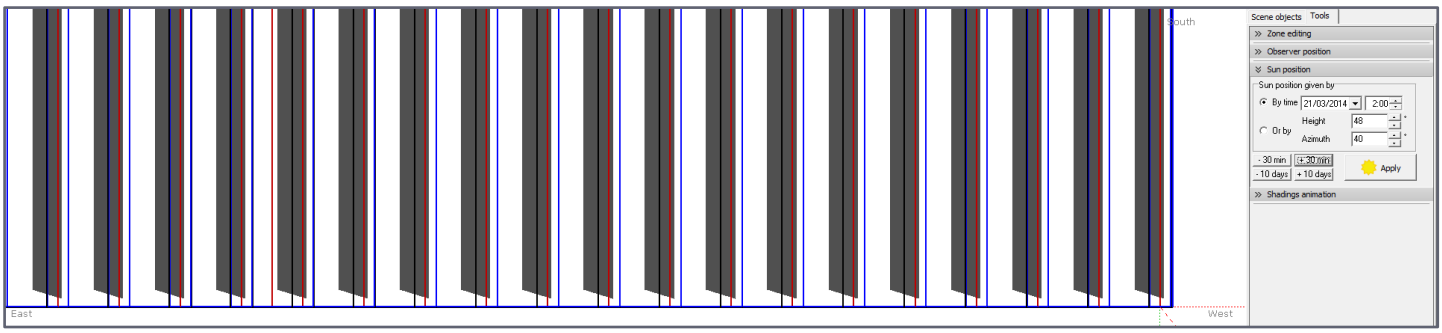
As detailed in this report, the proposed Junee Solar Farm shares similar, climatic, land & soil capability type, and site design characteristics to the operational Manildra Solar Farm in NSW. The groundcover in Manildra is in good condition and has prospered throughout one of the driest climate events in recent history.

Considering the Junee Solar farm, at a 5m tracker spacing, has a more favourable ground cover ratio and enables slightly more sunlight to reach the ground than the Manildra Solar Farm, Terrain Solar have amended the plans for the Junee Solar Farm to require at least 5m tracker spacing.

## ANNEXURE 1: SOLAR FARM LIGHT DISTRIBUTION

This shading assessment shows the direct light moving across the ground on the for the Junee Solar Farm at a 4.5m tracker spacing. The hours in the model are from 9am – 4pm on the 21st of March 2014. The dark bands are the shadows created by the panels and the white strips are the sunlight moving across ground throughout the day.

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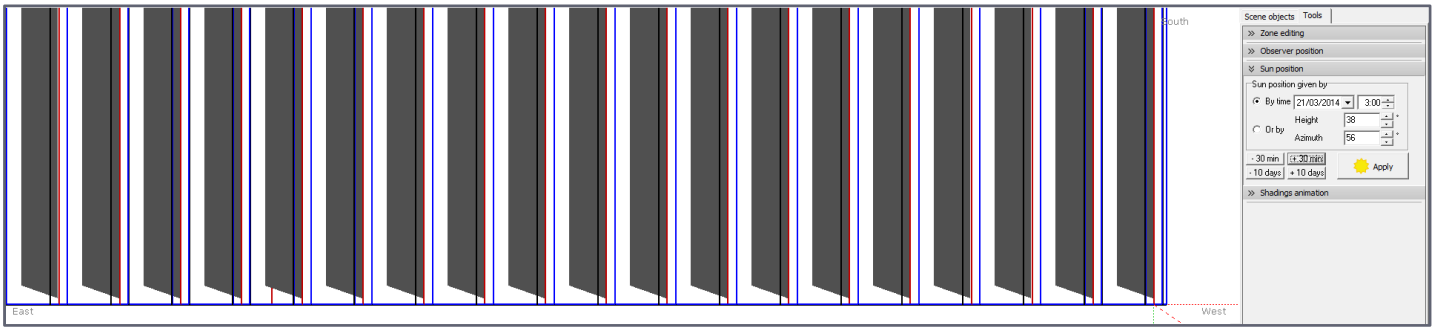
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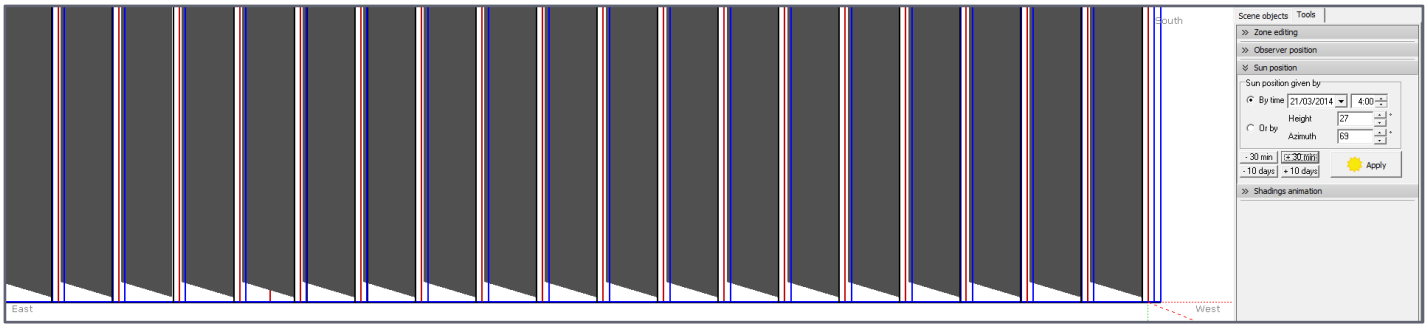
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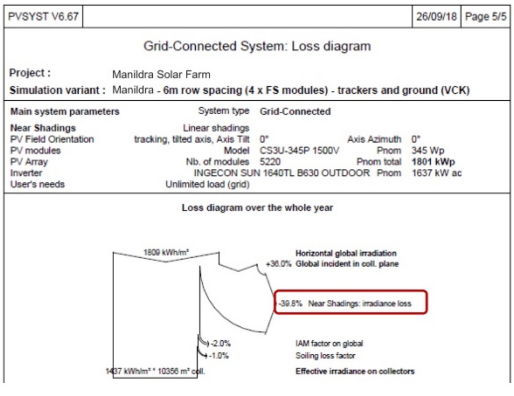
Shadings animation

## ANNEXURE 2: GROUND LIGHT MODEL | PVSYST RESULTS

### 1. Manildra Solar Farm Model Results:



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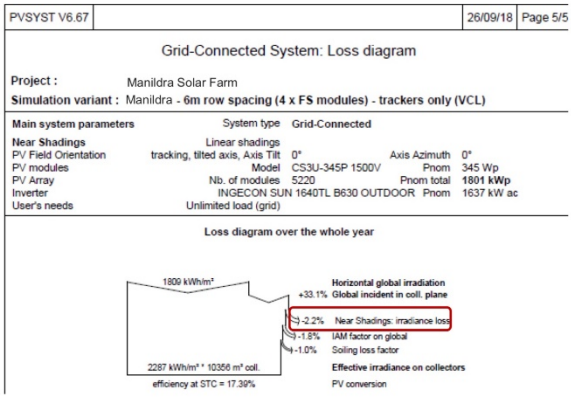
Grid-Connected System: Loss diagram

**Project :** Manildra Solar Farm
**Simulation variant :** Manildra - **6m row spacing (4 x FS modules) - trackers and ground (VCK)**

| **Main system parameters** | System type | Grid-Connected | | |
|---|---|---|---|---|
| **Near Shadings** | Linear shadings | | | |
| PV Field Orientation | tracking, tilted axis, Axis Tilt | 0° | Axis Azimuth | 0° |
| PV modules | Model | CS3U-345P 1500V | Pnom | 345 Wp |
| PV Array | Nb. of modules | 5220 | Pnom total | **1801 kWp** |
| Inverter | INGECON SUN 1640TL B630 OUTDOOR | | Pnom | 1637 kW ac |
| User's needs | Unlimited load (grid) | | | |

**Loss diagram over the whole year**





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Grid-Connected System: Loss diagram

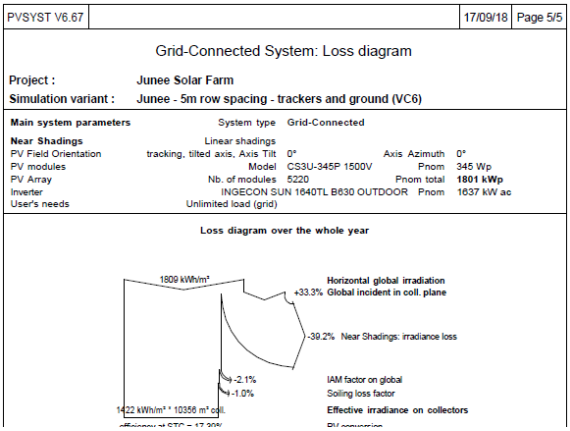
**Project :** Manildra Solar Farm
**Simulation variant :** Manildra - **6m row spacing (4 x FS modules) - trackers only (VCL)**

| **Main system parameters** | System type | Grid-Connected | | |
|---|---|---|---|---|
| **Near Shadings** | Linear shadings | | | |
| PV Field Orientation | tracking, tilted axis, Axis Tilt | 0° | Axis Azimuth | 0° |
| PV modules | Model | CS3U-345P 1500V | Pnom | 345 Wp |
| PV Array | Nb. of modules | 5220 | Pnom total | **1801 kWp** |
| Inverter | INGECON SUN 1640TL B630 OUTDOOR | | Pnom | 1637 kW ac |
| User's needs | Unlimited load (grid) | | | |

**Loss diagram over the whole year**



### 2. Junee Solar Farm Model Results (5m Tracker Spacing)



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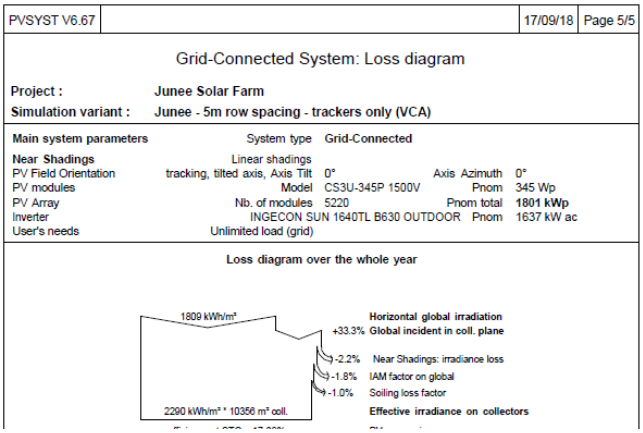
Grid-Connected System: Loss diagram

**Project :** Junee Solar Farm
**Simulation variant :** Junee - 5m row spacing - trackers and ground (VC6)

| **Main system parameters** | System type | Grid-Connected | | |
|---|---|---|---|---|
| **Near Shadings** | Linear shadings | | | |
| PV Field Orientation | tracking, tilted axis, Axis Tilt | 0° | Axis Azimuth | 0° |
| PV modules | Model | CS3U-345P 1500V | Pnom | 345 Wp |
| PV Array | Nb. of modules | 5220 | Pnom total | **1801 kWp** |
| Inverter | INGECON SUN 1640TL B630 OUTDOOR | | Pnom | 1637 kW ac |
| User's needs | Unlimited load (grid) | | | |

**Loss diagram over the whole year**





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Grid-Connected System: Loss diagram

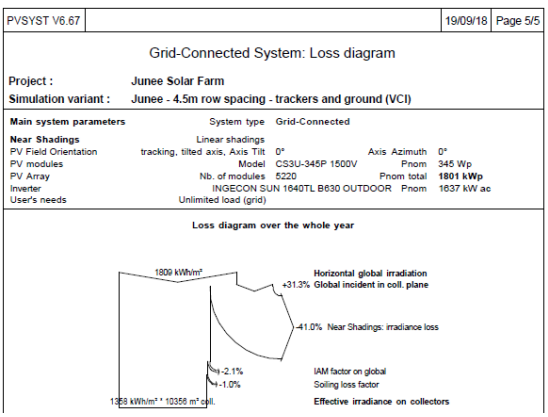
**Project :** Junee Solar Farm
**Simulation variant :** Junee - 5m row spacing - trackers only (VCA)

| **Main system parameters** | System type | Grid-Connected | | |
|---|---|---|---|---|
| **Near Shadings** | Linear shadings | | | |
| PV Field Orientation | tracking, tilted axis, Axis Tilt | 0° | Axis Azimuth | 0° |
| PV modules | Model | CS3U-345P 1500V | Pnom | 345 Wp |
| PV Array | Nb. of modules | 5220 | Pnom total | **1801 kWp** |
| Inverter | INGECON SUN 1640TL B630 OUTDOOR | | Pnom | 1637 kW ac |
| User's needs | Unlimited load (grid) | | | |

**Loss diagram over the whole year**



### 3. Junee Solar Farm Model Results (4.5m Tracker Spacing)



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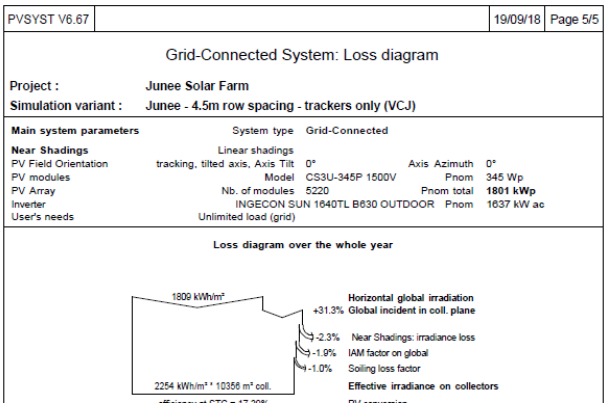
Grid-Connected System: Loss diagram

**Project :** Junee Solar Farm
**Simulation variant :** Junee - 4.5m row spacing - trackers and ground (VCI)

| **Main system parameters** | System type | Grid-Connected | | |
|---|---|---|---|---|
| **Near Shadings** | Linear shadings | | | |
| PV Field Orientation | tracking, tilted axis, Axis Tilt | 0° | Axis Azimuth | 0° |
| PV modules | Model | CS3U-345P 1500V | Pnom | 345 Wp |
| PV Array | Nb. of modules | 5220 | Pnom total | **1801 kWp** |
| Inverter | INGECON SUN 1640TL B630 OUTDOOR | | Pnom | 1637 kW ac |
| User's needs | Unlimited load (grid) | | | |

**Loss diagram over the whole year**





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Grid-Connected System: Loss diagram

**Project :** Junee Solar Farm
**Simulation variant :** Junee - 4.5m row spacing - trackers only (VCJ)

| **Main system parameters** | System type | Grid-Connected | | |
|---|---|---|---|---|
| **Near Shadings** | Linear shadings | | | |
| PV Field Orientation | tracking, tilted axis, Axis Tilt | 0° | Axis Azimuth | 0° |
| PV modules | Model | CS3U-345P 1500V | Pnom | 345 Wp |
| PV Array | Nb. of modules | 5220 | Pnom total | **1801 kWp** |
| Inverter | INGECON SUN 1640TL B630 OUTDOOR | | Pnom | 1637 kW ac |
| User's needs | Unlimited load (grid) | | | |

**Loss diagram over the whole year**

# ANNEXURE 3: MANILDRA SOLAR FARM
# OPERATIONS ENVIRONMENTAL MANAGEMENT PLAN

# MANILDRA SOLAR FARM

## OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN

PREPARED FOR:

RCR INFRASTRUCTURE

PREPARED BY:

JULY 2018

| | |
|---|---|
| ***Report Title:*** | *Manildra Solar Farm* |
| ***Project:*** | *Operational Environmental Management Plan* |
| ***Client:*** | *RCR Infrastructure* |
| ***Report Ref.:*** | *217136_OEMP_001B.docx* |
| ***Status:*** | *Final* |
| ***Issued:*** | *3 July 2018* |

Geolyse Pty Ltd and the authors responsible for the preparation and compilation of this report declare that we do not have, nor expect to have a beneficial interest in the study area of this project and will not benefit from any of the recommendations outlined in this report.

The preparation of this report has been in accordance with the project brief provided by the client and has relied upon the information, data and results provided or collected from the sources and under the conditions outlined in the report.

All information contained within this report is prepared for the exclusive use of RCR Infrastructure and First Solar (Australia) Pty Ltd to accompany this report for the land described herein and are not to be used for any other purpose or by any other person or entity. No reliance should be placed on the information contained in this report for any purposes apart from those stated therein.

Geolyse Pty Ltd accepts no responsibility for any loss, damage suffered or inconveniences arising from, any person or entity using the plans or information in this study for purposes other than those stated above.

## *Revision History*

| Version | Date | Reason | Approved |
|---|---|---|---|
| W. Draft (V1) | 14/5/18 | Working Draft – RCR Review | Geolyse |
| Draft (V1) | 14/5/18 | Draft – First Solar Review | RCR |
| Draft (V2) | 18/5/18 | Incorporating Department of Industry Land and Water and Cabonne Council comments on draft, including evidence of consultation, and expanding on compliance tracking program. | FSA |
| Draft (V3) | 2/7/18 | For DPE approval | FSA |
| Final (Rev0) | 3/7/18 | For DPE Approval | FSA |

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# APPENDICES

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*Conditions of Approval*

**APPENDIX B**
*Statements of Commitment*

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# Abbreviations

| | |
|---|---|
| APZ | Asset Protection Zone |
| BOS | Biodiversity Offset Strategy |
| CC | Cabonne Council |
| CEMP | Construction Environmental Management Plan |
| CEP | Community Engagement Plan |
| CoA | Condition of Approval |
| DILW | Department of Industry – Land and Water |
| DMP | Decommissioning Management Plan |
| DPE | Department of Planning and Environment |
| DPI | Department of Primary Industries |
| EA | Environmental Assessment |
| EEC | Endangered Ecological Community |
| EMS | Environmental Management System |
| EPA | Environment Protection Authority |
| EPC | Engineering, Procurement and Construction |
| EPL | Environment Protection Licence |
| ER | Environmental Representative |
| ETL | Electricity Transmission Line |
| ESCP | Erosion and Sediment Control Plan |
| FFMP | Flora and Fauna Management Plan |
| FSOC | First Solar Operations Centre |
| GCMP | Groundcover Management Plan |
| kL | Kilolitre |
| kV | Kilovolt |
| MSF | Manildra Solar Farm |
| MSFPL | Manildra Solar Farm Pty Ltd |
| MW | Megawatt |
| NOW | NSW Office of Water |
| NPfI | Noise Policy for Industry |
| OEH | Office of Environment and Heritage |
| OEMP | Operational Environmental Management Plan |
| OP | Offset Plan |
| PCS | Power Conversion Stations |
| PVIS | Photovoltaic Combining Switchgear |
| RAP | Registered Aboriginal Parties |
| RCRI | RCRI |
| RFS | Rural Fire Service |
| SoC | Statement of Commitments |
| SDS | Safety Data Sheets |
| SWMP | Soil and Water Management Plan |
| VIVR | Visual Impact Verification Report |
| WIRES | NSW Wildlife Information, Rescue and Education Service |

# Introduction

## 1.1 APPROVED PROJECT

The Manildra Solar Farm (MSF) was initially granted development consent on 3 March 2011 and subsequently modified by Minister's approval on 25 March 2015 and again 31 August 2015.

## 1.2 AS-BUILT FARM

As-built the MSF contains ten arrays and has a generation capacity of 46.7 $MW_{AC}$.

Each array contains strings of photovoltaic (PV) modules connected in parallel and fed into ten Power Conversion Station (PCS) that convert the DC power into 11 kV AC power. Two Photovoltaic Combining Switchgear (PVIS) lineups collect the electrical power from the PCSs. Connection to the grid is via underground cabling from the MSF's substation into Essential Energy's Manildra substation located on-site. The farm is accessed from Packham Drive and provides internal roads, a maintenance building with amenities and security fencing around the site.

The as-built layout is shown on **Figure 1**.

## 1.3 OWNER

MSF is owned by Manildra Asset Trust Manildra Solar Farm (MATSF).

## 1.4 OPERATOR

First Solar (Australia) Pty Ltd (FSA) is engaged by the MSF owner to provide maintenance works under a Maintenance Services Agreement.

## 1.5 PLAN FUNCTION

This Operational Environmental Management Plan (OEMP) has been prepared to satisfy a Condition of Approval (CoA). Specifically CoA E2 requires that:

> *The Plan shall be submitted for the approval of the Secretary no later than one month prior to the commencement of Operation of the project or within such period as otherwise agreed by the Secretary. Operation shall not commence until written approval has been received from the Secretary. Upon receipt of the Secretary's approval, the Proponent shall make the Plan publicly available as soon as practicable.*

For clarification, pursuant to definitions in the Department of Planning and Environment's (DPE) Project Approval (MP10_0122) operation is defined as:

> *Any activity which results in the production of electricity for contribution to the electricity grid, but does not include commissioning.*

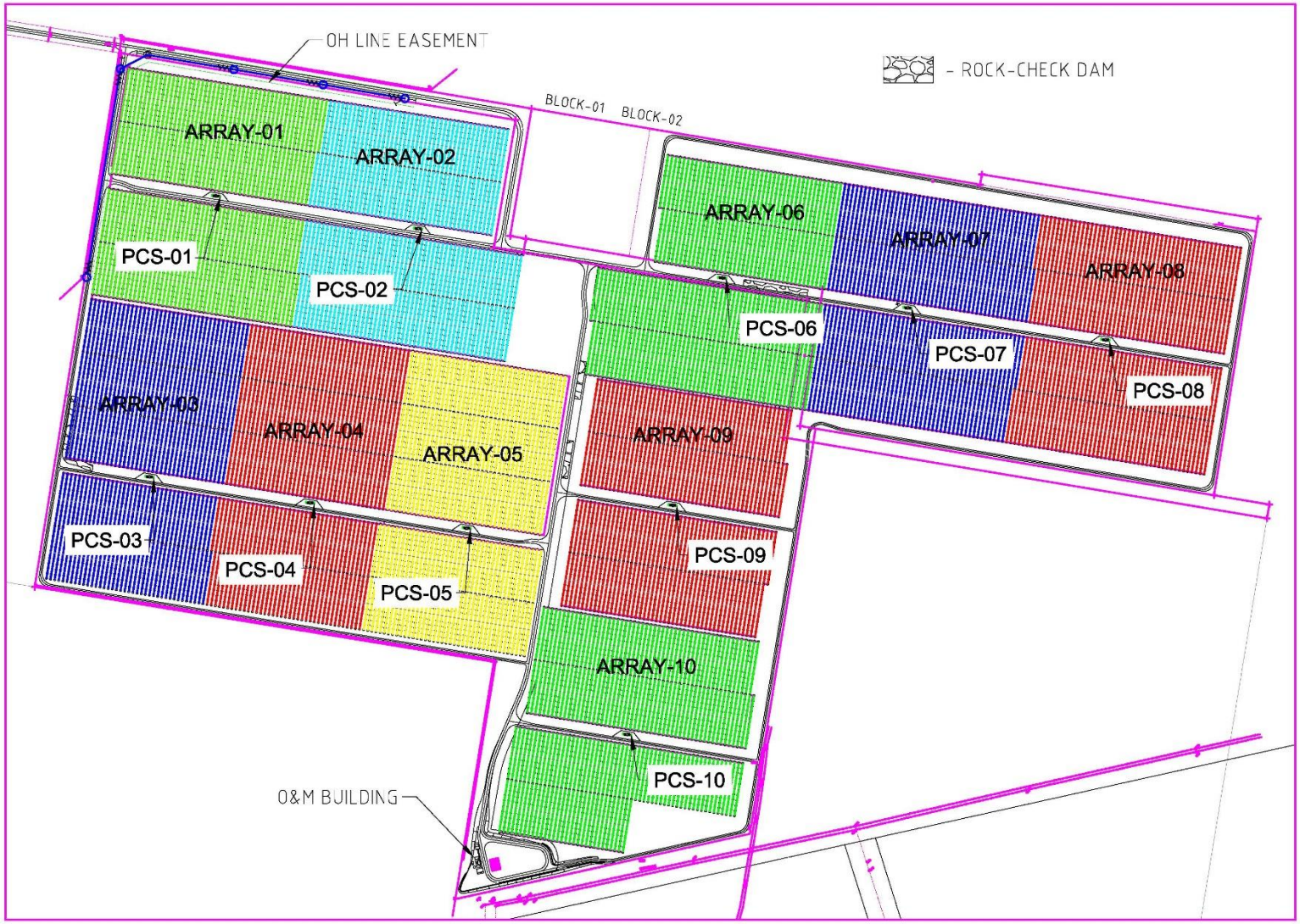



**Figure 1: As-Built Farm Layout**

## 1.6 PLAN STRUCTURE

The structure and format of this OEMP has been prepared cognizant of requirements in *Guidelines for the Preparation of Environmental Management Plans* (DIPNR, 2004) and *Environmental Management Systems – Requirements with Guidance for Use* (ISO 14001:2015).

## 1.7 PLAN SCOPE

The scope of this OEMP has been prepared to meet the specification required by CoA E2. That is, this OEMP includes:

*(a) identification of all statutory and other obligations that the Proponent is required to fulfil in relation to the operation of the development, including all consents, licences, approvals and consultations;*

*(b) a management organisational chart identifying the roles and responsibilities for all relevant employees involved in the operation of the project;*

*(c) overall environmental policies to be applied to the operation of the project;*

*(d) standards and performance measures to be applied to the project, and means by which environmental performance can be periodically monitored, reviewed and improved, (where appropriate) and what actions would be taken in the case that non-compliance with the requirements of this approval are identified. In particular the following environmental performance issues shall be addressed:*

*(i) bushfire hazard and risk management;*

*(ii) management and maintenance of offsets; and*

*(iii) management measures for easement areas, including management of vegetation, soil erosion, weed control and landholder liaison.*

*(e) the environmental monitoring requirements outlined under this approval;*

*(f) complaints handling procedures as identified in conditions C8 to C10;*

*(g) specific consideration of relevant measures to address any requirements identified in the EA; and*

*(h) management policies to ensure that environmental performance goals are met and do comply with the conditions of this approval.*

## 1.8 DOCUMENT REVIEW

### 1.8.1 TRIGGERS FOR UPDATES

The OEMP is a 'live' document and will be reviewed and updated as required during operations.

Triggers for amendments to the OEMP will include:

- When there is a need to improve performance in an area of environmental impact;
- As a result of changes in environmental legislation applicable and relevant to the farm;
- Where the outcomes from auditing/monitoring establish a need for change; or
- As a result of an incident or complaint occurring that necessitates an amendment.

### 1.8.2 APPROVAL OF UPDATES

Future approval for and sign-off on any modifications to the OEMP will involve the following process.

- A change to this OEMP that proposes any diminution of environmental monitoring and/or performance reporting will be submitted to DPE for approval.

  Any other change will be submitted by FSA to Manildra Asset Trust Manildra Solar Farm for approval.
- Subject to securing approval for the amendment to the OEMP from either DPE or the MSF owner, the OEMP will then be updated and a soft copy issued to relevant stakeholders.

  Relevant stakeholders will include all agencies that have been previously provided a copy of the OEMP. This will include the:

  – Department of Planning and Environment,
  – Department of Primary Industries,
  – Rural Fire Service, and
  – Cabonne Shire Council.

  The amended OEMP will be issued with appropriate document control provisions through updating the ***Revision History*** (refer **page i**).

### 1.8.3 CHANGES ON-SITE

In the event that any changes are proposed onsite, the OEMP will be updated and resubmitted to DPE for approval prior to these changes being made. This process will ensure DPE remain informed and approve minor changes to the OEMP through the life of the MSF.

## 1.9 PLAN AVAILABILITY

A copy of the approved OEMP will, consistent with CoA C6 and CoA E2, be posted on the MSF website and made publicly available.

## 1.10 RELATIONSHIP TO OTHER APPROVED PLANS

The Minister's consent for the MSF required DPE approval on a range of other strategies, plans and programs that have implications for and direct relevance to this OEMP. As appropriate, the commitments, protocols, procedures and monitoring specified in these plans relevant to the operation of the MSF have been incorporated this OEMP.

Provided below in **Table 1.1** is a summary of what these plans are and commentary on how and where they relate to this OEMP.

**Table 1.1 – Environmental Plans**

| Plan | Linkage | OEMP Section |
|---|---|---|
| Community Information Plan | Details commitments relating to public access to information and complaints handling procedures. | Sect 6.4 |
| Compliance Tracking Program | Intended to track compliance with the requirements of the Minister's approval during the operation of the MSF. | Sect 9.3 |
| Construction Environmental Management Plan | Was required prior to construction commencing and delineates environmental responsibilities between the EPC Contractor building the MSF and the FSA operating the MSF. | Section 1.11 |
| Flora and Fauna Management Plan | The approved FFMP specifies monitoring requirements related to fauna habitat restoration, | Sect 6.2 |
| Ground Cover Management Plan | The approved GCMP specifies groundcover management protocols and monitoring requirements during the operational life of the MSF. | Sect 6.1 |
| Biodiversity Offset Strategy | The approved *Biodiversity Offset Strategy* triggered the requirement to prepare and implement an approved *Offset Plan*. | Sect 6.2 |
| Offset Plan | The approved *Offset Plan* specifies management actions and monitoring requirements within the Offset Area as required in the Conservation Property Vegetation Plan (CPVP) that the owner of the MSF is a cosignatory. | Sect 6.2 |
| Visual Impact Verification Report | A report yet to be prepared but required within six months of the commissioning of the MSF, that will confirm visual impacts and lock in requisite landscape plantings required. | Sect 6.6 |
| Landscape Plan | The approved Landscape Plan identifies landscaping objectives and standards, details species used to enhance, mitigate and/or augment landscaping to minimise the visual impact of the MSF, details implementation, management and monitoring strategies to ensure the establishment and ongoing maintenance of landscaped areas, and outlines a consultation strategy to seek feedback from affected residents on the proposed landscape measures. As detailed in this plan, to be informed by Visual Impact Verification Report, the establishment and maintenance of plantings specified in the Landscape Plan carry over into operation of the MSF and as such forms part of the OEMP. | Sect 6.6 |

## 1.11 CEMP/OEMP CONCURRENCE

There will be a period of time during which both the CEMP and OEMP will operate concurrently (ie. a transition period). This circumstance will last until specific environmental performance objectives required under the CEMP are satisfied. Specifically:

- the requirement for groundcover monitoring as this may not be complete at time of operation (ie. 70% groundcover and self-sustaining); and
- perimeter screening, and the need to monitor and ensure the screening is self sustaining.

All other environmental management activities will be managed through the OEMP.

# Obligations

## 2.1 REQUIREMENT

CoA E2 states the OEMP shall include:

*a) identification of all statutory and other obligations that the Proponent is required to fulfil in relation to the operation of the development, including all consents, licences, approvals and consultations;*

*g) specific consideration of relevant measures to address any requirements identified in the EA; and*

In addition to the above:

CoA A6 states that:

> *The Proponent shall ensure that all licences, permits and approvals are obtained and maintained as required throughout the life of the project. No condition of this approval removes the obligation of the Proponent to obtain, renew or comply with such licences, permits or approvals. The Proponent shall ensure that a copy of this approval and all relevant environmental approvals are available on the site at all times during the project.*

## 2.2 DEVELOPMENT CONSENT

### 2.2.1 CONDITIONS OF APPROVAL

The Minister's Project Approval MP10_0122 as modified August 2015 is the overarching approval which FSA is required to satisfy. Development approval for the MSF was granted contingent on compliance with consent conditions. CoA A1 states:

> *The Proponent shall carry out the project generally in accordance with the:*
>
> *(a) EA; and*
>
> *(b) conditions of this approval.*

**Appendix A** of this OEMP provides a complete and verbatim listing of all CoA, including comment on their applicability to the operational phase of the MSF and the section within this OEMP where these CoA are addressed.

### 2.2.2 STATEMENTS OF COMMITMENT

EA (Environmental Assessment) includes:

- The Environmental Assessment titled *Environmental Assessment Manildra Solar Farm* dated October 2010 and associated response to submissions titled *Manildra Solar Farm Submissions Report* dated December 2010;
- The application to modify the project approval (Modification 1) dated 5 December 2014 and supplementary visual impact assessment titled *Manildra Solar Farm – Modification (MP 10_0122 MOD 1)* dated 22 January 2015; and
- Modification application MP 10_0122 MOD 2 and associated letter supporting the application dated 27 July 2015.

Commitments made in the EA are referred to as Statements of Commitment (SoC).

**Appendix B** of this OEMP provides a complete and verbatim listing of all SoC, including comment on their applicability to the operational phase of the MSF and the section within this OEMP where these SoC are addressed.

## 2.3 DIRECTOR GENERAL REQUESTS

FSA will comply with any reasonable requirements of the Secretary arising from the DPE's assessment of:

- any reports, plans or correspondence that are submitted in accordance with the development approval (MP 10_0122) and relevant to the scope and function of this OEMP; and
- the implementation of any actions or measures contained in these reports, plans or correspondence relevant to the operation of the MSF.

## 2.4 LEGISLATIVE OBLIGATIONS

As it relates to the operation of the MSF, FSA has a legal obligation to comply with the following legislation.

**Table 2.1 – Legislative Obligations**

| Act | Requirement |
|---|---|
| *Protection of the Environment Operations Act 1997* | Section 148 requires the EPA to be notified in the event of a pollution incident causing or threatening material harm to the environment. |
| *Rural Fires Act 1997* | If proposed, prior to conducting any Hot Works in a Total Fire Ban an exemption must be obtained from the Commissioner of the NSW Rural Fire Service (RFS) pursuant to s.99. |
| *Biosecurity Act 2015* | Section 21 imposes a duty to prevent, eliminate or minimise biosecurity risk (noxious weeds). |
| *Environmental Planning and Assessment Act 1979* | The MSF must be operated in accordance with the Minister's Development Approval (MP 10_0122). |
| *Local Government Act 1993* | The on-site sewerage system servicing the maintenance building must be maintained in accordance with the s.68 approval issued by Cabonne Council. |

## 2.5 CONSULTATION

The Minister's approval required that this OEMP be prepared in consultation with the Department of Industry – Land and Water (DILW) and Cabonne Council.

This consultation has been undertaken and evidence of the same is provided in **Appendix C**.

# Roles and Responsibilities

## 3.1 MANAGEMENT STRUCTURE

As the owner of MSF Manildra Asset Trust Manildra Solar Farm (MATSF) has ultimate responsibility to ensure all CoA are satisfied.

As the operator of MSF providing maintenance works under a Maintenance Services Agreement, First Solar (Australia) Pty Ltd (FSA) has responsibility to implement and adhere to the requirements of this OEMP.

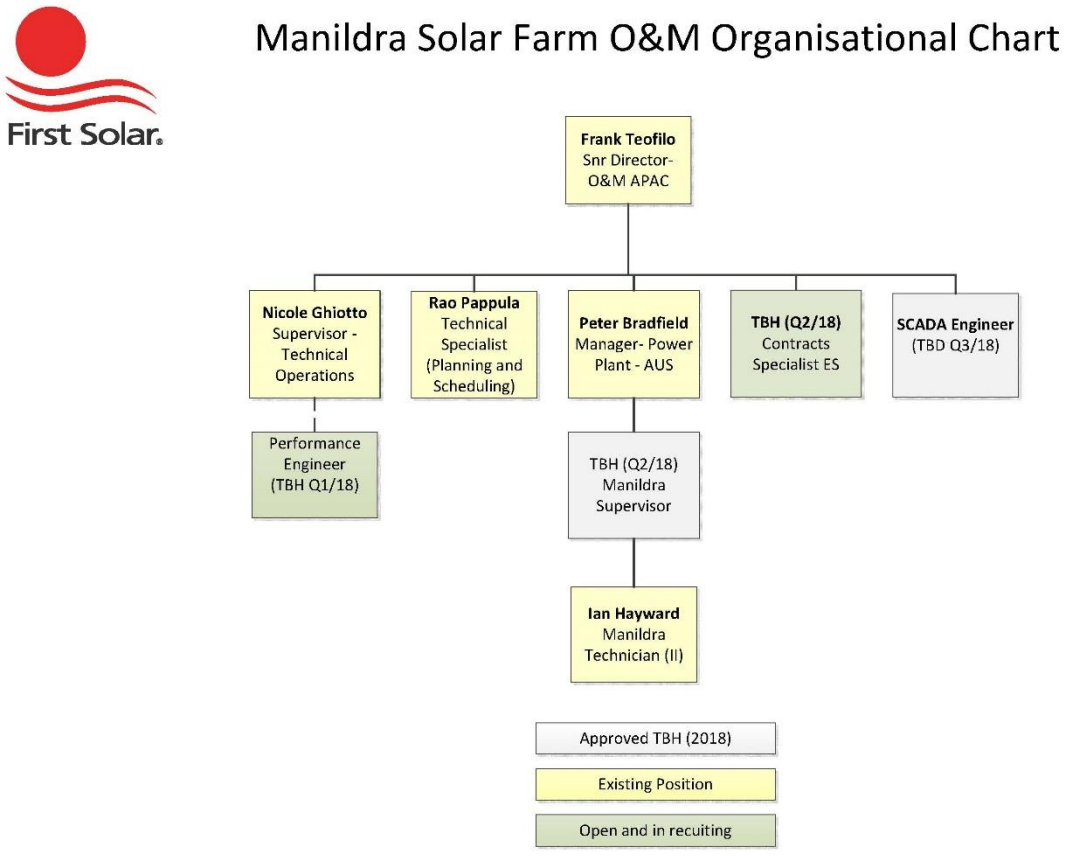



**Figure 2: Roles and Responsibilities**

## 3.2 ROLES AND RESPONSIBILITIES

### 3.2.1 MANILDRA SUPERVISOR

FSA's Manildra Supervisor has responsibility to:

- implement and adhere to all requirements of this OEMP as they relate to on farm activities;
- ensure that FSA employees and contractors are aware of and understand their environmental responsibilities required by this OEMP; and
- co-operating with the Environmental Representative.

### 3.2.2 MANAGER POWER PLANT

FSA's Manager Power Plant has responsibility to:

- Ensure adequate resources are provided to implement the requirements of this OEMP;
- Participate in management reviews to monitor the effectiveness of the OEMP.

### 3.2.3 ENVIRONMENTAL REPRESENTATIVE

As required by CoA C12, FSA is required to continue to engage an Environmental Representative (ER) until at least six months after commencement of operation (or as otherwise agreed by the Secretary).

The ER must be approved by DPE and has responsibility to:

- monitor the implementation of all environmental management plans and monitoring programs required under the Minister's approval;
- monitor the outcome of all environmental management plans and advise FSA upon the achievement of all project environmental outcomes;
- have responsibility for considering and advising FSA on matters specified in the CoA and all other licences and approvals related to the environmental performance and impacts of the MSF;
- ensure that environmental auditing is undertaken in accordance with the requirements of CoA C11 and the project Environmental Management System(s);
- be consulted in responding to the community concerning the environmental performance of the MSF; and
- have the authority and independence to recommend to FSA reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts, and, failing the effectiveness of such steps, to recommend to FSA that relevant activities are to be ceased as soon as reasonably practicable if there is a significant risk that an adverse impact on the environment will be likely to occur, until reasonable steps are implemented to avoid such impact.

## 3.3 ENVIRONMENTAL DUE DILIGENCE INDUCTION

Prior to any person commencing operational activities on-farm they will be required to attend an Environmental Due Diligence induction. This induction will provide competency training on the scope and requirements of this OEMP.

# Environmental Policy

First Solar (Australia) Pty Ltd's Health, Safety and Environmental Policy Statement is the principal environmental policy that will be applied in operating the MSF.

## Health, Safety and Environmental Policy Statement

First Solar is committed to creating a culture where HEALTH, SAFETY AND THE ENVIRONMENT is an integral part of all our employees and subcontractors daily lives, creating a better future for the world by being the HSE industry leader.

We will always conduct our business in a manner that protects the HEALTH AND SAFETY of every person on our sites and protects the ENVIRONMENT around us. We expect all personnel to undertake their work in a manner that does not place either themselves or their colleagues at risk.

We maintain a goal of zero workplace injuries, which is consistent with our vision and values that all workplace injuries are preventable.

To achieve this outcome we will:

- Conduct business in a manner that actively integrates the elements of the First Solar HEALTH, SAFETY AND ENVIRONMENTAL Management Systems into all aspects of our operations;
- Promote First Solar sustainability through ENVIRONMENTAL operational excellence, waste minimisation, resource conservation and a world-class recycling program;
- Comply with all applicable laws, regulations and statutory obligations;
- Proactively identify and control HEALTH, SAFETY AND ENVIRONMENTAL hazards and risks in the workplace;
- Support employees, contractors and subcontractors in their decision to stop work and intervene when unsafe acts or conditions are identified;
- Enable First Solar to continuously improve the HEALTH, SAFETY AND ENVIRONMENTAL management systems and our HSE performance through open communication and consultation with employees, clients, subcontractors and visitors;
- Provide the necessary tools, resources and training to facilitate continuous improvement, ensure the objectives and targets derived from this policy are achieved thereby ensuring HSE excellence throughout First Solar operations;
- Maintain proactive leadership in the management of HEALTH, SAFETY AND THE ENVIRONMENT.

9 January 2018

**Endorsed By:** Steven Jackson, Vice President APAC **Date**

**Figure 3: First Solar (Australia) Pty Ltd - Policy Statement**

# Environmental Aspects

## 5.1 DEFINITION

Pursuant to definitions in the International Standard *ISO 14001* an environmental aspect is an element of FSA' services that interacts or can interact with the environment. FSA's services are to maintain and operate the MSF.

Changes to the environment, either adverse or beneficial, that result wholly or partially from environmental aspects are called environmental impacts.

FSA's environmental aspects and associated environmental impacts provide the focus and scope for its procedures and protocols to manage these impacts such that compliance with the Minister's approval can be achieved. Potential environmental impacts identified during the environmental assessment and planning approvals process form the basis for identifying FSA environmental aspects to be addressed in this OEMP.

## 5.2 ASPECTS/IMPACTS

Based on the above, and consideration of the Conditions of Approval (CoA) and Statements of Commitment (SoC) (refer **Appendices A** and **B**), key environmental aspects relevant to FSA's operation of the MSF include:

- Biodiversity
- Groundcover Management
- Weed control
- Soil Erosion
- Bushfire Risk
- Noise
- Visual amenity
- Air quality
- Community Engagement
- Waste Management
- Heritage Protection

## 5.3 ENVIRONMENTAL OBJECTIVES

This OEMP identifies actions FSA will undertake to address its environmental aspects and compliance obligations through documenting environmental objectives as operational criterion, and specifying:

- standards and performance measures to be applied;
- the means by which environmental performance will be periodically monitored, reviewed and improved (where necessary); and
- what actions will be taken in the case that non-compliance with the requirements of the Minister's approval are identified.

These operational criterion are the management policies designed to ensure that environmental performance goals are met and the operation of the MSF comply with the Minister's Conditions of Approval.

# Operational Criterion

## 6.1 GROUNDCOVER MANAGEMENT

### 6.1.1 SCOPE

The effective management of groundcover with the MSF site will provide the means for preventing localised erosion, protecting water quality, minimising dust emissions, managing fuel loads and bushfire risk, and preventing the proliferation of noxious weeds.

### 6.1.2 OBJECTIVE

Commitments and obligations relevant to the management of groundcover will be met through compliance with the existing approved *Groundcover Management Plan*.

Specific mitigation measures to minimise impacts to groundcover form part of the MSF's CoA, including the commitment to prepare a management plan to monitor and respond to adverse groundcover impacts, as required.

The *Groundcover Management Plan* addresses rehabilitation of disturbed areas and weed control and has operational management aspects. It was prepared to address relevant CoA and SoC and details management protocols specific to:

- Minimising disturbance to groundcover
- Weed control
- Rehabilitation of areas disturbed by the project
- Grazing management, if desirable
- Reporting and responding to the results of monitoring
- Groundcover monitoring requirements and protocol

### 6.1.3 MANAGEMENT PROTOCOLS

The performance target is to successfully maintain appropriate groundcover while reducing weeds and enhancing native species diversity.

Grazing by sheep may be utilised within the array area to control biomass. A number of strategic grazing strategies can be implemented, for example; optimised, short-term or long-term deferred grazing or timed grazing. The strategy to be implemented will depend on the condition and composition of the grassland at the time and should be informed by a professional agronomist. It is noted that grazing may not be used and that slashing or isolated spraying (limited targeted applications where soil protection would not be reduced) may alternatively be implemented.

If grazing is to be utilised, the following protocol will be implemented.

**Table 6.1 – Groundcover Management Protocol - Grazing**

| Activity | Protocol |
|---|---|
| Determine and implement suitable grazing, slashing or spraying strategies | Prior to operation, consult with an agronomist and the land owner to determine the most suitable grazing strategies for the array area. Different strategies may be required for the western and eastern paddocks considering their past management and current composition.<br><br>Document the recommended strategy. Strategy must include suitable frequency of monitoring to gauge the impact of the grazing (i.e. in addition to annual groundcover monitoring) and each monitoring event must include agronomist advice regarding continuation of grazing or any changes to grazing management to ensure no adverse impacts are occurring.<br><br>If stock are brought into the area, they would come off pastures that are free of noxious weeds or subject to regular weed control. |
| Adapt grazing strategies to changing grassland condition and composition | Following each grazing monitoring event (i.e. in addition to the annual groundcover monitoring), consult with an agronomist to discuss the suitability of existing grazing regimes and adapt if recommended.<br><br>Document any alterations to the strategy.<br><br>Implement changes proposed by agronomist to improve the on-ground results of the strategy. |

Source: Groundcover Management Plan (Section 4.4)

### 6.1.4 MONITORING STRATEGY

The plan was approved on the assumption that the MSF life will be approximately 50 years and that changes to micro-climatic conditions and shading under the arrays will have an unknown effect. The plan determined that consistent with the findings of the environmental assessment for the MSF, the best means of managing any future impact is considered to be through monitoring and adaptive management during the life of the project. Detail on the approved groundcover monitoring is provided below.

Groundcover monitoring would commence the first winter after the PV panels have been installed and continue annually.

**Table 6.2 – Groundcover Monitoring Requirements**

| Aspect | Consideration |
|---|---|
| Objectives | The primary objective of this monitoring is to determine the effects of the panel shading on groundcover.<br><br>Secondarily, the monitoring will trigger management, where required, to maintain stable ground cover, suitable to resist erosion and weed infestation.<br><br>Given the highly modified nature of the groundcover at the development site and the dominance of exotic species, monitoring would focus on the degree of general vegetative cover and biomass present. The relative abundance of all native and exotic species and species diversity is not considered an important factor however gaining an idea of what species are being successful (or not) is crucial to ongoing adaptive management. |
| Personnel | The surveys require an individual competent in the identification of common pasture species. They would optimally be undertaken by the same person, to reduce variations due to subjective assessments (for example in estimating percentage ground cover) but this is not essential. |
| Timing and Duration | Monitoring would be undertaken annually during early winter (June). This timing is considered most suitable as pasture growth is generally lower but remnant reproductive material may still be present which would enable identification of species or at least genera. Assessing the groundcover during this time provides for a better indication of the health of the groundcover as growth rates are down and climatic stresses are generally higher. Shading from the solar arrays would also likely have their greatest impact during this time as there is reduced insolation in general.<br><br>For at least the first three years, data will be collected annually and reported to the OEH. After three years, the need for monitoring and reporting would be reviewed in consultation with OEH. |

**Table 6.2 – Groundcover Monitoring Requirements**

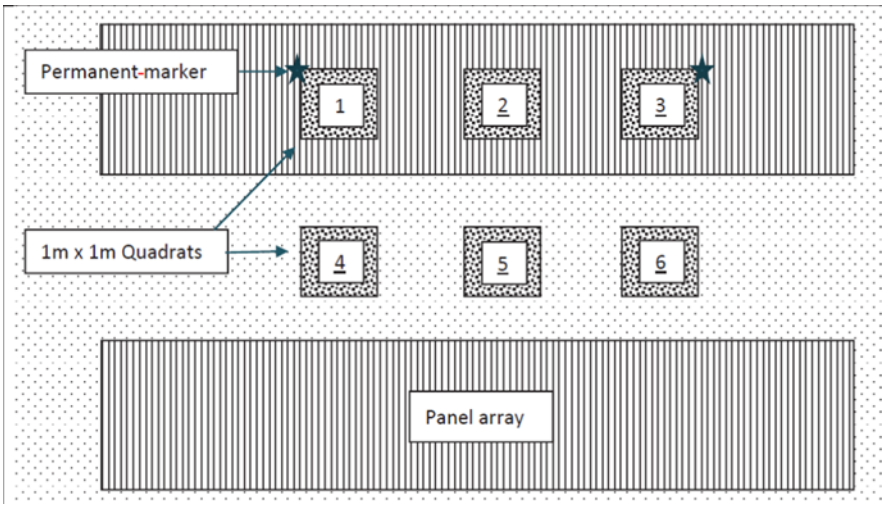
| Aspect | Consideration |
|---|---|
| | Permanent 5m x 1m monitoring plots would be established throughout the array area. At each monitoring location there would be two plots with one each placed in the following areas:<br>- In permanent shade, directly beneath panels<br>- Between panels that will receive the most sun<br><br>Each plot would consist of a series of three 1m x 1m quadrats each spaced one metre apart. The top left hand corner and the top right hand corner of the plot under the arrays would be permanently marked with a steel stake or similar. These would serve as reference points for placing the quadrats. From these points, tape measures could be used to place each quadrat. It is not recommended that the plot in the inter-row spaces be permanently marked as it is likely to be subject to occasional vehicular traffic. The distance from the plot under the array to that in the inter-row space will be dependent on the final constructed layout and will be recorded during the monitoring. The arrangement at each monitoring location is illustrated below.<br><br>  <br><br>The GCMP was approved on the basis the *nghenvironmental's* 'suggestion' for monitoring plots (as detailed below) would be adopted.<br><br>It is suggested that monitoring plots be established at minimum of six locations across the array area (12 5m x 1m plots) capturing variations in aspect and topography. For each quadrat at a monitoring location the following will be recorded.<br><br>- Total alive and dead/leaf litter vegetative cover using percentage cover estimates in 5% intervals<br>- Total cover of bare ground using percentage cover estimates in 5% intervals<br>- Dominant five species in each quadrat (or less if less species are present) and their percentage contribution to the living plant cover in each quadrat.<br>- Total biomass using the rising plate method. Measurements will be taken at the centre of each quadrat.<br>- A digital photographic image<br>- Data recorded from each of the three quadrats would be averaged to provide a single value for each plot. Only one physical quadrat should be required which can be moved to the correct location in each plot using the reference points and a tape measure. The actual distance from the reference points back to the inter-row plot will also be recorded on the datasheets to allow for accurate replication.<br>- In addition to the plot data recorded above, incidental records of any noxious weeds will also be recorded across the broader site.<br><br>Data sheets are provided in the Groundcover Management Plan. |
| Analysis and interpretation of data | The data can be simply analysed by plotting the variables recorded over time to identify trends in declining or increasing cover and biomass. The relative abundance of certain species could also be plotted over time to gain an understanding of species that are being successful or declining. The data would be used to inform the requirement for management actions such as weed control, alterations to grazing regimes or seeding/planting as outlined in the response to monitoring protocol. |

**Table 6.2 – Groundcover Monitoring Requirements**

| Aspect | Consideration |
|---|---|
| Benchmarks and Indicators | Indicators to be monitored will include:<br>- Percentage grass cover – 70% is the minimum required<br>- Weed ingress – bare ground is susceptible to weed infestation<br>- Active soil erosion - bare ground is susceptible to soil erosion, further reducing the ability to re-establish ground cover |
| Reporting Requirements | Within 3 months of annual monitoring events, the results will be written up in a report and submitted to the OEH. The report will contain as a minimum:<br>- The noxious weed map(s) will be updated to reflect the current distribution of noxious weeds on the site<br>- The results of monitoring<br>- Details of management activities carried out such as weed control and rehabilitation<br>- A discussion of the current groundcover condition relative to the results of monitoring from previous years monitoring<br>- Recommendations for adaptive management |
| Response to results | Management protocols will be adapted and implemented as required. Particularly:<br>- Weed control activities will be undertaken as per the Weed Control Protocol.<br>- The OEH and an agronomist will be consulted to determine an effective approach to maintaining groundcover greater than 70% if this target is not being met.<br>- Trials may be considered where information gaps are identified. |

Source: Groundcover Management Plan

### 6.1.5 EROSION PREVENTION

Commitments and obligations relevant to protecting the soil resource and water quality will be met through compliance with the approved *Soil and Water Management Plan* (SWMP). The SWMP was required before construction of the MSF could commence, had to be prepared in consultation with (then) NSW Office of Water and approved by DPE.

The objective of the SWMP (Entura, June 2017) was to specify requirements to be implemented in order to minimise erosion and sediment discharge from the MSF during and after the construction.

The SWMP adopted the Groundcover Management Plan benchmark indicator of 70% minimum grass cover over the farm.

The SWMP requires that site inspection and monitoring be undertaken to ensure the objectives are met and the control measures perform effectively. Specifically, as it relates to operational impacts FSA will undertake regular monitoring of the potential for and any actual erosion associated with the drainage lines and the areas adjacent which influence these. Specifically, the monitoring regime will, in addition to checking conditions across the entire MSF site, focus on:

- Areas where erosion control measures have been implemented during construction.
- Where the dry creek emerges into the MSF site in the north-east corner, to observe if runoff emerging upstream of the site would or would not accentuate sediment transport.
- Downstream, where the drainage line leaves the MSF site.

If monitoring triggers the need for mitigation works the Department of Industry - Lands and Water will be consulted with respect to these works.

Unless necessary, maintenance vehicles will not leave the constructed internal access roads when soils are very wet to minimise soil compaction and disturbance.

### 6.1.6 DUST

CoA B5 requires that FSA operate the MSF in a manner that minimises dust generation from the farm, including wind-blown and traffic-generated dust as far as practicable, and that all activities on the farm be undertaken with the objective of preventing visible emissions of dust.

To achieve this objective FSA will:

- Restrict vehicle movements off internal access tracks to a minimum.
- Enforce low speed restrictions on all vehicle movements within the farm.
- Undertake strategic watering if required.
- In extreme adverse conditions (dry and windy) consideration will be given to rescheduling any maintenance activity that could generate excessive dust.

If visible dust emissions attributable to the operation of the MSF do occur, FSA will identify and implement all practicable dust mitigation measures such that emissions of visible dust cease.

As noted, successful groundcover management is the principal means of preventing fugitive dust emissions from within the MSF.

### 6.1.7 WATER SOURCES

Water use for dust suppression, vegetation rehabilitation and general use will be sourced, preferentially as follows.

1. From the 10 kL rainwater tank at the MSF maintenance building.
2. In consultation with the landowner, from existing farm dams on the property within which the MSF is located.
3. As a last resort - purchased from a supplier and tanked to the MSF.

# 6.2 BIODIVERSITY PROTECTION

## 6.2.1 OBJECTIVE

Commitments and obligations relevant to biodiversity protection and enhancement will be met through compliance with the existing approved

- *Biodiversity Offset Strategy*;
- *Offset Plan*; and
- *Flora and Fauna Management Plan*.

Whilst the plans are provided in full within the Appendices, a summary of each for context and scope is provided below.

### 6.2.1.1 Biodiversity Offset Strategy

The *Biodiversity Offset Strategy* was prepared in consultation with the Office of Environment and Heritage and the landholder, and approved by DPE, to guide the development of the biodiversity offset package for the MSF. It was required by CoA C2 before construction of the farm could commence and included:

- consideration of all native vegetation losses and the adequacy of the proposed offset;
- demonstration of how the offset will 'improve or maintain' biodiversity values;
- the proposed offset ratios and connectivity improvements;
- proposed management actions;
- demonstration of how the strategy was prepared in accordance with OEH's *Principles for the Use of Biodiversity Offsets in NSW*; and
- measures to ensure in-perpetuity the conservation commitment.

### 6.2.1.2 Offset Plan

The *Offset Plan* was prepared in consultation with the Office of Environment and Heritage, the Local Land Service and the landholder, and approved by DPE, to provide the details of the biodiversity offset package. It was required by CoA E3 before MSF could start operations and had to:

- describe how the offset shall be guaranteed, managed and monitored in perpetuity;
- ensure all impacted vegetation communities and threatened species habitat have been offset as per the ratios/amounts calculated through the outcomes of the assessment carried out under CoA C2;
- demonstrate how the offset ratio is consistent with the principles of "improve or maintain" for biodiversity values; and
- include requirements for a post construction review to confirm the extent of clearing was commensurate with and not greater than that predicted. If clearing is greater, then the package shall demonstrate how the offset was modified and increased to the value of the actual biodiversity loss.

The *Offset Plan* identified the 'offset site' (refer **Figure 4: Offset Site**) and specified the security mechanism to secure the offset site in perpetuity and allow the ongoing management of the site (including how the designated management actions will be funded).

### *Conservation Property Vegetation Plan*

In accordance with the approved *Offset Strategy* a Conservation Property Vegetation Plan (CPVP) was established over the offset area and attached to the land title. The CPVP is a legally binding agreement under both the (then) *Native Vegetation Act 2003* and *Threatened Species Conservation Act 1995*. The terms of the CPVP are not affected by any changes to local or state planning rules or new listings of threatened species. A CPVP can be varied at the landholder's request, provided the variation will still improve or maintain environmental outcomes.

The CPVP includes management actions associated with the offset area that apply in perpetuity, and these management actions were prepared to address the requirements from the MSF approval.

As a leaseholder of the *Offset Site*, for the duration of the project, the owner of the MSF is a cosignatory of the CPVP and is obligated to ensuring the landholders have sufficient resources and information to implement the management actions.


**Figure 4: Offset Site**

### *Management Actions*

The overall objective of the management actions detailed in the *Offset Plan* is to improve the biodiversity value of the *Offset Site*.

Specific actions address threats and actions to improve existing values. Specific management requirements for the *Offset Site* include:

- Fencing and signage to ensure the site is protected from inadvertent impacts of nearby agricultural activities.
- A highly controlled light grazing regime (using biomass indicators to ensure adequate ground cover is maintained in all seasons) may be appropriate, if it can enhance native species diversity.
- Controlled burning may be appropriate as a strategy to enhance native seed germination.
- Weed control and monitoring.
- Feral animal control and monitoring.
- Replanting native trees to enhance landscape connectivity in specific areas. These would preferentially be the derived native grassland areas where the likelihood of natural regeneration seems low.

Additionally, LLS required specific measures including:

- Nest boxes installation, to offset hollows to be removed on the development site.
- Fire management (optional).
- Exclusion of apiaries within the offset site.
- Revegetation to include mid storey species.

These measures were developed in consultation with the LLS to ensure the CPVP for the site and the *Offset Plan* are in alignment with regard to carrying out management actions.

The *Offset Plan* contains additional detail and for each action, clear targets and protocols are set out, including allowance for actions to be adapted if required to meet the intent of the management action.

### 6.2.1.3 Flora and Fauna Management Plan

The *Flora and Fauna Management Plan* was prepared in consultation with the Office of Environment and Heritage and approved by DPE before construction of the MSF could start to provide the details of the biodiversity offset package. It was required by CoA C13(a) and was required to outline measures to protect and minimise loss of native vegetation and native fauna habitat as a result of construction of the project. The approved plan included:

- plans showing terrestrial vegetation communities; important flora and fauna habitat areas; location where EECs, native pasture; and areas to be cleared. The plans shall also identify vegetation adjoining the site where this contains important habitat areas and /or threatened species, populations or ecological communities;
- methods to manage impacts on flora and fauna species and their habitat which may be directly or indirectly affected by the project, such as location of fencing, procedures for vegetation clearing or soil removal/stockpiling and procedures for re-locating hollows or installing nesting boxes and managing weeds;
- procedures to accurately determine the total area, type, and condition of vegetation community to be cleared;
- reference to the Ground Cover Management Plan required in condition C14(b); and
- a procedure to review management methods where they are found to be ineffective.

Notwithstanding that the *Flora and Fauna Management Plan* related to construction activity, two of the management protocols specified in this plan effectively carry over and impact on the operation of the MSF. Specifically:

- After clearing, the boundaries of all cleared areas will be mapped using hand held GPS. An updated vegetation impact table will be produced, with input from an ecologist. The actual area of impact will be used to verify that the designated offsets for the project are adequate and in accordance with the Offset Plan for the project. If inadequate, additional offsets will be added in consultation with OEH. (Protocol 3 – After Clearing Verify Offsets are Adequate).
- Annual monitoring of nest boxes (not in the *Offset Site*) is to be carried out for a period of five years to establish occupancy rates and enable control of feral pest animal species and ensure the boxes remain securely attached and suitable for use (Protocol 6 – Fauna Habitat Restoration).

## 6.2.2 MONITORING AND REPORTING

In accordance with the project approval the monitoring requirements include a post construction review to confirm the extent of clearing was commensurate with and not greater than that predicted. If clearing is greater, the Proponent would need to increase the Offset Site size or secure additional land to the value of the actual biodiversity loss.

The management actions will be reviewed at intervals no less than 4 years and no more than 6 years by a suitably qualified person. To allow for adaptive management, minor alterations can be made prior to the 4 year period (e.g. recording additional weed or pest outbreaks and controls).

For the duration of the project (up to 50 years), the success of the management actions would be audited and reported as part of the annual environmental report for the project.

At the decommissioning stage of the solar farm, the management responsibilities will fall to the land owner.

It is anticipated at this stage, the key management actions will have been adapted to ensure that they are meeting their objectives and continuation of the management actions are not considered likely to require further auditing.

**Table 6.3 – Monitoring and Reporting Schedule**

| Monitoring and Reporting Event | Timing | Responsibility |
|---|---|---|
| Verify the extent of development site impacts and assess whether the area exceeds the areas used in this Offset Plan.<br><br>If the area of native vegetation exceeds Section 4 assumptions, the Proponent would increase the Offset Site size or secure additional land to the value of the actual biodiversity loss, in consultation with OEH and LLS.<br><br>Report findings to DPE, to fulfil Project Approval conditions. | Completion of construction | RCR |
| Monitor site condition against biometric benchmarks and base line data.<br><br>Report on management actions conducted and their effectiveness. Recommend if changes are required to monitoring or management actions to better meet objectives for the next year. **Note1**.<br><br>Actions may be required if the offset site is not within bench marks for Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (LA120)**.** | Annually, for life of solar farm development (or not less than 25 years), as part of the project's Annual Environmental Report. | FSA |
| Record management actions undertaken and their effectiveness. Recommend if changes are required to monitoring or management actions to better meet objectives for the next year. | Annually | Landowner |
| Management plan review – for effectiveness and the need for adaptation | Every 4 years | FSA for life of MSF then landowner |

Note 1. The *Offsets Plan* details the following specific monitoring requirements.
- Regular inspection of fencing
- Annual monitoring of nine nest boxes for Superb Parrot
- Annual mapping, monitoring and reporting of weed infestations
- Annual monitoring for rabbit scat and warrens
- Annual monitoring of revegetation against benchmark values for EEC

In addition to the above, *the Flora and Fauna Management Plan* requires (**outside the Offset Site**):
- Annual monitoring of nest boxes to be carried out for a period of five years to establish occupancy rates and enable control of feral pest animal species and ensure the boxes remain securely attached and suitable for use

Source: Offset Plan (Table 6.2)

# 6.3 BUSHFIRE HAZARD

## 6.3.1 OBJECTIVE

In operating the MSF FSA's objectives relating to bush fire management are to minimise ignition risks and regularly consult with the Manildra RFS Brigade.

## 6.3.2 STAKEHOLDER CONSULTATION

### 6.3.2.1 Rural Fire Service

Consultation with Fire and Rescue NSW as part of the Construction Environmental Management Plan (CEMP) established that the first point of call for the MSF in relation to bushfire management is the Rural Fire Service as the MSF is located within the RFS Fire District.

FSA will consult regularly with the Rural Fire Service (Manildra Brigade) to ensure the Brigade Captain is:

- Satisfied with the communication and response protocols proposed in the event of a fire originating from within the MSF or in the event of an external bushfire threatening the MSF.
- Satisfied that accessing the MSF and undertaking fire fighting within the MSF will not expose firefighters to risks from either electrical hazards or emissions from burning infrastructure.
- Familiar with the location of infrastructure on the farm, including site access and internal road layout.
- It has 24/7 contact details for FSA representatives during the bushfire season.

FSA will comply with any reasonable request of the Manildra Brigade Captain to reduce the risk of bushfire and facilitate timely access to the MSF in the event of an emergency.

### 6.3.2.2 Neighbours

In the event that a fire is burning within the MSF, FSA will notify neighbouring and downwind landholders.

## 6.3.3 RISK MANAGEMENT

### 6.3.3.1 Fuel Reduction

If sowing of pasture grasses in the MSF is required as part of groundcover management measures low growing species will be selected.

Whilst SoC 97 states that pasture would be maintained at a low height (<100mm) below the PV array, this is considered a guide only, with the acceptable height of vegetation to be determined, contingent on the season, in consultation with the Manildra Brigade Captain.

The fuel load over the farm will be monitored in the lead up to bushfire season and reduction measures will be implemented as required. These measures will include grazing and/or mechanical slashing.

Asset protection zones (APZs) based on the NSW policy document *Planning for Bushfire Protection*, will be maintained around the MSF, including transmission line easements that exists in the north west corner of the MSF.

#### 6.3.3.2 Work Practices

- No burning of vegetation will take place on the MSF site.
- In bushfire season all vehicle and plant movements beyond formed roads and trafficable hard stand areas will be restricted to diesel vehicles and fitted with hand held fire extinguishers.
- Total Fire Ban rules will be adhered to. That is, FSA will not:
  - drive or use any motorised machine unless the machine is constructed so that any heated areas will not come into contact with combustible matter;
  - carry out Hot Works (e.g. welding operations or use an angle grinder or any other implement that is likely to generate sparks), unless FSA has the necessary exemption from the NSW RFS Commissioner and complies with all requirements specified in the exemption.

#### 6.3.3.3 Fire Fighting Equipment

Appropriate firefighting equipment will be provided in the maintenance building, including portable fire extinguishers and protective clothing.

## 6.4 COMMUNITY ENGAGEMENT

### 6.4.1 OBJECTIVE

FSA aim to meet and exceed both jurisdictional and voluntary best practice requirements to ensure that it maintains a good reputation and an ongoing positive relationship with the community.

### 6.4.2 COMMUNITY ENGAGEMENT PLAN

FSA will implement its *Community Engagement Plan* (CEP) for which the main objective is to provide overarching communications and consultations strategies, methodologies and tools to effectively inform and engage the community and stakeholders throughout the operating life of the MSF.

The following community engagement principles underpin the CEP:

- *Keeping an open dialogue with our communities. Our aim is to build strong relationships through transparent communication with communities during all aspects of development, construction and operation, whilst respecting the diverse cultures, views and needs of these communities.*
- *MSF has established efficient, non-threatening, fair and accessible mechanisms for dealing with any concerns raised by the community. These are set out in the conditions of planning approval for operating assets and in the comprehensive consultation process for development projects.*
- *Fostering local relationships. MSF aims to foster lasting relationships with non-profit organisations by supporting local community initiatives; however MSF does not normally sponsor any partisan political activities or religious groups.*
- *Seeking to source locally. MSF will seek to source materials and services from locally based suppliers to support the local economy, enhance community engagement, and to reduce its impact on the environment from transportation.*
- *Raising awareness about renewable energy. MSF promotes renewable energy using factual and scientific data, and advocates for regulation that delivers increased policy predictability for the renewable energy industry. MSF's parent company is a member of Australia's Clean Energy Council.*
- *Community Engagement Register: MSF has developed a Community Engagement Register to monitor and track financial and other in-kind support that MSF provides to local communities.*

### 6.4.3 COMMUNICATIONS MANAGEMENT SYSTEM

Interactions with all stakeholders, community and other interested parties will be maintained in a database at the First Solar Operations Centre (FSOC). The elements of this system will include:

- 24/7 dedicated phone line (02 9002 7733)
- Email and Website
- Social media
- MSF contact database

### 6.4.4 ACCESS TO INFORMATION

FSA will publish and maintain up-to-date information on the MSF website, including:

- the status of the project;
- a copy of the Minister's approval;
- a copy of each relevant environmental approval, licence or permit required and obtained;
- a copy of each plan, report, or monitoring program required by the Minister's approval; and
- details of the outcomes of compliance reviews and audits of the MSF.

Subject to reasonable confidentiality requirements, FSA will make all documents required under the Minister's approval available for public inspection on request.

## 6.5 ACOUSTIC AMENITY

### 6.5.1 OBJECTIVE

FSA will ensure that the noise generated by the MSF does not exceed 35dB(A)$_{(LAeq15min)}$ at any residence on privately-owned land unless FSA has entered into a written agreement with the relevant landowner to exceed these limits and advised DPE in writing of the terms of this agreement.

Noise generated by the project will be measured in accordance with relevant requirements of the *NSW Noise Policy for Industry*.

### 6.5.2 COMPLIANCE REPORTING

In the event that any landowner makes a complaint with respect to noise from the MSF in the first 12 months of operation, FSA will prepare a noise compliance report. The noise compliance report will:

- be prepared by a suitably qualified noise expert;
- demonstrate that the MSF is complying with the applicable noise; and
- be submitted to the DPE, EPA and Cabonne Council within one month of receiving the report.

Note: The existing CoA requires a compliance report within 3 months of commissioning.

# 6.6 VISUAL AMENITY

## 6.6.1 REQUIREMENTS

FSA will have obligations relating to the establishment and maintenance of landscape plantings designed to mitigate visual impacts of the MSF. The extent of these are not known at this point in time and will only be known after approval of a Visual Impact Verification Report (VIVR).

## 6.6.2 VISUAL IMPACT VERIFICATION REPORT

CoA F4 requires that, within six months of the commissioning of the MSF, the FSA prepare and submit a VIVR for DPE approval. Unless otherwise agreed to by DPE, the VIVR will confirm the visual impacts at each of the receptors and roadways identified in the Environmental Assessment as having the potential to be at least 'moderately impacted', considering the final model and layout of generating components on site as well as site specific mitigating factors at the receptors and roadways (such as receptor orientation and intervening screening factors).

The VIVR must identify all reasonable and feasible screening and landscape planting options available at each receptor and roadways at which potential impacts have been verified including demonstration that these measures have been determined in consultation with affected receptors and relevant road authorities.

Within 18 months of the approval of the VIVR by DPE (or as otherwise agreed by DPE), FSA must ensure that the measures identified in the VIVR are implemented at affected receptors and roadways as identified in the VIVR in consultation with relevant landowners and road authorities.

## 6.6.3 LANDSCAPE PLAN

Notwithstanding that the VIVR has yet to be approved, CoA C14 required that *a Landscape Plan* be prepared in consultation with Cabonne Council and approved by DPE prior to construction of the MSF commencing. The approved *Landscape Plan*:

- identifies landscaping objectives and standards based on visual impacts and local environmental values;
- details species used to enhance, mitigate and/or augment landscaping to minimise the visual impact of the MSF, particularly with respect to the impacts on nearby residences;
- details implementation, management and monitoring strategies to ensure the establishment and ongoing maintenance of landscaped areas;
- outlines a consultation strategy to seek feedback from affected residents and the interested community on the proposed landscape measures.

As detailed in this plan, to be informed by VIVR, the establishment and maintenance of plantings specified in the *Landscape Plan* carry over into operation of the MSF and as such, forms part of the OEMP.

### 6.6.4 OBJECTIVES

The overall objective of the visual mitigation is to achieve a better visual integration of the MSF and the retention of existing landscape character at both local, and regional scales. The mitigation measures attempt to lessen the visual impact of the MSF whilst enhancing the visual character of the surrounding environment. Key performance indicators are set as follows for each specific objective of this plan.

**Table 6.4 – Landscaping Objectives**

| Landscape Plan Objective | Key Performance Outcome |
|---|---|
| Identification of landscaping objectives and standards based on visual impacts and local environmental values identified in the EA. | Compliance with strategies recommended in the EA. |
| Appropriate species to enhance, mitigate and or augment landscaping to minimise the visual impact of the project, on the project site, at residences, on local roads. | Reasonable stakeholder expectations are met with regard to type and location of planting. (Stakeholders include affected residents, interested community members, local Council and Roads and Maritime Services. |
| Provide procedures to implement and monitor plantings to ensure objectives are being met. | All stages of implementation carried out effectively and in a timely manner.<br><br>Plants are properly established and maintained. |

Source: Landscaping Plan

### 6.6.5 MONITORING

Screen plantings will be monitored and mortalities replaced in the first five (5) years

## 6.7 HERITAGE PROTECTION

### 6.7.1 PROTECTION OF STONE ARTEFACT

The *Archaeological and Cultural Heritage Assessment* (NSW Archaeology Pty Ltd, September 2010) for the MSF recorded a single stone artefact of Aboriginal origin close to the northern boundary fence (660720e 6328571n GDA). Impact to this site was avoided during construction and the artefact remains in-situ.

Aboriginal objects are protected in New South Wales under the *National Parks and Wildlife Act 1974*. Section 90 of the NPW Act requires an Aboriginal heritage impact permit (AHIP) for harm to an Aboriginal object. Significant penalties are in place for harm to Aboriginal objects or places regardless of whether the harm was committed knowingly or not. All FSA staff and contractors will be made aware of the need to avoid any impact to this recorded site.

### 6.7.2 UNANTICIPATED FINDS PROTOCOL

In the event that any object suspected to be of possible Aboriginal origin is discovered during maintenance of the MSF, professional archaeological advice will be sought in consultation with the Registered Aboriginal Parties.

### 6.7.3 COTTAGE RUINS

An abandoned stone cottage ruin is located adjacent to the existing track that is used as part of the landowner's farming enterprise and for Essential Energy to access the existing substation. The cottage has been the subject of a heritage assessment and has been assessed as being of historical heritage significance to the Manildra area. The location of this ruin is outside the MSF site and operation of the MSF does not risk any impact on this ruin. Notwithstanding, all FSA staff and contractors will be made aware of the need to avoid any impact to this ruin.

# 6.8 WASTE MINIMISATION

## 6.8.1 HOUSEKEEPING

- General Solid Waste (non-putrescible and putrescible) associated with the on-site presence of maintenance personnel will be stored in a secure 240 L wheelie bin near the maintenance building and disposed of periodically to the Manildra Waste Management Facility (MWMF).

  MWMF is operated by Cabonne Council and located 3 kms south of Manildra at 368 Yellowbox Road. It provides recycling and landfilling facilities and is open Wednesday and Sunday from 10 am to 1 pm and 2 pm to 5 pm. The facility cannot accept liquid or hazardous waste.
- No waste will be received on the farm.
- No burning of any waste type, including vegetation will be undertaken on farm.
- No burial of any waste materials will be undertaken on farm.

## 6.8.2 CLASSIFICATION

No potentially hazardous material is expected to be generated from operations. FSA will ensure that all liquid and/or non-liquid waste generated on the site is assessed and classified in accordance with the EPA's (2014) *Waste Classification Guidelines* before it is removed from the farm.

## 6.8.3 RECYCLING

FSA's *Health, Safety and Environmental Policy Statement* (refer **Section 4**) states it will promote waste minimisation, resource conservation and a world-class recycling program.

Equipment that is replaced as the farm infrastructure ages will, where possible, be recycled.

## 6.8.4 WASTE TRACKING

All wastes, including recyclable materials, from the farm's operation will be tracked using a Waste Register. All waste/recyclable material transported off-site will be recorded.

This register will record the following information:

- Date the load departed site;
- A description of the waste/recyclable material in the load.
- Clarification whether the material is to be recycled or whether it is a waste to be disposed off.
- If a waste for disposal, the waste classification.
- The quantity of material (either tonnage or volume).
- Its destination.
- The freight company transporting the material.

# 6.9 DANGEROUS GOODS

## 6.9.1 HAZARDOUS GOODS STORAGE

Potentially hazardous materials will be stored in secure containers with appropriate signage and Safety Data Sheets (SDS) will be held on-site.

Hazardous goods and combustible liquids will be stored and handled in accordance with:

- all relevant Australian Standards;
- a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bud; and
- the EPA's *Environment Protection Manual Technical Bulletin Bunding and Spill Management*.

## 6.9.2 SPILL RESPONSE KIT

An appropriately sized spill kit will be provided on-site.

## 6.9.3 SPILL RESPONSE PROCEDURE

In the event of a spill the following procedures would be followed.

- The spill will be contained utilising a spill kit;
- Impacted soil will be scraped to a depth where there is no visible contamination staining, and material placed in a secure covered receptacle;
- The soil will have samples analysed to establish the waste classification; and
- The material will be transported and disposed of at a waste facility legally permitted to accept the material.
- An Environmental Incident Report will be completed for any spill occurrence.

## 6.9.4 PLANT MAINTENANCE

No higher risk maintenance works (eg. oil changes) of maintenance plant and equipment will be undertaken on-site.

## 6.9.5 BUNDED INFRASTRUCTURE

Bunded infrastructure will be routinely monitored to ensure that volume of oil could be fully contained in the event of leak.

# Incident Management

## 7.1 INTERNAL REPORTING

Any incident that occurs with the potential to cause an environmental impact will be reported immediately to the Manildra Supervisor.

## 7.2 IMMEDIATE RESPONSE

Upon receiving notification of an incident with the potential to cause an environmental impact, but not constituting an emergency, FSA will immediately attend the incident and:

- Isolate the area affected by the incident;
- Implement containment measures to prevent the impact of the incident spreading; and
- Make a determination as to the significance of the potential environmental impact and, as appropriate, undertake appropriate external notifications.

## 7.3 EXTERNAL NOTIFICATIONS

### 7.3.1 MATERIAL HARM

EPA notification is required where a pollution incident occurs in the course of an activity such that material harm to the environment is caused or threatened.

Material harm to the environment is defined in s.147 of the *Protection of the Environment Operations Act 1997* as follows:

> *(a) harm to the environment is material if:*
>
> *i) it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or*
>
> *ii) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations), and*
>
> *(b) loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment."*

FSA will, as soon as the immediate response actions have been implemented, make a determination as to whether material harm has been caused or is threatened.

### 7.3.2 EPA/DPE NOTIFICATION

If it is determined that material harm exists the EPA and DPE will be immediately notified and provided the following relevant information.

- the time, date, nature, duration and location of the incident;
- the location of the place where pollution is occurring or is likely to occur;
- the nature, the estimated quantity or volume and the concentration of any pollutants involved, if known;
- the circumstances in which the incident occurred (including the cause of the incident, if known); and
- the action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution, if known.

### 7.3.3 COUNCIL NOTIFICATION

Following EPA notification Cabonne Council will then be informed of the situation. This initial notification to these stakeholders would be for information purposes alone and FSA would continue to concentrate on responding to any instruction or request from the EPA.

## 7.4 INCIDENT INVESTIGATION

### 7.4.1 AVOID RECURRENCE

As soon as the incident has been contained and external notifications undertaken (if required), FSA will then undertake an incident investigation. One purpose of the investigation will be to identify and understand the cause of the incident with a view to modifying operational procedures to avoid the potential for a recurrence.

### 7.4.2 RESTORATION

The other purpose of the incident investigation will be to define the appropriate remediation work required in order to address any bio-physical impact of the incident. The appropriate remediation work (if required) would be determined by the specific circumstances of the incident.

## 7.5 INCIDENT REPORTING

### 7.5.1 DOCUMENTATION

Any environmental incident will be recorded on an Environmental Incident Report and an updated Environmental Incidents Register.

Each Environmental Incident Report will include details on:

- the date, time and duration of the incident;
- clarify whether there was material harm to the environment;
- detail the nature of the incident;
- climatic conditions;
- the location of the incident;
- pollutants involved;
- circumstances in which the incident occurred;
- whether external notification (EPA) was undertaken; and
- corrective action taken.

### 7.5.2 DISSEMINATION

For any environmental incident for which there is no material harm, FSA will provide a copy of the Environmental Incident Report to Cabonne Council within 72 hours of the incident occurring.

For an incident in which material harm has or could have resulted and the EPA has been notified, FSA will provide reporting to the EPA as may be instructed, in accordance with the timeframes that may be so specified by the EPA.

# Complaints Management

## 8.1 REQUIREMENT

CoA C8 requires that unless otherwise agreed by DPE, for the life of the MSF that the following are available for community complaints:

- a 24 hour telephone number on which complaints about operational activities at the site may be registered;
- a postal address to which written complaints may be sent; and
- an email address to which electronic complaints may be transmitted.

The telephone number, postal address and e-mail address will be advertised in a newspaper circulating in the area at six-monthly intervals for a period of two years following commencement of operation. These details must also be provided on the MSF website and displayed on a sign near the entrance to MSF in a position that is clearly visible to the public.

## 8.2 CONTACT DATABASE

During operations a dedicated number will be available at the First Solar Operations Centre (FSOC) to take any enquiries and complaints. The phone number will be included on the MSF website, all notifications, advertising and signage and any other information in the public domain relating to the MSF.

All calls will be directed to the Asset Manager to determine whether the call is an enquiry or complaint. In the case of complaints the Asset Manager will determine a suitable course of action and FSA will endeavour to respond to all enquiry calls or emails within 48 hours or as soon as possible. All calls, both enquiries and complaints, will continue to be logged, tracked and closed out on the MSF database.

## 8.3 COMPLAINT REGISTER

The MSF database will be used as the main reporting and monitoring tool for communications activities. The database will be the management tool for recording all complaints, enquiries, issues and responses. It will capture;

- the date and time of the complaint;
- the means by which the complaint was made (telephone, mail or email);
- any personal details of the complainant that were provided, or if no details were provided, a note to that effect;
- the nature of the complaint;
- any actions taken in relation to the complaint, including timeframes for implementing the action; and
- if no action was undertaken in relation to the complaint, the reasons why no action was taken

The MSF database will enable compilation of monthly reports on stakeholder and community contact and issues management.

## 8.4 COMPLAINTS HANDLING

The procedure for complaints handling will be as follows:

- All complaints received during business hours will be investigated and responded to within 48 hours of receipt where practical.
- Complaints received overnight or on weekends will be responded to within 48 hours unless otherwise agreed with the complainant, but no later than the following business day.
- Written correspondence regarding the MSF will be answered within seven working days of receipt.

A written response will be provided to any complainant who gives their details, within fourteen calendar days to close out the complaint.

## 8.5 DISPUTE RESOLUTION

In the event a satisfactory resolution cannot be immediately agreed with the complainant FSA will follow an internal complaints escalation process and will seek further dialogue with the complainant to negotiate a successful outcome and resolve the complaint.

If the complaint is still not able to be resolved to the satisfaction of the complainant, a staged dispute resolution process will be implemented and the complainant will be able to request intervention and mediation by an Independent Community Liaison Representative.

## 8.6 DPE NOTIFICATION

DPE will be notified in writing to compliance@planning.nsw.gov.au within 7 days after FSA receive a complaint.

The notification will:

- identify the development (***Manildra Solar Farm***) and the application number (***MP10_0122***);
- set out the nature of the complaint; and
- what actions have been done, or will be, undertaken to avoid a recurrence.

# Performance Evaluation

## 9.1 PERFORMANCE REPORTING

**Table 9.1 – Environmental Performance Reporting**

| Performance Data | Frequency |
|---|---|
| **MONITORING** | |
| Biodiversity Offset Site (site condition against biometric benchmarks and base line data; nest boxes for Superb Parrot; weed infestations; rabbit scat and warrens ). | Annually, for life of MSF (or not less than 25 years). |
| Outside Offset Site - Nest boxes for occupancy rates and ensure boxes remain securely attached and suitable for use | Annual for a period of 5 years. |
| Groundcover Management (Total alive and dead/leaf litter vegetative cover using percentage cover estimates in 5% intervals; Total cover of bare ground using percentage cover estimates in 5% intervals; Dominant five species in each quadrat and their percentage contribution to the living plant cover in each quadrat; Total biomass; digital photographic image; Incidental records of any noxious weeds across the broader site. | Annually during early winter for at least the first 3 years with ongoing need reviewed in consultation with OEH |
| Landscape Plantings – monitoring health and replacing mortalities | In the first 5 years |
| Waste/recyclables volumes/tonnages generated from operations. | Life of MSF. |
| **REPORTS** | |
| Biodiversity Offset Site Environmental Report (management actions conducted and their effectiveness, recommendations if changes are required to better meet objectives for the next year) | Annually, for life of MSF (or not less than 25 years). |
| Groundcover Management – Annual Report (results of monitoring, noxious weed maps, details of management activities carried out, discussion of the current groundcover condition relative to the results of monitoring from previous years monitoring, recommendations for adaptive management) | Within 3 months of annual monitoring |
| Visual Impact Verification Report (confirms visual impacts and lock in requisite landscape plantings required). | Within 6 months of commissioning |
| Noise Compliance Report - confirming that the noise generated by the MSF does not exceed 35dB(A)(LAeq15min) at any residence on privately-owned land.t | Triggered by receipt of a complaint relating to noise in the first 12 months of operation. |
| Environmental Incident Report | Any environmental incident |
| Complaints Report - MSF database compilation of stakeholder and community contact and issues management. | Monthly |
| **AUDITS** | |
| Biodiversity Offset Site (evaluating compliance with management actions in the Offset Plan) | Annually, for life of MSF (or not less than 25 years). |
| Internal OEMP compliance audits | Biannual for 3 years then annually thereafter. |
| External compliance audit | Within 2 years of operation. |
| **MANAGEMENT REVIEWS** | |
| Post construction review to confirm the extent of clearing was commensurate with and not greater than that used to finalise the Offset Site requirements. | One off - post construction |
| Management Review of Offset Plan | At intervals no less than 4 years and no more than 6 years. |
| Annual Review of OEMP to ensure its continuing suitability, adequacy and effectiveness. | Annual |

## 9.2 INTERNAL AUDITS

FSA will establish, implement and maintain an internal audit program. The audit criteria will be compliance with this OEMP, concentrating on its effective implementation and maintenance as well as opportunities for improvement.

FSA will retain documented information as evidence of the implementation of the audit program and the audit results. The results of the audits will be reported to FSA's Manager – Power Plant and to the owner of the MSF.

The frequency of the conduct of internal audits will be twice yearly for the first three years of operation dropping to yearly thereafter – contingent on audit findings and recommendations.

## 9.3 COMPLIANCE TRACKING PROGRAM

FSA, consistent with CoA C11, will maintain a compliance tracking program to track compliance with the requirements of the Minister's approval during the operation of the MSF.

This program includes:

- reporting on compliance status with the Minister's approval to DPE through submission of an independent environmental audit undertaken in accordance with *AS/NZ ISO 19011:2003 - Guidelines for Quality and/or Environmental Management Systems Auditing* within two years of operation;
- a commitment to continual improvement and documenting corrective actions as specified in this OEMP;
- recording environmental incidents and actions taken in response to those incidents as specified in this OEMP;
- reporting environmental incidents to DPE as specified in this OEMP; and
- ensuring all employees, contractors and sub-contractors, prior to commencing operational activities on-farm, are informed through the site induction, of the specific environmental conditions as they align with this OEMP.

Evidence of the implementation of the compliance tracking program during operation of the MSF will be available through the environmental performance reporting documentation and deliverables identified in **Table 9.1**, inclusive of monitoring results, reports, audits (external and internal) and management reviews.

In addition to making performance reporting documentation available to DPE on request, FSA, consistent with CoA C5, will make these documents available (subject to reasonable confidentiality requirements) for public inspection on request as they are required under the Minister's approval .

## 9.4 DPE NOTIFICATION

DPE will be notified in writing to compliance@planning.nsw.gov.au within 7 days after FSA becomes aware of any non-compliance.

The notification will:

- identify the development (***Manildra Solar Farm***) and the application number (***MP10_0122***);
- set out the condition of consent that the development is non-compliant with;
- the way in which it does not comply;
- the reasons for non-compliance (if known); and
- what actions have been done, or will be, undertaken to address the non-compliance.

## 9.5 MANAGEMENT REVIEW

FSA's Manager – Power Plant and Manildra Supervisor will review the OEMP annually to ensure its continuing suitability, adequacy and effectiveness.

This management review will include consideration of

- the status of actions from previous management reviews;
- the results and recommendations from the internal audits;
- changes in the needs and expectations of interested parties;
- the extent to which environmental objectives have been achieved;
- information on environmental performance, including trends in nonconformities and corrective actions, monitoring and measurement results;
- complaints and incidents; and
- Opportunities for improvement.

The outputs of these management reviews will include:

- conclusions on the continuing suitability, adequacy and effectiveness of the OEMP;
- decisions related to continual improvement opportunities;
- decisions related to any need for changes to the OEMP; and
- actions if environmental compliance has not been achieved.

FSA will retain documented information as evidence of the results of management reviews.

## 9.6 CONTINUAL IMPROVEMENT

FSA will determine opportunities for improvement and implement necessary actions to achieve full and consistent compliance with this OEMP. If a noncompliance occurs FSA will:

- React to the nonconformity and, as applicable:
  - take action to control and correct it;
  - deal with the consequences, including mitigating adverse environmental impacts;
- Evaluate the need for action to eliminate the causes of the nonconformity, in order that it does not recur or occur elsewhere, by:
  - reviewing the nonconformity;
  - determining the causes of the nonconformity;
  - determining if similar nonconformities exist, or could potentially occur;
- Implement any action needed;
- Review the effectiveness of any corrective action taken;
- Make changes to the OEMP (if necessary).

FSA will retain documented information of any noncompliance and the corrective action taken.

# References

**ISO 14001:2015(E)** *Environmental management systems – requirements with guidance for use*

**DIPNR (2004)** *Guidelines for the Preparation of Environmental Management Plans*

**EPA (2017)** *Noise Policy for Industry*

**Entura (June 2017)** *Manildra Solar Farm – Soil and Water Management Plan (Rev D)*

**Footprint (undated)** *Proposed Manildra Solar Farm – Preliminary Hydrological and Hydraulic Assessment*

**Heggies (October 2010)** *Manildra Solar Farm Noise Monitoring and Assessment*

**Essential Energy (March 2012)** Operational Procedure: Vegetation Clearing Guidelines for New Power Lines

**NSW Rural Fire Service (undated)** Bushfire Survival Plan

**ngh environmental (December 2010)** *Manildra Solar Farm Submissions Report*

**ngh environmental (February 2017)** *Manildra Solar Farm Offset Plan*

**ngh environmental (October 2010)** *Environmental Assessment Manildra Solar Farm*

**ngh environmental (February 2016)** *Manildra Solar Farm Landscape Plan*

**ngh environmental (February 2016)** *Manildra Solar Farm Groundcover Management Plan*

**ngh environmental (April 2016)** *Manildra Solar Farm Flora and Fauna Management Plan*

**ngh environmental (February 2016)** *Manildra Solar Farm Offset Strategy*

**ngh heritage (December 2010)** *Manildra Solar Farm Heritage Assessment – Stone Cottage Ruin*

**ngh environmental (December 2010)** ***Manildra Solar Farm Submissions Report***

**ngh environmental (December 2010)** *Manildra Solar Farm Submissions Report – Biodiversity Assessment Addendum*

**New South Wales Archaeology (September 2010)** *Archaeological and Cultural Heritage Assessment*

# Appendix A

## CONDITIONS OF APPROVAL

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| **Part A – Administrative Conditions** | | | |
| A1 | The Proponent shall carry out the project generally in accordance with the:<br>(a) EA; and<br>(b) conditions of this approval.<br>Note: The general layout of the project is shown in Appendix 1. | Yes | |
| A2 | In the event of an inconsistency between the above documents, the most recent document shall prevail to the extent of any inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency. | Yes | |
| A3 | The Proponent shall comply with any reasonable requirement(s) of the Secretary arising from the Department's assessment of:<br>(a) any reports, plans or correspondence that are submitted in accordance with this approval; and<br>(b) the implementation of any actions or measures contained in these reports, plans or correspondence. | Yes | Section 2.3 |
| A4 | For the purpose of section 75S(2)(b) of the Act, the relevant provisions, as defined in section 75S(1A) of the Act, apply to this approval. | No | - |
| A5 | This project approval shall lapse on 3 March 2019, unless the works subject of this approval have been physically commenced before that date. | No | - |
| A6 | The Proponent shall ensure that all licences, permits and approvals are obtained and maintained as required throughout the life of the project. No condition of this approval removes the obligation of the Proponent to obtain, renew or comply with such licences, permits or approvals. The Proponent shall ensure that a copy of this approval and all relevant environmental approvals are available on the site at all times during the project. | Yes | Section 2.4 |
| A7 | Within one year of decommissioning, the site shall be returned, as far as practicable, to its condition prior to the commencement of construction in consultation with relevant landowners. All solar panels and associated above ground structures including but not necessarily limited to, the substation, the control and facilities building and electrical infrastructure, including underground infrastructure to a depth of 300mm, shall be removed from the site unless otherwise agreed by the Secretary, except where the substation, control room or overhead electricity lines are transferred to or in the control of the local electricity network operator. All other elements associated with the project, including site roads, shall be removed unless otherwise agreed to by the Secretary. | No | |
| A8 | If the solar farm is not used for the generation of electricity for a continuous period of 12 months, it shall be decommissioned by the Proponent, unless otherwise agreed by the Secretary. The Proponent shall keep independently-verified annual records of the use of the solar panels for electricity generation. Copies of these records shall be provided to the Secretary upon request. The solar panels and any associated infrastructure are to be dismantled and removed from the site by the Proponent within 18 months from the date that the solar panels were last used to generate electricity. | No | |
| A9 | Prior to the commencement of construction, the Proponent shall provide written evidence to the satisfaction of the Secretary that the lease agreements with the site landowners have adequate provisions to require that decommissioning occurs in accordance with this approval. | No | |
| A10 | All staff and contractors are made aware of the stone cottage ruin adjacent to the access road. The site of the cottage should be clearly marked out, fenced, and referred to in the CEMP for the proposal. | No | |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| A11 | Should widening of the access road that would decrease its distance to the cottage be proposed, then further assessment of the impacts on the Stone Cottage ruin shall be conducted. A Heritage Impact Statement must be prepared and submitted for the Secretary's approval prior to the commencement of any construction works of the access road. | No | |
| A12 | Nothing in this approval permits the demolition or other direct impacts on the Stone Cottage ruin. | Yes | Section 6.7 |
| **Part B – General Conditions** | | | |
| B1 | The Proponent shall ensure that all project components on site are designed, constructed and operated to minimise ignition risks, provide for asset protection consistent with relevant RFS design guidelines (Planning for Bushfire Protection 2006 and Standards for Asset Protection Undated) and provide for necessary emergency management including appropriate fire-fighting equipment and water supplies on site to respond to a bush fire. | Yes | Section 6.2 |
| B2 | Throughout the operational life of the project, the Proponent shall regularly consult with the local RFS to ensure its familiarity with the project, including the construction timetable and the final location of all infrastructure on the site. The Proponent shall comply with any reasonable request of the local RFS to reduce the risk of bushfire and to enable fast access in emergencies. | Yes | Section 6.2 |
| B3 | The Proponent shall construct and operate the project in a manner that minimises dust generation from the site, including wind-blown and traffic-generated dust as far as practicable. All project related activities on the site shall be undertaken with the objective of preventing visible emissions of dust from the site. Should visible dust emissions attributable to the project occur during operation and construction, the Proponent shall identify and implement all practicable dust mitigation measures, including cessation of relevant works, as appropriate, such that emissions of visible dust cease. | Yes | Section 6.1.6 |
| B4 | Except as may be expressly provided by an Environment Protection Licence for the project, the Proponent shall comply with section 120 of the *Protection of the Environment Operations Act 1997* which prohibits the pollution of waters. | Yes | Section 6.1.5 |
| B5 | The Proponent shall not cause, permit or allow any waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997, if such a licence is required in relation to that waste. | Yes | Section 6.8 |
| B6 | The Proponent shall maximise the reuse and/or recycling of waste materials generated on site, to minimise the need for treatment or disposal of those materials outside the site. | Yes | Section 6.8 |
| B7 | The Proponent shall ensure that all liquid and/or non-liquid waste generated on the site is assessed and classified in accordance with Waste Classification Guidelines (DECC, 2008), or any future guideline that may supersede that document and where removed from the site is only directed to a waste management facility lawfully permitted to accept the materials. | Yes | Section 6.8 |
| B8 | The Proponent shall ensure that no green waste is burnt on site during the life of the project. | Yes | Section 6.8 |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| B9 | The Proponent shall store and handle all dangerous goods (as defined by the Australian Dangerous Goods Code), combustible liquids, and any other hazardous materials strictly in accordance with:<br>(a) all relevant Australian Standards;<br>(b) a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund; and<br>(c) Storing and Handling Liquids: Environmental Protection – Participants Manual (2007); and<br>(d) Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management – Part B Review of Best Practice and Regulation (2005). In the event of an inconsistency between requirements listed from a) to d) above, the most stringent requirement shall prevail to the extent of the inconsistency. | Yes | Section 6.9 |
| **Part C – Prior to Construction** | | | |
| C1 | The clearing of all native vegetation is to be limited to the minimal extent practicably required. Details regarding the procedures for clearing vegetation and minimising the extent of clearing shall be clearly included in the Flora and Fauna Management Plan required by in condition C14(a). | No | |
| C2 | The Proponent shall prepare a biodiversity offset strategy, in consultation with OEH and the landholder to the satisfaction of the Secretary, to guide the development of the offset package required in condition E3. The offset strategy is to be prepared by an ecologist and submitted for approval prior to the commencement of construction and include:<br>(a) consideration of all native vegetation losses and the adequacy of the proposed offset;<br>(b) demonstration of how the offset will 'improve or maintain' biodiversity values;<br>(c) the proposed offset ratios and connectivity improvements;<br>(d) proposed management actions;<br>(e) demonstration of how the strategy was prepared in accordance with OEH's Principles for the Use of Biodiversity Offsets in NSW; and<br>(f) measures to ensure in-perpetuity the conservation commitment. | No | |
| C3 | Deleted | - | - |
| C4 | Prior to the commencement of construction of the project, the Proponent shall commission a suitably qualified expert to assess the condition of all public roads proposed to be traversed by construction traffic associated with the project (including over-mass or over-dimensional vehicles) in consultation with Council and the RMS, and identify any upgrade requirements to accommodate project traffic for the duration of construction (including culvert, bridge and drainage design; intersection treatments; vehicle turning requirements; and site access) considering final traffic volumes. The road dilapidation report shall be submitted to the Secretary prior to the commencement of construction clearly identifying recommendations made by the Council and the RMS and how these have been addressed. The Proponent shall ensure that all upgrade measures identified in the report are implemented to the satisfaction of Council and the RMS, prior to the commencement of construction. | No | |
| C5 | Subject to reasonable confidentiality requirements, the Proponent shall make all documents required under this approval available for public inspection on request. | Yes | Section 6.4 |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| C6 | Prior to the commencement of construction, the Proponent shall establish a dedicated website or maintain dedicated pages within its existing website for the provision of electronic information associated with the project. The Proponent shall publish and maintain up-to-date information on this website or dedicated pages including, but not necessarily limited to:<br>(a) the status of the project;<br>(b) a copy of this approval and any future modification to this approval;<br>(c) a copy of each relevant environmental approval, licence or permit required and obtained in relation to the project;<br>(d) a copy of each plan, report, or monitoring program required by this approval; and<br>(e) details of the outcomes of compliance reviews and audits of the project. | Yes | Section 6.4 |
| C7 | Prior to the commencement of construction, the Proponent shall prepare and implement a Community Information Plan which sets out the community communication and consultation processes to be implemented during construction and operation of the project. The Plan shall include but not be limited to:<br>(a) procedures to inform the local community of planned investigations and construction activities, including blasting works (if any);<br>(b) procedures to inform the relevant community of construction traffic routes and any potential disruptions to traffic flows and amenity impacts;<br>(c) procedures to consult with local landowners with regard to construction traffic to ensure the safety of livestock and to limit disruption to livestock movements;<br>(d) procedures to inform the community where work outside the construction hours specified in Condition PART CD1 in particular noisy activities, has been approved; and<br>(e) procedures to inform and consult with affected landowners to rehabilitate impacted land. | Yes | Section 6.4 |
| C8 | Prior to the commencement of construction, the Proponent shall ensure that the following are available for community complaints for the life of the project (including construction and operation) or as otherwise agreed by the Secretary:<br>(a) a 24 hour telephone number on which complaints about construction and operational activities at the site may be registered;<br>(b) a postal address to which written complaints may be sent; and<br>(c) an email address to which electronic complaints may be transmitted.<br>The telephone number, postal address and e-mail address shall be advertised in a newspaper circulating in the area on at least one occasion prior to the commencement of construction; and at six-monthly intervals during construction and for a period of two years following commencement of operation of the project. These details shall also be provided on the Proponent's internet site required by condition C6. The telephone number, the postal address and the email address shall be displayed on a sign near the entrance to the construction site(s), in a position that is clearly visible to the public. | Yes | Section 8 |
| C9 | The Proponent shall record details of all complaints received through the means listed in condition C8 of this approval in an up-to-date Complaints Register. The Register shall record, but not necessarily be limited to:<br>(a) the date and time, of the complaint;<br>(b) the means by which the complaint was made (telephone, mail or email);<br>(c) any personal details of the complainant that were provided, or if no details were provided, a note to that effect;<br>(d) the nature of the complaint;<br>(e) any action(s) taken by the Proponent in relation to the complaint, including timeframes for implementing the action; and<br>(f) if no action was taken by the Proponent in relation to the complaint, the reason(s) why no action was taken.<br>The Complaints Register shall be made available for inspection by the Secretary upon request. | Yes | Section 12 |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| C10 | The Proponent shall provide an initial response to any complaints made in relation to the project during construction or operation within 48 hours of the complaint being made. The response and any subsequent action taken shall be recorded in accordance with condition C9. Any subsequent detailed response or action is to be provided within two weeks. | Yes | Section 12 |
| C11 | Prior to the commencement of construction, the Proponent shall develop and implement a Compliance Tracking Program, to track compliance with the requirements of this approval during the construction and operation of the project and shall include, but not necessarily be limited to:<br>(a) provisions for periodic reporting of compliance status to the Secretary including at least prior to the commencement of construction of the project, prior to the commencement of operation of the project and within two years of operation commencement;<br>(b) a program for independent environmental auditing in accordance with AS/NZ ISO 19011:2003 - Guidelines for Quality and/or Environmental Management Systems Auditing;<br>(c) procedures for rectifying any non-compliance identified during environmental auditing or review of compliance;<br>(d) mechanisms for recording environmental incidents and actions taken in response to those incidents;<br>(e) provisions for reporting environmental incidents to the Secretary during construction and operation; and<br>(f) provisions for ensuring all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this approval relevant to their respective activities. | Yes | Section 9 |
| C12 | Prior to the commencement of any construction or operational activities, the Proponent shall nominate for the approval of the Secretary a suitably qualified and experienced Environmental Representative(s) independent of the design, construction and operation personnel. The Proponent shall engage the Environmental Representative(s) prior to construction until at least six months after commencement of operation, or as otherwise agreed by the Secretary. The Environmental Representative(s) shall:<br>(a) monitor the implementation of all environmental management plans and monitoring programs required under this approval;<br>(b) monitor the outcome of all environmental management plans and advise the Proponent upon the achievement of all project environmental outcomes;<br>(c) have responsibility for considering and advising the Proponent on matters specified in the conditions of this approval, and all other licences and approvals related to the environmental performance and impacts of the project;<br>(d) ensure that environmental auditing is undertaken in accordance with the requirements of Condition C11 and the project Environmental Management System(s);<br>(e) be consulted in responding to the community concerning the environmental performance of the project; and<br>(f) have the authority and independence to recommend to the Proponent reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts, and, failing the effectiveness of such steps, to recommend to the Proponent that relevant activities are to be ceased as soon as reasonably practicable if there is a significant risk that an adverse impact on the environment will be likely to occur, until reasonable steps are implemented to avoid such impact. | Yes | Section 3.2. |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| C13 | The Proponent shall prepare and implement a Construction Environmental Management Plan (CEMP) to outline environmental management practices and procedures to be followed during construction of the project. The Plan shall be prepared in consultation with NOW and Cabonne Shire Council and be consistent with the Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004 or its latest revision) and shall include, but not necessarily be limited to:<br>The Construction Environmental Management Plan shall be submitted for the approval of the Secretary no later than one month prior to the commencement of any relevant construction works associated with the project, or within such period otherwise agreed by the Secretary. Construction works shall not commence until written approval has been received from the Secretary. | | |
| (a) | a description of all relevant activities to be undertaken on the site during construction including an indication of stages of construction, where relevant; | No | |
| (b) | identification of the potential for cumulative impacts with other construction activities occurring in the vicinity and how such impacts would be managed; | No | |
| (c) | details of any construction sites and mitigation, monitoring, management and rehabilitation measures specific to the site compound(s) that would be implemented; | No | |
| (d) | statutory and other obligations that the Proponent is required to fulfil during construction including all relevant approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies; | No | |
| (e) | evidence of consultation with relevant public authorities required under this condition and how issues raised by the agencies have been addressed in the plan; | No | |
| (f) | a description of the roles and responsibilities for all relevant employees involved in the construction of the project including relevant training and induction provisions for ensuring that all employees, contractors and sub-contractors are aware of their environmental and compliance obligations under these conditions of approval; | No | |
| (g) | details of how the environmental performance of construction will be monitored, and what actions will be taken to address identified potential adverse environmental impacts; | No | |
| (h) | specific consideration of relevant measures to address any requirements identified in the EA; | No | |
| (i) | the additional requirements of this approval; | No | |
| (j) | a complaints handling procedure during construction; | No | |
| (k) | maps or plans clearly indicating where the project area has been reduced to minimise impacts to EEC and native grasses in good condition; | No | |
| (l) | a matrix of construction work method statements (or similar) to be prepared and the anticipated level of risk associated with each to be determined. | No | |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| (m) | measures to monitor and manage soil and water impacts in consultation with NOW including: control measures for works close to waterways (including rehabilitation measures following disturbance and monitoring measures and completion criteria to determine rehabilitation success), identification of construction activities that are likely to pose a risk of groundwater interference, and procedures for managing groundwater impacts should they occur (including to groundwater dependent species and to registered groundwater users); | No | |
| (n) | measures to monitor and manage flood impacts in consultation with NOW and shall include contingency measures for the site during potential floods; | No | |
| (o) | measures to monitor and manage dust emissions including dust generated by traffic on unsealed public roads and unsealed internal access tracks; and | No | |
| (p) | emergency management measures including measures to control bushfires. | No | |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| C14 | As part of the Construction Environmental Management Plan required under condition C13 of this approval, the Proponent shall prepare and implement the following: | | |
| (a) | a Flora and Fauna Management Plan, developed in consultation with OEH, to outline measures to protect and minimise loss of native vegetation and native fauna habitat as a result of construction of the project. The Plan shall include, but not necessarily be limited to:<br>(i) plans showing terrestrial vegetation communities; important flora and fauna habitat areas; locations where EECs, native grasses are to be cleared. The plans shall also identify vegetation adjoining the site where this contains important habitat areas and/or threatened species, populations or ecological communities;<br>(ii) methods to manage impacts on flora and fauna species and their habitat which may be directly or indirectly affected by the project, such as location of fencing, procedures for vegetation clearing or soil removal/stockpiling and procedures for re-locating hollows or installing nesting boxes and managing weeds;<br>(iii) procedures to accurately determine the total area, type and condition of vegetation community to be cleared;<br>(iv) reference to the Ground Cover Management Plan required in condition C14(b); and<br>(v) a procedure to review management methods where they are found to be ineffective. | Yes | Section 6.2 |
| (b) | a Ground Cover Management Plan, developed in consultation with OEH, to outline measures to ensure adequate vegetation cover and composition beneath the solar PV array. The Plan shall include, but not necessarily be limited to:<br>(i) procedures to minimise disturbance to ground cover not impacted by the project particularly in the area of the native grasses in good condition;<br>(ii) procedures for the stabilisation, rehabilitation and revegetation of disturbed ground cover including reference to field trials where required;<br>(iii) weed management measures to control and prevent the spread of noxious weeds;<br>(iv) monitoring methods to assess the impact of the project on the ground cover vegetation; and<br>(v) a procedure to review management methods where they are found to be ineffective. | Yes | Section 6.1 |
| (c) | a Landscape Plan for the approval of the Secretary. In preparing the Plan, the Proponent shall consult with Council. The Plan shall include, but not necessarily be limited to:<br>(i) identification of landscaping objectives and standards based on visual impacts and local environmental values;<br>(ii) details of species used to enhance, mitigate and/or augment landscaping to minimise the visual impact of the project, particularly with respect to the impacts on nearby residences;<br>(iii) implementation, management and monitoring strategies to ensure the establishment and ongoing maintenance of landscaped areas;<br>(iv) a consultation strategy to seek feedback from affected residents and the interested community on the proposed landscape measures. | Yes | Section 6.6 |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| (d) | a Construction Noise Management Plan to manage noise impacts during construction and to identify all feasible and reasonable noise mitigation measures. The Plan shall include, but not necessarily be limited to:<br>(i) details of construction activities and an indicative schedule for construction works;<br>(ii) identification of construction activities that have the potential to generate noise impacts on surrounding land uses, particularly residential areas;<br>(iii) detail the requirements for Noise Impact Statement(s) for discrete work areas, including construction site compounds;<br>(iv) detail what reasonable and feasible actions and measures would be implemented to minimise noise impacts;<br>(v) procedures for notifying sensitive receivers of construction activities that are likely to affect their noise amenity, as well as procedures for dealing with and responding to noise complaints;<br>(vi) an out-of-hours work (OOHW) protocol for the assessment, management and approval of works outside of standard construction hours as defined in condition D1 of this approval, including a risk assessment process under which the Environmental Representative may approve out-of-hour construction activities deemed to be of low environmental risk and refer high risk works for the Secretary's approval. The OOHW protocol shall detail standard assessment, mitigation and notification requirements for high and low risk out-of-hour works, and detail a standard protocol for referring applications to the Secretary; and<br>(vii) a description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be conducted, the locations where monitoring would take place, how the results of this monitoring would be recorded and reported; and, if any exceedance is detected how any non-compliance would be rectified. | No | |
| (e) | a Traffic Management Plan to manage traffic conflicts that may be generated during construction. The Plan shall address the requirements of the relevant road authority and shall include, but not necessarily be limited to:<br>(i) details of how construction of the project will be managed in proximity to local and regional roads;<br>(ii) details of traffic routes for heavy vehicles, including any necessary route or timing restriction for oversized loads;<br>(iii) demonstration that all statutory responsibilities with regard to road traffic impacts have been complied with;<br>(iv) details of measures to minimise interactions between the project and other users of the roads such as the use of fencing, lights, barriers, traffic diversions etc;<br>(v) procedures for informing the public where any road access will be restricted as a result of the project;<br>(vi) procedures to manage construction traffic to ensure the safety of livestock and to minimise disruption to livestock;<br>(vii) speed limits to be observed along routes to and from the site and within the site; and<br>(viii) details of the expected behavioural requirements for vehicle drivers travelling to and from the site and within the site. | No | |
| **Part D – During Construction** | | | |
| D1 | The Proponent shall only undertake construction activities associated with the project that would generate an audible noise at any sensitive receptor during the following hours:<br>(a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;<br>(b) 8:00 am to 1:00 pm on Saturdays; and<br>(c) at no time on Sundays or public holidays.<br>This condition does not apply in the event of a direction from police or other relevant authority for safety reasons, or emergency work to avoid the loss of lives, property and/or to prevent environmental harm. | No | |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| D2 | Construction outside of these hours specified in condition D1 may be varied for works as approved through the out-of-hours work protocol outlined in condition C14(d) of this approval. Any request to alter the hours of construction shall:<br>(a) be considered on a case-by-case basis;<br>(b) be accompanied by details of the nature and need for activities to be conducted during the varied construction hours and any other information necessary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of receptors in the vicinity of the site; and<br>(c) require that affected residential receivers are informed of the timing and duration of any construction activities approved under this condition at least 48 hours before that work commences. | No | |
| D3 | Any work generating high noise levels that have impulsive, intermittent, low frequency or tonal characteristics, including jack hammering, line drilling, pile driving, rock hammering, rock breaking, saw cutting, sheet piling, vibratory rolling but excluding blasting, which exceeds 42dBA at any sensitive receiver, must only be undertaken:<br>(a) between the hours of 8:00am and 6:00pm Monday to Friday;<br>(b) between the hours of 8:00am and 1:00pm Saturday; and<br>(c) in continuous blocks of no more than three hours, with at least a one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receivers;<br>except as otherwise approved by the Secretary. For the purposes of this Condition 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this Condition. | No | |
| D4 | The Proponent shall implement all reasonable and feasible measures to minimise noise generation from the construction of the project consistent with the requirements of the Interim Construction Noise Guideline (DECC, July 2009) including noise generated by heavy vehicle haulage and other construction traffic associated with the project. | No | |
| D5 | The proponent should implement mitigation measures as recommended in the Noise Monitoring & Assessment Report prepared by Heggies, including:<br>(a) sensitive receivers being advised in advance of periods of sustained noise emissions which exceed noise targets;<br>(b) periods of respite would be provided in the case of unavoidable maximum noise level events;<br>(c) reasonable and feasible measures to reduce noise such as temporary barriers along the western boundary of the construction area, minimising the duration of activities and the number of items of plant equipment operating concurrently; carrying out extremely noisy activities during weather conditions that do not favour the propagation of sound to noise sensitive locations; and<br>(d) a documented complaints process.<br>The above mitigation measures shall be detailed in the CNMP. | No | |
| D6 | If during the course of construction the Proponent becomes aware of any previously unidentified Aboriginal object(s), all work likely to affect the object(s) shall cease immediately and the OEH informed in accordance with the National Parks and Wildlife Act 1974. In addition, registered Aboriginal stakeholders shall be informed of the finds. Works shall not recommence until an appropriate strategy for managing the objects has been determined in consultation with OEH and the registered Aboriginal stakeholders and written authorisation from OEH is received by the Proponent. | No | |
| D7 | If during the course of construction the Proponent becomes aware of any unexpected historical relic(s), all work likely to affect the relic(s) shall cease immediately and the Heritage Office notified in accordance with the Heritage Act 1977. Works shall not recommence until the Proponent receives written authorisation from the Heritage Office. | No | |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| D8 | Soil and water management controls shall be employed to minimise soil erosion and the discharge of sediment and other pollutants to lands and/or waters during construction activities, in accordance with:<br>(a) Managing Urban Stormwater: Soils and Conservation (Landcom, 2004);<br>(b) Managing Stormwater: Urban Soils and Construction 2A Installation of Services (DECC 2008); and<br>(c) Managing Stormwater: Urban Soils and Construction Vol 2C Unsealed Roads (DECC 2008). | No | |
| **Part E – Prior to Operations** | | | |
| E1 | Prior to the commencement of operation of the project, the Proponent shall commission a suitably qualified expert to assess the condition of all public roads traversed by construction traffic associated with the project (including over-mass or over-dimensional vehicles) in consultation with Council and the RMS. Should the preoperational dilapidation survey report identify any damage to roads attributable to construction traffic associated with the project, the Proponent shall repair the roads consistent with the recommendations of the pre-operational dilapidation survey report, within such time as agreed to with the Council and the RMS. The pre-operation road dilapidation report shall be submitted to the Secretary prior to the commencement of operation, clearly identifying recommendations made by the Council and the RMS and how these have been addressed. | No | |
| E2 | The Proponent shall prepare and implement an Operational Environmental Management Plan in accordance with the Guideline for the Preparation of Environmental Management Plans (DUAP, 2004) or its latest revision. The Plan is to be prepared in consultation with the NOW and Cabonne Council as relevant. The Plan shall include but not necessarily be limited to:<br>(a) identification of all statutory and other obligations that the Proponent is required to fulfil in relation to the operation of the development, including all consents, licences, approvals and consultations;<br>(b) a management organisational chart identifying the roles and responsibilities for all relevant employees involved in the operation of the project;<br>(c) overall environmental policies to be applied to the operation of the project;<br>(d) standards and performance measures to be applied to the project, and means by which environmental performance can be periodically monitored, reviewed and improved, (where appropriate) and what actions would be taken in the case that non-compliance with the requirements of this approval are identified. In particular the following environmental performance issues shall be addressed:<br>(i) bushfire hazard and risk management;<br>(ii) management and maintenance of offsets; and<br>(iii) management measures for easement areas, including management of vegetation, soil erosion, weed control and landholder liaison.<br>(e) the environmental monitoring requirements outlined under this approval;<br>(f) complaints handling procedures as identified in conditions C8 to C10;<br>(g) specific consideration of relevant measures to address any requirements identified in the EA; and<br>(h) management policies to ensure that environmental performance goals are met and do comply with the conditions of this approval.<br>The Plan shall be submitted for the approval of the Secretary no later than one month prior to the commencement of Operation of the project or within such period as otherwise agreed by the Secretary. Operation shall not commence until written approval has been received from the Secretary. Upon receipt of the Secretary's approval, the Proponent shall make the Plan publicly available as soon as practicable. | Yes | |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| E3 | Details of the offset package shall be submitted for the approval of the Secretary prior to the commencement of operation or as agreed by the Secretary. The package shall:<br>(a) describe how the offset shall be guaranteed, managed and monitored in perpetuity;<br>(b) ensure all impacted vegetation communities and threatened species habitat have been offset as per the ratios/amounts calculated through the outcomes of the assessment carried out under Condition C2;<br>(c) demonstrate how the offset ratio is consistent with the principles of "improve or maintain" for biodiversity values; and<br>(d) include requirements for a post construction review to confirm the extent of clearing was commensurate with and not greater than that predicted. If clearing is greater, then the package shall demonstrate how the offset was modified and increased to the value of the actual biodiversity loss. | Yes | Section 6.2 |
| F1 | During operations, the Proponent shall ensure that the noise generated by the project does not exceed 35dB(A)(LAeq15min) at any residence on privately-owned land.<br>Noise generated by the project is to be measured in accordance with relevant requirements of the NSW Industrial Noise Policy (as may be updated from time to time).<br>This limit does not apply if the Proponent has entered into a written agreement with the relevant landowner to exceed the limits, and the Proponent has advised the Department in writing of the terms of this agreement. | Yes | Section 6.5 |
| F2 | The Proponent shall prepare a noise compliance report within 3 months of commissioning of the project. The noise compliance report must:<br>(a) be prepared by a suitably qualified noise expert;<br>(b) demonstrate that the project is complying with the noise criteria in condition F1; and<br>(c) be submitted to the Department and EPA within one month of receiving the report,<br>to the satisfaction of the Secretary. | Yes | Section 6.5 |
| F3 | Deleted | - | - |
| F4 | Within six months of the commissioning of the project, the Proponent shall prepare and submit a Visual Impact Verification Report for the Secretary's approval. Unless otherwise agreed to by the Secretary, the Visual Impact Verification Report shall confirm the visual impacts at each of the receptors and roadways identified in the Environmental Assessment as having the potential to be at least 'moderately impacted', considering the final model and layout of generating components on site as well as site specific mitigating factors at the receptors and roadways (such as receptor orientation and intervening screening factors). The Visual Impact Verification Report shall identify all reasonable and feasible screening and landscape planting options available at each receptor and roadways at which potential impacts have been verified including demonstration that these measures have been determined in consultation with affected receptors and relevant road authorities.<br>Within 18 months of the approval of the Visual Impact Verification Report by the Secretary (or as otherwise agreed to by the Secretary), the Proponent shall ensure that the measures identified in the Report are implemented at affected receptors and roadways as identified in the Report in consultation with relevant landowners and road authorities | Yes | Section 6.6.2 |
| F5 | The Proponent shall ensure that any permanent buildings are designed and constructed to minimise visual intrusion to nearest sensitive receptors as far as reasonable and feasible, including appropriate external finishes and landscape planting to screen views. | No | |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| F6 | The Proponent shall implement a revegetation and rehabilitation program for all areas of the development footprint which are disturbed during the construction of the project, but which are not required for the ongoing operation of the project including temporary construction facility sites and sections of construction access roads. The Proponent shall ensure that all revegetation measures are implemented progressively where possible and in all cases within six months of the cessation of construction activities at the relevant area. Unless otherwise agreed to by the Secretary, the Proponent shall monitor and maintain the health of all revegetated areas until such time that the plantings have been verified by an independent and suitably qualified expert (whose appointment has been agreed to by the Secretary) as being well established, in good health and self sustaining. | Yes | Section 6.1 |

**Table A.1 – Conditions of Approval**

| CoA | Description | Relevance to OEMP | OEMP Reference |
|---|---|---|---|
| **Part G – Decommissioning / Post Operations** | | | |
| G1 | No later than one month prior to the decommissioning of the project, or as otherwise agreed by the Secretary, the Proponent is to prepare a Decommissioning Management Plan for the approval of the Secretary. The Plan is to include but not necessarily be limited to:<br>(a) identification of structures to be removed and how they will be removed;<br>(b) measures to reduce impacts on the environment and surrounding sensitive land uses;<br>(c) details of components to be recycled;<br>(d) details of rehabilitation and revegetation with reference to the biodiversity offset required under condition E3. | No | |

Source: NSW Government Department of Planning Project Approval MP10_0122

# Appendix B

## STATEMENTS OF COMMITMENT

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| **BIODIVERSITY** | | | | |
| 1 | Loss or modification of habitat | An Offset Plan will be prepared by an ecologist consistent with the 'Principles for the use of biodiversity offsets in NSW', as outlined in the Biodiversity Assessment, and submitted for approval prior to the commencement of works. The plan would be developed in consultation with the landowner and would offset the impact of the development for the period that the impact occurs. | Yes | Section 6.2 |
| 2 | Infrastructure related biodiversity impacts | The PV array, site access tracks and other infrastructure should be sited to avoid constraints identified within the Biodiversity Assessment constraints mapping. These include:<br>- The larger stands of Box-Gum Woodland across the site<br>- Hollow bearing trees<br>- Isolated shade trees where possible<br>- Native grassland and associated rock outcrops in the Western Paddock<br>- As far as possible rock outcrops across the proposal site together with a minimum 2.5 metre buffer to avoid shading. | No | |
| 3 | Infrastructure related biodiversity impacts | Areas of high biodiversity value would be clearly identified throughout construction and protected from the direct and indirect impacts of the Proposal. Contractors and staff would be made aware of the significance and sensitivity of these areas. | No | |
| 4 | Infrastructure related biodiversity impacts | The western paddock of the proposed solar farm site should be avoided if possible to minimise impacts to grassy groundcover flora comprising the Box-Gum Woodland EEC. | No | |
| 5 | Construction Impacts | Where security concerns permit perimeter fences should not contain barbed wire, particularly the top strands. If a cycisolated mesh fence is to be used efforts should be made to increase the visibility to fast flying parrots. | No | |
| 6 | Construction Impacts | If used, and where practicable, power poles and overhead powerlines will be bird-safe using flags or marker balls, large wire size and wire and conductor spacing. | No | |
| 7 | Infrastructure related biodiversity impacts | If the removal of any hollow bearing trees was required this activity would be proceeded by a pre clearance check by a qualified ecologist including anabat survey and stag watching. | No | |
| 8 | Infrastructure related biodiversity impacts | Works will avoid impacts to mature eucalypts wherever possible. Tree protection standards should comply with Australian standard AS4970-2009 Protection of trees on development sites (Standards Australia, 2009). Wherever practicable, excavations and vehicle/machinery movements will occur outside the canopy dripline of large eucalypts. | No | |
| 9 | Construction Impacts | Existing farm tracks should be used wherever possible to minimise the number of new roads. | No | |
| 10 | Construction Impacts | Where cement is included in cable trench backfill, at least 20 centimetres of cement-free topsoil will be replaced as the top layer in the backfill.No | No | |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| 11 | Construction Impacts | Where practicable, whole sods will be removed with an excavator where these areas are well-vegetated with dense root systems. Sods will be stored in moist, shaded conditions and replaced following the works. Sod storage time will be minimised and sods will be replaced in a manner that maximises the chances of re-establishment. | No | |
| 12 | Construction Impacts | Where possible, as a precaution, works should be planned to avoid sensitive times for Superb Parrots - September to January. | No | |
| 13 | Construction Impacts | Excavated topsoil, subsoil will be stored separately and replaced in a manner that replicates the original profile as closely as possible | No | |
| 14 | Construction Impacts | Where practicable, grass surfaces and shrubs will be retained or restored on infrequently used vehicle routes | No | |
| 15 | Construction Impacts | Site stabilisation, rehabilitation and revegetation of all disturbed areas would be undertaken without delay. | No | |
| 16 | Construction Impacts | As a general rule, disturbed areas will be used preferentially for vehicle and machinery access, materials laydown, stockpiling of cleared vegetation and the deposition and retrieval of spoil whenever practicable. | No | |
| 17 | Construction Impacts | Works will be avoided during, and immediately following heavy rainfall events to protect soils and vegetation at the site. | No | |
| 18 | Construction Impacts | Weed / pathogen controls will be implemented, including:<br>- Machinery and vehicles used in construction works will be washed before and after site access to reduce the introduction and spread of weeds and pathogens.<br>- Laydown sites for excavated spoil, equipment and construction materials will be weed-free or treated for weeds wherever practicable.<br>- Weed monitoring will be carried out at all sites after the completion of construction works and ongoing weed control will occur where noxious or invasive species are recorded. In particular, monitoring will be undertaken during the following late spring/early summer, and remedial action taken as required.<br>- Sediment control materials should be weed free (straw bales, geotextiles).<br>- Imported materials such as sand and gravel will be sourced from sites which do not show evidence of noxious weeds or Phytophthora infection | No | |
| 19 | Construction Impacts | If dams are removed during site development works, alternative watering points should be established to compensate for their loss and maintain similar habitat resources for native fauna. | No | |
| 20 | Construction Impacts | Any trench sections left open for greater than a day would be inspected daily, early in the morning and any trapped fauna removed. The use of ramps or ladders to facilitate trapped fauna escape is recommended. | No | |
| 21 | Construction Impacts | Rock and log habitat removed during the construction phase will be reinstated following the works. | No | |
| 22 | Construction Impacts | Where tree hollows are required to be removed, these should be replaced by nest boxes of similar size in nearby trees. | No | |
| 23 | Construction Impacts | Wherever possible small rock outcrops at the site should be excluded from the array, together with a minimum 2.5 metre buffer to avoid shading. | No | |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| 24 | Operational Impacts | A groundcover management plan would be developed that would include regular monitoring of vegetation cover and composition and allow for adaptive management. This would include:<br>- Establishment of a shade tolerant perennial groundcover across the cropping and exotic dominated grazing paddocks prior to the installation of the PV arrays<br>- Advice from an agronomist in relation to preferred species/varieties, establishment methods of alternative pastures and best practice management.<br>- Where information is lacking, trials may be required onsite | Yes | Section 6.1 |
| 25 | Operational Impacts | If localised erosion is detected, effective treatments would be applied without delay, such as hardening with mulch, reseeding and covering with an open weave jute matting, gypsum application to improve structure and infiltration, protection with geotextile fabric or localised flow dispersal and diversion structures. | Yes | Section 6.1 |
| 26 | Operational Impacts | The space between the PV array rows should be maintained and kept clear to enable access by vehicles for ongoing weed control, and pasture renovation if required. | Yes | Section 6.1 |
| 27 | Operational Impacts | Efforts should be made to minimise disturbance to the existing groundcover during construction. Construction and maintenance vehicles should not access the site when soils are very wet to minimise soil compaction and disturbance. | Yes | Section 6.1.5 |
| 28 | Operational Impacts | Fencing along Molong Manildra Road should be maintained so as macropods and other large native fauna are not funnelled along the perimeter fence and onto the road creating a traffic hazard and collision risk to the animal. | Yes | Section 6.2 |
| 29 | Operational Impacts | Monitoring of fauna site habitat usage pre and post construction is recommended but not considered essential | Yes | Section 6.2.2 |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| **Visual Amenity** | | | | |
| 30 | Deterioration of visual amenity during construction | Measures to reduce visual impacts during construction, including but not limited to the following:<br>- Dust reduction throughout the construction process<br>- Restoration of any earthworks required for the construction<br>- Clearing of existing vegetation would be kept to a minimum | No | |
| 31 | Deterioration of visual amenity by solar panels and associated infrastructure | Measures include but are not limited to the following:<br>- Colour of above ground infrastructure to be sympathetic to the landscape character<br>- Underground cabling to be utilised if practical<br>- The design and location of ancillary works are to incorporate measures which would reduce this visual impact | No | |
| 32 | Deterioration of visual amenity at surrounding residences and roads | - Visual screen planting is to be undertaken in the form of boundary planting around the solar farm, foreground planting at affected viewpoints and residential tree planting.<br>- Screening vegetation would be planted along the northern, southern and western perimeters of the site.<br>- Roadside planting along the eastern edge of Manildra Molong Road may be undertaken to ensure views from the road are fragmented<br>- Tree planting would be undertaken in consultation with relevant landowners to achieve screening for homesteads with visual impacts to strategically block parts of the development.<br>- Species typical of the area would be selected to enhance the existing landscape character. | Yes | Section 6.6 |
| 33 | Creation of a visual Attraction | A designated viewing area may be provided where visitors would be able to safely view the solar farm and surrounding landscape. | No | |
| **Archaeology & Aboriginal Heritage** | | | | |
| 34 | Disturbance to artefacts | Where possible, the artefact scatter comprising five stone artefacts would be avoided. | Yes | Section 6.7 |
| 35 | Impact on local Aboriginal community | Ongoing consultation would be undertaken with Registered Aboriginal Parties | Yes | Section 6.7 |
| **Noise** | | | | |
| 36 | Noise impacts to sensitive receivers | Construction would be undertaken during standard working hours of:<br>- Monday – Friday: 7 am to 6 pm<br>- Saturday: 8 am to 1 pm<br>- Sunday and public holidays: No work | No | |
| 37 | Noise impacts to sensitive receivers | Construction staff would be made aware of noise sensitive receivers and would be made aware of noise reduction options. | No | |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| 38 | Noise impacts to sensitive receivers | Periods of respite would be provided in the case of unavoidable maximum noise level events. | No | |
| 39 | Noise impacts to sensitive receivers | Reasonable and feasible measures to reduce noise would be implemented and could include reducing the throttle setting and turning off equipment when not being used. | No | |
| 40 | Noise impacts to sensitive receivers | Equipment and plant would be maintained to reduce noise emissions. | No | |
| 41 | Noise impacts to sensitive receivers | Mobile plant clustering near residences would be avoided. | No | |
| 42 | Noise impacts to sensitive receivers | A 24 hour toll-free contact phone number for enquiries during the works would be provided. | No | |
| 43 | Noise impacts to sensitive receivers | A documented complaints process would be implemented and would include an escalation procedure so that if a complainant is not satisfied there is a clear path to follow. | Yes | Section 8 |
| 44 | Noise impacts to sensitive receivers | Where complaints occur safeguards would be reviewed to determine if further safeguards are required or possible. | Yes | Section 6.5 |
| **Traffic and Access** | | | | |
| 45 | Safety and asset Protection | The proponent would develop and implement a Traffic Management Plan (TMP) in consultation with roads authorities to facilitate appropriate management of potential traffic impacts. The TMP would include provisions for:<br>- Scheduling of deliveries and managing timing of transport to minimise impacts on road and rail traffic<br>- Limiting the number of trips per day<br>- Undertaking community consultation before and during all haulage activities<br>- Designing and implementing temporary modifications to intersections, roadside furniture, stock grids and gates<br>- Managing the haulage process, including the erection of warning and/or advisory speed signage prior to isolated curves, crests, narrow bridges and change of road conditions<br>- Designation of a speed limit would be placed on all of the roads that would be used primarily by construction traffic<br>- Preparation of a Transport Code of Conduct to be made available to all contractors and staff<br>- Identification of a procedure to monitor the traffic impacts during construction and work methods modified (where required) to reduce the impacts<br>- Provide a contact phone number to enable any issues or concerns to be rapidly identified and addressed through appropriate procedures<br>- Reinstatement of pre-existing conditions after temporary modifications to the roads and pavement along the route. | No | |
| 46 | Safety and asset Protection | The proponent would use a licensed haulage contractor with experience in transporting similar loads, responsible for obtaining all required approvals and permits from the RTA and Councils and for complying with conditions specified in those approvals. | No | |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| 47 | Safety and asset Protection | The proponent would prepare road dilapidation reports covering pavement and drainage structures in consultation with roads authorities for the route prior to the commencement of construction and after construction is complete. This report would include consideration of the Old Orange Road rail crossing. | No | |
| 48 | Safety and asset Protection | The proponent would repair any damage resulting from the construction traffic (except that resulting from normal wear and tear) as required during and after completion of construction at the proponent's cost or, alternately, negotiate an alternative for road damage with the relevant roads authority. | No | |
| 49 | Safety and asset Protection | Route specific mitigation measures, which would be investigated and detailed further in the Traffic Management Plan, include accessing the site via Old Orange Road and using the existing access track within site boundaries. | No | |
| **Historic Heritage** | | | | |
| 51 | Impact to a potential heritage item (abandoned stone Cottage | Should direct impacts on the cottage ruin or part of its built fabric be required (including road upgrades or heavy vehicle vibration), impacts would be managed in accordance with the assessment of heritage significance recommendations, above, and in consultation with a noise and vibration specialist. This may include:<br>- Traffic management measures, such as 'go slow' areas or vibration loggers<br>- Fencing or demarcating the site<br>- Clear identification of the feature on CEMP site maps and staff induction | Yes | Section 6.7 |
| 52 | Disturbance to a potential historic relic | In the event of an item of heritage significance being uncovered at the proposal site after works commence, the NSW Heritage Branch (Department of Planning) should be contacted prior to further work being undertaken at the site. | No | |
| **Soils and Landforms** | | | | |
| 53 | Soil loss and soil quality | Progressive Erosion and Sediment Control Plans would be prepared for the site, including controls at drainage lines and slopes. | No | |
| 54 | Soil loss or stability of landform loss | Access track construction and management would comply with guidelines set down in DLWC (1994), Landcom (2004) and DECC (2008b). | No | |
| 55 | Soil quality | Avoid compaction of soil resulting from vehicle access and laying of materials particularly during saturated soil conditions, and remediate as necessary. | No | |
| 56 | Soil Quality | Where cement is included in cable trench backfill, at least 20 centimetres of cement-free topsoil would be replaced as the top layer in the backfill. | No | |
| 57 | Soil loss or stability of landform loss | Concrete wash would be deposited in an excavated area, below the level of the topsoil, or in an approved landfill site. Where possible, waste water and solids would be reused onsite. | No | |
| 58 | Soil loss or stability of landform loss | Access routes and tracks would be confined to already disturbed areas, where possible. All contractors would be advised to keep to established tracks. | No | |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| 59 | Soil quality | A spill response plan would be developed for all phases of the project. This would include trigger points of when to notify the DECCW | No | |
| 60 | Soil loss or stability of landform loss | If concentrated rainsplash and runoff below the panel rows result in localised erosion, the affected soils at the site should be treated and protected without delay. | Yes | Section 6.1 |
| 61 | Soil loss or stability of landform loss | The proponent would routinely monitor soil condition and vegetation cover below the array and liaise with the landowner regarding stock and vegetation management issues as required. | Yes | Section 6.1 |
| 62 | Soil loss or stability of landform loss | Thick and continuous pasture cover should be established prior to the installation of the array, and maintained at all times, including during winter and drought periods if possible. | Yes | Section 6.1 |
| **Hydrology and Water Quality** | | | | |
| 63 | Deterioration of water quality (Surface Water) | Infrastructure placement, including tracks, substations, control buildings, stockpiles, and site compounds and turnaround areas, would not be sited within 40 metres of a major drainage line or water course | No | |
| 64 | Deterioration of water quality (Surface Water) | The proponent would prepare a Erosion and Sediment Control Plan (ESCP) as a sub-plan of the Construction Environmental Management Plan. This plan would include the following provisions:<br>- Sediment traps would be installed wherever there is potential for sediment to collect and enter waterways<br>- Stockpiles generated as a result of construction activities would be bunded with silt fencing, (mulch bunds or similar) to reduce the potential for runoff from these areas<br>- On the steeper slopes check banks or berms would be installed across the trenchline, as appropriate, following closure of the trench. These would discharge runoff to areas of stable vegetation<br>- Stabilisation and site remediation would be undertaken as soon as practicable throughout and post construction<br>- Soil and water management practices would be developed as set out in Soils and Construction Vol. 1 (Landcom 2004)<br>- Monitoring of surface water quality would be undertaken following heavy rainfall events | No | |
| 65 | Deterioration of water quality (Surface Water) | The site CEMP and OEMP would be provided to the New South Wales Office of Water for review of soil and water management measures for construction and operation, prior to project commencement. | Yes | **Appendix C** |
| 66 | Water supply | Undertake liaison with representatives of Cabonne Council regarding the potential supply of construction water | No | |
| 67 | Deterioration of water quality (Surface Water) | All vehicles onsite would follow established trails and minimise onsite movements | Yes | Section 6.1 |
| 68 | Deterioration of water quality (Surface and Ground Water) | Machinery would be operated and maintained in a manner that minimises risk of hydrocarbon spills | No | |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| 69 | Deterioration of water quality (Surface and Ground Water) | Maintenance or re-fuelling of machinery would be carried out on hard-stand in accordance with industry standards for fuel transfer. | Yes | Section 6.9.3 |
| 70 | Deterioration of water quality (Surface and Ground Water) | Design of concrete batch plants would ensure concrete wash would not be subjected to uncontrolled release. Areas of the batching would be bunded to contain peak rainfall events and remediated after the completion of the construction phase. Waste sludge would be recovered from the settling pond and used in the production of road base manufactured onsite. The waste material would be taken from the batching plant to be blended in the road base elsewhere onsite. | No | |
| 71 | Deterioration of water quality (Surface and Ground Water) | Carry out dust suppression as required through either watering or chemical means (environmentally friendly polymer based additives to water). | Yes | Section 6.1.6 |
| 72 | Deterioration of water quality (Surface Water) | A Site Restoration Plan (SRP) would be prepared as part of the Construction Environmental Management Plan. This would set out protocols for restoration works including:<br>- Site Preparation<br>- Stabilisation<br>- Revegetation<br>- Monitoring | No | |
| 73 | Deterioration of water quality (Surface and Ground Water) | A Spill Response Plan would be prepared as part of the CEMP and OEMP including:<br>- Identify persons responsible for implementing the plan if a spill of a dangerous or hazardous chemical/waste would occur<br>- Identify all chemicals required for the proposal, including physio-chemical properties, risks posed to water quality objectives and appropriate methods of storage of these chemicals.<br>- Locate Material Safety Data Sheets (MSDS) for all chemical inventories at on site and readily available<br>- Comply with manufacturers recommendations in relation to application and disposal where chemicals are used<br>- Report any spill that occurs to the Construction Manager regardless of the size of the spill<br>- Establish clearly defined works and refuelling areas<br>- Spill protocols in this plan would dictate when the EPA would be notified<br>- Chemical / fuel storage areas would be identified, and be bunded to prevent loss of any pollutants<br>- Hydrocarbon spill kits would be stored at the site. A number of site staff are to be trained in the use of the spill kits | No | Section 6.9.3 |
| 74 | Deterioration of water quality (Surface and Ground Water) | The proponent would notify the NSW DECC EPA in the event of any spill that had the potential to pollute waters | Yes | Section 7.3 |
| 75 | Protection of ground Water | Undertake investigations, as part of the geotechnical investigation, to ensure that the project would have no material adverse effect on groundwater/aquifers as a result of blasting activities | No | |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| 76 | Deterioration of water quality (Surface and Ground Water) | Monitor bunded infrastructure to ensure that volume of oil could be fully contained in the event of leak | Yes | Section 6.9.5 |
| 77 | Deterioration of water quality (Surface and Ground Water) | Maintain septic systems, if installed, to meet appropriate Australian standards | Yes | Section 2.4 |
| **Air Quality and Climate** | | | | |
| 78 | Air quality | Dust levels at stockpile sites would be visually monitored. Dust suppression would be implemented if required. Stockpiles would be protected from prevailing weather conditions | No | |
| 79 | Air quality | Undertake ongoing visual dust monitoring and suppression (if required) during the construction phase. Monitoring would regularly assess the effectiveness of dust suppression activities. Monitoring would regularly assess the effectiveness of dust suppression activities. | No | |
| 80 | Air quality | Should a complaint relating to dust by a resident be received, dust monitoring would be undertaken. The proponent would assess the dust gauges and identify additional mitigation measures, where required. | Yes | Section 8 |
| 81 | Air quality | Vegetation cover would be maintained throughout operation | Yes | Section 6.1 |
| **Waste Management and Resource Use** | | | | |
| 82 | Waste generation | The proponent would prepare a Waste Management Plan to be included within the Construction Environmental Management Plan. It would include but not be limited to the following:<br>- The scope for reuse and recycling would be evaluated<br>- Provision for recycling would be made onsite<br>- Wastes would be disposed of at appropriate facilities<br>- Toilet facilities would be provided for onsite workers and sullage from contractor's pump out toilet facilities would be disposed at the local sewage treatment plants or other suitable facility agreed to by Council<br>- Excavated material would be used in road base construction where possible. Surplus material would be disposed of in appropriate locations on site (on agreement with the landowner), finished with topsoil, and revegetated. | No | |
| 83 | Waste generation | PV modules would be recycled, where possible | Yes | Section 6.8.3 |
| **Socio-Economic and Community** | | | | |
| 83 | Impact on current land use | Develop, implement and monitor the effects of a Site Restoration Plan. The plan would aim to stabilise disturbed areas. The Plan would consider:<br>- Appropriate stabilisation techniques across the precincts<br>- Suitable species for re-seeding (native, locally occurring species would be given preference) in areas dominated by native cover<br>- Monitoring for weed and erosion issues | Yes | Section 6.1 |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| 84 | Impact on current land use | Liaison would be undertaken with neighbouring landowners to provide information about the timing and routes to be used during construction and decommissioning. This could be in the form of advertising and provision of a contact point for further inquiries. The aim would be to reduce the risk of interference with agricultural activities on affected roads and road verges | No | |
| 85 | Impact on local community | Liaise with local industry representatives to maximise the use of local contractors and manufacturing facilities in the construction and decommissioning phases of the project. | No | |
| 86 | Impact on local community | Liaise with the local visitor information centres to ensure that construction and decommissioning timing and haulage routes are known well in advance of works and to the extent practical coordinated with local events, such as the Agricultural show. | No | |
| 87 | Impact on local community | Make available employment opportunities and training for the ongoing operation of the solar farm to local residents where reasonable. | Yes | Section 6.4 |
| 88 | Impact on local community | Dissemination of accessible and independent information on solar farm impacts. | Yes | Section 6.4 |
| **Land Use and Mineral Resources** | | | | |
| 89 | Impact on current land Use | A Site Restoration Plan would be developed to ensure stabilisation of disturbed areas as quickly as possible. The Plan would consider:<br>- Appropriate stabilisation techniques across the precincts.<br>- Suitable species for re-seeding (native, locally occurring species would be given preference) in areas dominated by native cover.<br>- Monitoring for weed and erosion issues. | Yes | Section 6.1 |
| 90 | Impact on Manildra Common Pit | The proponent would consult the Cabonne Council regarding any potential traffic issues during construction of the Solar Farm, for incorporation into the Traffic Management Plan. | No | |
| 91 | Impact on current land Use | Liaison would be undertaken with neighbouring landowners and landowners adjoining access roads, to provide information about the timing and routes to be used during construction and decommissioning. This could be in the form of advertising and provision of a contact point for further inquiries. The aim would be to reduce the risk of interference with agricultural activities on affected roads and road verges | No | |
| 92 | Impact on current land Use | Grazing of sheep within the panel areas is likely to occur. The carrying capacity is likely to be reduced, however condition of the site would be considered in relation to stocking rates. | Yes | Section 6.1 |
| **Health and Safety** | | | | |
| 93 | Radiation exposure from EMFs | Adhere to standard industry approaches and policies with respect to EMF through maintenance of adequate easements around transmission lines. | No | |
| 94 | Radiation exposure from EMFs | The substation upgrade and transmission lines would be located as far as practical from residences, farm sheds, and yards in order to reduce the potential for both chronic and acute exposure. | No | |

**Table B.2 – Statement of Commitments**

| SoC | Issue | Commitment | Relevance to Operation | OEMP Reference |
|---|---|---|---|---|
| **Fire and Bushfire Issues and Impacts** | | | | |
| 95 | Bushfire risk | The proponent would prepare a Bushfire Management Plan as part of the Construction Environmental Management Plan and Operation Environmental Management Plan. The Rural Fire Service and NSW Fire Brigade would be consulted in regard to its adequacy to manage bushfire risks during construction, operation and decommissioning. The plan would as a minimum include:<br>- Hot-work procedures, asset protection zones, safety, communication, site access and response protocols in the event of a fire originating in the solar farm infrastructure, or in the event of an external wildfire threatening the solar farm or nearby persons or property.<br>- Fire response planning would address any potential for dangerous gas emissions from the solar farm during a fire event to affect firefighters and neighbouring residents.<br>- Flammable materials and ignition sources brought onto the site, such as hydrocarbons, would be handled and stored as per manufacturer's instructions.<br>- During the construction phase, appropriate fire fighting equipment would be held onsite when the fire danger is very high to extreme, and a minimum of one person on site would be trained in its use. The equipment and level of training would be determined in consultation with the local RFS.<br>- Asset protection zones (APZs), based on the NSW policy document Planning for Bushfire Protection, would be maintained around the site buildings and in the transmission line corridor. Workplace health and safety protocols would be developed to minimise the risk of fire for workers during construction and during maintenance in the control room and amenities.<br>- Fire extinguishers would be stored onsite in each of the site buildings. | Yes | Section 6.3 |
| 96 | Bushfire risk | If sowing of pasture grasses in the PV array area is required, low growing species should be selected. | Yes | Section 6.1 |
| 97 | Bushfire risk | Pasture would be maintained at a low height (<100mm) below the PV array using sheep grazing or slashing | Yes | Section 6.3 |
| 98 | Bushfire risk | Appropriate firefighting equipment would be maintained on the site during the operation of the solar farm, including protective clothing. Staff would be trained in its use. | Yes | Section 6.3 |
| 99 | Bushfire risk | A formal response procedure would be developed for operation staff at the solar farm, including procedures for notification of neighbouring and downwind landholders if required. | Yes | Section 6.3 |

**Source: nghenvironmental (December 2010)** ***Manildra Solar Farm: Submissions Report***

# Appendix C

## AGENCY CONSULTATION

CABONNE COUNCIL

Phone: (02) 6392 3247
Fax: (02) 6392 3260
Contact: H. Nicholls

THE GENERAL MANAGER
POST OFFICE BOX 17
MOLONG 2866
Website: www.cabonne.nsw.gov.au
Email: council@cabonne.nsw.gov.au

Our Ref: HN:hn
Doc ID: 927851
ABN: 41992 919 200

18 May 2018

Mr A Brownlow
Geolyse Pty Ltd
PO Box 1963
ORANGE NSW 2800

abrownlow@geolyse.com

Dear Sir,

**MANILDRA SOLAR FARM**
**OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN**

Council is in receipt of your correspondence of 14 May 2018, requesting review of the Manildra Operation Environmental Management Plan. The document has been reviewed and council has no additional comments or requirements of the plan.

Should you have any further enquiries please contact council's Environmental Services Department on 6392 3247 between 9am and 11am Monday to Friday.

Yours faithfully,

HJ Nicholls
**DIRECTOR ENVIRONMENTAL SERVICES**

## Andrew Brownlow

**From:** Andrew Brownlow [redacted]
**Sent:** Friday, 18 May 2018 8:18 AM
**To:** 'Tim Baker'
**Cc:** 'Danny Dyson'; 'Water Referrals'; 'Alister Middleton'
**Subject:** RE: Lands and Water response: Manildra Solar Farm - OEMP

Tim
Thank you for looking at this one so quickly. I will identify and include the source and storage arrangements for operational water. I have also added the areas you recommended by included in the monitoring regime for erosion and included the requirement to consult with LAnds and Water if mitigation works are required. Section 6.1.5 of the OEMP has been updated (red text) as follows .

**6.1.5 Erosion Prevention**

Commitments and obligations relevant to protecting the soil resource and water quality will be met through compliance with the approved *Soil and Water Management Plan* (SWMP). The SWMP was required before construction of the MSF could commence, had to be prepared in consultation with (then) NSW Office of Water and approved by DPE.
The objective of the SWMP (Entura, June 2017) was to specify requirements to be implemented in order to minimise erosion and sediment discharge from the MSF during and after the construction.
The SWMP adopted the Groundcover Management Plan benchmark indicator of 70% minimum grass cover over the farm.
The SWMP requires that site inspection and monitoring be undertaken to ensure the objectives are met and the control measures perform effectively. Specifically, as it relates to operational impacts FSA will undertake regular monitoring of the potential for and any actual erosion associated with the drainage lines and the areas adjacent which influence these. Specifically, the monitoring regime will, in addition to checking conditions across the entire MSF site, focus on:

- Areas where erosion control measures have been implemented during construction.
- Where the dry creek emerges into the MSF site in the north-east corner, to observe if runoff emerging upstream of the site would or would not accentuate sediment transport.
- Downstream, where the drainage line leaves the MSF site.

If monitoring triggers the need for mitigation works the Department of Industry - Lands and Water will be consulted with respect to these works.

Regards
**Andrew Brownlow**
*Manager - Environmental / Director (CEnvP)*
**Geolyse Pty Ltd**

**From:** Tim Baker [redacted]
**Sent:** Friday, 18 May 2018 7:26 AM
**To:** Andrew Brownlow [redacted]
**Cc:** Danny Dyson [redacted]; Water Referrals <water.referrals@dpi.nsw.gov.au>; Alister Middleton [redacted]
**Subject:** Lands and Water response: Manildra Solar Farm - OEMP

Hi Andrew,

Thanks for sending the OEMP through to review in accordance with DP&E's conditions of approval. In response to your request the following comments are provided:

- It is understood water will be required for dust management, vegetation rehabilitation and general use. It is recommended a reference be included in the OEMP as to the source of this water, and any storage requirements on site.
- Key aspects for ongoing operation of this site in terms of water management is the monitoring and management of erosion potential associated with the drainage lines and the areas adjacent which influence these. There is reference in the OEMP to annual groundcover monitoring to aim to identify erosion potential and also to the site upstream where a dry creek enters the site. This is supported. Reference is also made to the role of the SWMP in managing erosion potential, however the detail on this is not included in the OEMP. However as the OEMP does make reference to observing the upstream part of the creek in the SWMP it is recommended the SWMP be reviewed to ensure it is

monitoring the potential for and actual erosion adjacent to and within drainage lines and also within the site and downstream. Lands and Water would wish to be consulted where this monitoring triggers mitigation requirements.

Please give me a call if you need to discuss further.

Regards

Tim

Tim Baker | Senior Water Regulation Officer
Lands and Water
Department of Industry

On 14 May 2018 at 09:44, Andrew Brownlow [redacted]> wrote:

> **Tim Baker**
> **Senior Water Regulation Officer**
> **Department of Industry/Water**
>
> Tim
>
> A condition of the Minister's approval for the Manildra Solar Farm is that (then) NSW Office of Water be consulted with regards to the Operational Environmental Management Plan (OEMP) prior to the Department of Planning and Environment's approval of the OEMP.
>
> To this end please find attached a copy of this draft plan for the Department's consideration. With construction near completion approval of the OEMP is now on the critical path in terms of enabling operations to commence.
>
> I appreciate fully this is no doubt just one of many requests before you, but if there is anything at all that I can provide that will help expedite confirmation the Department has been consulted and is happy please do not hesitate to ask.
>
> With thanks
>
> Andrew
>
> **Andrew Brownlow**
> *Manager - Environmental / Director (CEnvP)*
> **Geolyse Pty Ltd**


GEOLYSE
ORANGE
154 PEISLEY STREET
P.O. BOX 1963
ORANGE NSW 2800
orange@geolyse.com
www.geolyse.com
Ph. (02) 6393 5000
Fx. (02) 6393 5050

GIS PROJECT DETAILS

Datum: GDA 1994 MGA Zone 55 (EPSG: 28355)
Directory: O:\Projects\217\217514\Out\GIS\217514.qgs
Data Source: NSW Spatial Services (Aerial Imagery)
Project Number: 217514

DRAWING SCALE

0 50 100 150 200 m

A3

APPROVAL AUTHORITY

junee

NSW GOVERNMENT Southern Joint Regional Planning Panel

CLIENT

TERRAIN SOLAR

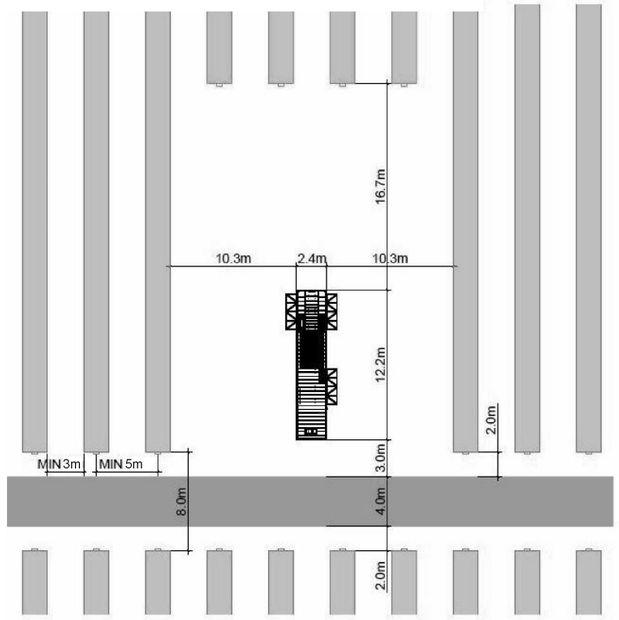
PROJECT

**JUNEE SOLAR FARM**

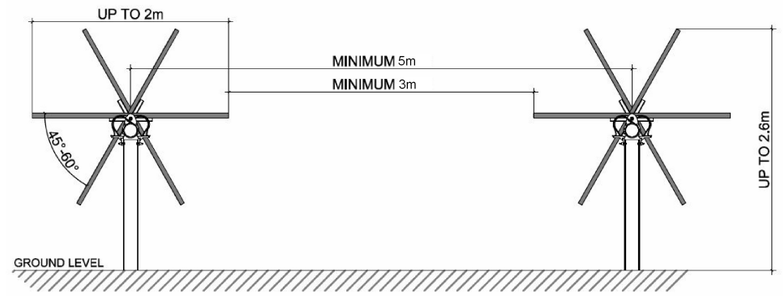
DRAWING

Name: Concept Farm Plan
Reference: 217514_03C_EV01-EV02
Sheet: EV01 of EV02
Status: Final
Date: 04/10/2018

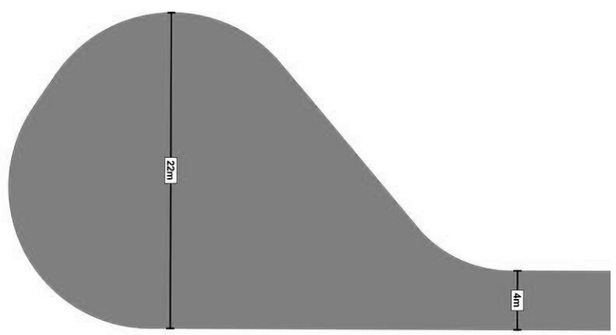
## INSET A - TYPICAL INVERTER BLOCK



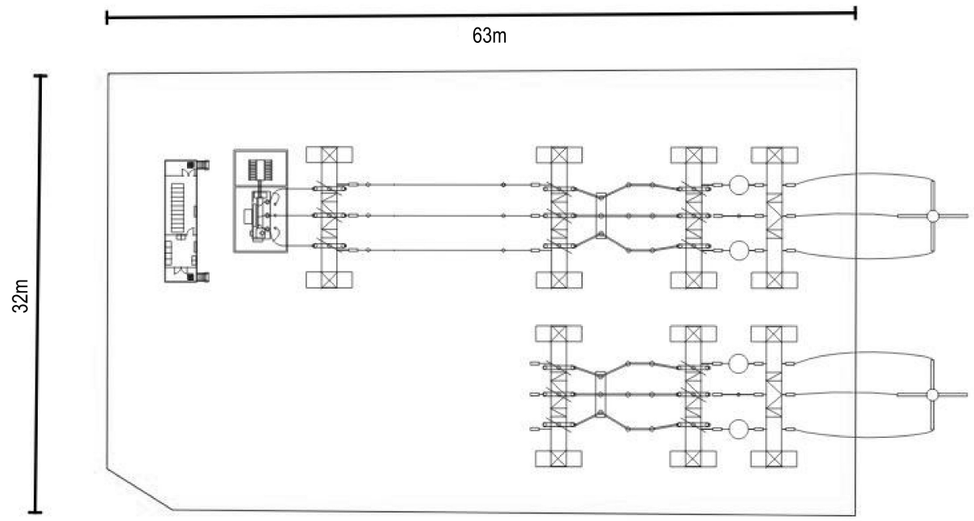

## INSET B - TYPICAL TRACKER SECTION



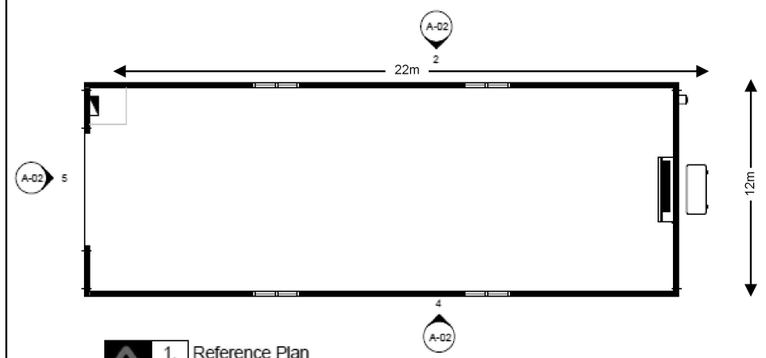

## INSET C - INTERNAL ACCESS ROAD & TURNING CIRCLE DIMENSIONS



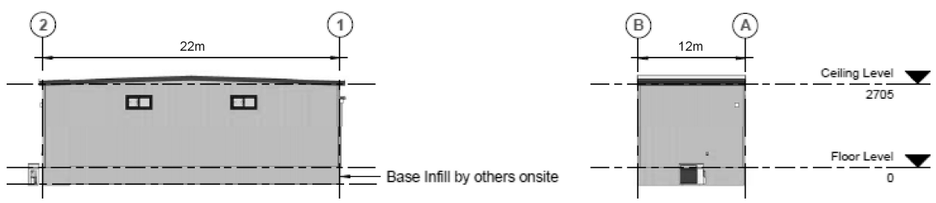

## INSET D - SUBSTATION




## INSET E - OPERATIONS & MAINTENANCE BUILDING




1. Reference Plan




2. A-02

3. A-02

GEOLYSE
ORANGE
154 PEISLEY STREET
P.O. BOX 1963
ORANGE NSW 2800
orange@geolyse.com
www.geolyse.com
Ph. (02) 6393 5000
Fx. (02) 6393 5050

**GIS PROJECT DETAILS**

Datum: GDA 1994 MGA Zone 55 (EPSG: 28355)
Directory: O:\Projects\217\217514\Out\GIS\217514.qgs
Data Source: Terrain Solar
Project Number: 217514

**DRAWING SCALE**

Note: Infrastructure as shown is indicative and subject ot detailed design

**APPROVAL AUTHORITY**

junee
NSW GOVERNMENT Southern Joint Regional Planning Panel

**CLIENT**

TERRAIN SOLAR

**PROJECT**

**JUNEE SOLAR FARM**

**DRAWING**

Name: Detail Views
Reference: 217514_03C_EV01-EV02
Sheet: EV02 of EV02
Status: Final
Date: 04/10/2018

IRIS Visual Planning + Design

Landscape Planning | Visual Assessment | Landscape Architecture

78 Macgregor Terrace, Bardon 4064
PO Box 189 Red Hill 4059
0404558501
ABN 72166862157

# MEMO

To: Simon Ingram, Terrain Solar

From: Suzie Rawlinson

CC: Andrew Brownlow, Geolyse

Date: 17 October, 2018

Re: Response to Request for Information, Solar Farm proposal, Junee

Landscape concept plan and visual impact assessment

---

## Introduction

Terrain Solar are seeking development approval for a solar farm at Old Sydney Road, Junee. A Visual impact assessment report and landscape concept plan was prepared for the project by IRIS Visual Planning + Design in July 2018. The following memo has been prepared to respond to a request for information from the Joint Regional Planning Panel (JRPP), relating to the landscape concept masterplan and visual assessment. This request includes:

- *'Landscape plan to include provision for canopy trees',* and
- *'Photomontage with the solar cells to be included in the visual impact assessment. The visual assessment should include locations when viewed from the immediately adjoining site, within proximity to the common boundaries.'*

This memo begins with some guidance notes for landscape and visual assessment. Following this, it includes a description of the updates which have been made to the **landscape concept plans** to incorporate canopy trees. This memo also confirms the **location of the common boundaries**, includes a **viewshed analysis** of the viewpoints assessed in the visual assessment, and **identifies** the most appropriate **viewpoints for** the preparation of **photomontages**. The **details and method** for preparation of the photomontages has been documented and the photomontages provided.

## Guidance for Landscape and Visual Assessment

A range of guidance is available for the assessment of landscape and visual impact in Australia and internationally. In New South Wales assessments typically refer to the *RMS Guidance note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment (Version 3a), 2018.* In addition to this, *The Guidance Note for Landscape and Visual Assessment (2018)*, prepared by the Australian Institute of Landscape Architects (Queensland Chapter), provides further guidance for the industry. The methodology used for this assessment is consistent with the direction offered by these documents.

In particular, we note the following:

### *Visual impact*

*… 'visual impact is the combination of an effect (magnitude of change) and the sensitivity of a view.' (AILA, 2018)*

*Magnitude of change*

*'Magnitude refers to the physical scale of the project, how distant it is and the contrast it presents to the existing condition.'* (RMS 2018)

*Sensitivity*

*'The sensitivity of a landscape character zone or view and its capacity to absorb change of the nature of the proposal. In the case of visual impact this also relates to the type of viewer and number of viewers.'* (RMS, 2018)

These guidelines state the following regarding representing impacts from community locations:

*'If a viewpoint can't be physically accessed (eg because it is located on private property …) a view from the nearest accessible point should be taken, and this noted in the text.' (RMS, 2018)*

*'When assessing the importance of views, … views from accessible public spaces (streets, lookouts, parks etc.) are valued more than views available only from private residences. In general, no resident has a 'right' to a view, but impacts on private residential views may be relevant in relation to planning scheme intentions.' (AILA, 2018)*

## Landscape plan updates

The plant list for the project (refer Figure 2.3) has been adjusted to incorporate canopy trees, and the landscape concept plan has been revised to include wider corridors of native screen planting to accommodate these larger canopy species. (refer Figures 2.1 and 2.2)

The plant list includes *Allocasuarina* and *Callitris* species which have a fine dense foliage and would provide an effective screen. These species would provide a canopy, replacing the *Acacia* species over time and growing to a height of between 8 and 15 metres. *Pittosporum angustifolium* is a local tree species and would also provide a canopy and reach a mature height of 10 metres.

The landscape buffer zones have been widened to 10 metres and would be located around the entire perimeter of the solar farm, excluding the entry driveway and overhead powerline crossing, where any vegetation would be cleared by TransGrid in accordance with their guidelines.

These additional landscape buffer zones have been proposed to reinforce the existing blocks of screening vegetation and ensure that visual mitigation measures are not reliant on any vegetation outside the landholder's property.

It is noted on site that there is an existing corridor of vegetation along the eastern boundary of the site which is 10 metres wide and which provides an effective screen to views from the east on Danswans Road. The design anticipates a similar effect would be achieved over time.

## Location of the common boundaries

The landholder's property boundary is shown at Figure A Site conditions. It extends approximately 750 metres to the east of the development site, 450 metres to the west, and two kilometres to the south. To the north the neighbouring property is located 50 metres from the site boundary, and to the southeast, at its closest point, the neighbouring property is located 150 metres from the site.

This plan illustrates that the viewpoints used in the visual assessment are located on the adjacent property boundaries to the north (viewpoints 3 and 4) and west (viewpoints 5 and 6), and across one field to the east (viewpoints 1 and 2). The distance between the development site and adjoining properties (approximately 2 km) mitigates any potential views from the south.

## Viewshed analysis

The findings of the visual assessment are that the site is visually contained by landform and existing vegetation. For this reason, it is difficult to find a location where the solar panels would be seen and would therefore be suitable for the preparation of a photomontage.

A viewshed analysis has been undertaken to illustrate the visibility of the project site from viewpoints adjacent to the site. This analysis has been used to identify the locations from which the project may be seen (as described in the visual assessment report). This analysis identifies two views where the site would be seen. A photomontage has been prepared for these views. The following paragraphs explain this process and the findings of the analysis.

The diagrams at Figures B - J are based on a digital model combining topographic data and a 3D model of existing and proposed vegetation across the property.

Two scenarios have been modelled, these are as follows:

- Infrastructure only scenario - GIS generated viewshed diagrams based on a digital terrain model* and with key areas of existing vegetation modelled**
- Infrastructure and proposed mitigation measures scenario - GIS generated viewshed diagram based on a digital terrain model*, with key areas of existing vegetation** and proposed areas of screening vegetation modelled***.

Notes:

* A digital terrain model has been prepared using the JUNEE, 2km x 2km 5 metre Resolution Digital Elevation Model, 2015.

** Existing vegetation has been modelled based on aerial photography and site visit observations, a nominal height of 12 metres has been used for the mature trees along Old Sydney Road, and 9 metres for all other blocks and corridors of vegetation surrounding the site.

*** Proposed vegetation has been modelled with an assumed height of 6 metres to reflect a medium-term growth scenario.

Findings of the receptor viewshed analysis are as follows:

### *Viewpoint 1*

Landform screens views from the elevated portions of Danswans Lane (Refer Figure B). This location is not suitable for the preparation of a photomontage.

### *Viewpoint 2*

This viewpoint is located on Danswans Lane, one field from the property boundary of the site (at a distance of approximately 1 kilometre). Aerial photography and site photographs confirm that there is a dense corridor of vegetation on the eastern boundary of the landholder's property. This corridor of vegetation is 10 metres wide and includes semi-mature trees. The site visit confirmed that this vegetation filters views into the adjacent field, and screens views to the site, which is set a further 1.4 kilometres from the neighbouring property boundary. (Refer Figure C)

There would be no panels visible from this viewpoint or the neighbouring field, therefore this is not a suitable location for a photomontage.

*Viewpoints 3 and 4*

Viewpoints 3 and 4 are located on a narrow, surfaced road, it is lightly trafficked and there is no access for pedestrians. From this location the development site is located at a distance of 20 metres from the road, beyond a corridor of existing trees. In these views there are glimpses through the existing vegetation to the site. Whilst difficult to model, the viewshed analysis illustrates this filtering effect indicatively (Refer Figure D, E, F and G)

The panels would be visible in the middle ground of these views, through this vegetation on day one. However, the proposed 10-metre-wide corridor of vegetation would screen these views. A photomontage has been produced for Viewpoint 3, where a gap in the vegetation exists to illustrate this. (refer Figure K and Figure L)

*Viewpoint 5*

Landform and a block of vegetation screens views from Millbank Road to the site (Refer Figure H). This location is not suitable for the preparation of a photomontage.

*Viewpoint 6*

Due to the dense vegetation along Millbank Road, the next view is located where a clearing has been created for the entrance drive to residences located to the south of the site. (Refer Figure I). The viewshed analysis shows that there would be a slot view through existing corridors of vegetation, to a small area in the south of the development site. This view is at a distance of approximately 1.5 km.

The panels would be visible in the background of these views, through this break in vegetation on day one. However, the proposed 10-metre-wide corridor of screening vegetation long the southern boundary of the site would screen these views in the middle term (Refer Figure J). A photomontage has been produced for Viewpoint 6 to illustrate this effect. (refer Figure M and Figure N)

## Photomontages

In summary, viewpoint 3 and 6 have been selected for the preparation of photomontages as they are the closest locations to the site where the panels would be seen. They also offer two different angles of the proposed development.

The photomontages have been prepared showing the solar panels (excluding the proposed screening vegetation within the site) and then showing the solar panels as well as the vegetation, which has been shown to reflect a mid-term growth scenario.

## Photomontage methodology

The photomontages have been prepared to illustrate the expected changes to views as a result of the project. These photomontages have been prepared by a combination of 3D modelling and photo editing.

The photography was undertaken on a joint site visit by Suzie Rawlinson of IRIS Visual Planning and Design, and Ben Carless of Beluca.

Details of the photography are as follows:

- Photographs were taken on a Canon EOS 100D with a Canon EFS 18-55mm f3.5-5.6 IS STM lens
- Where possible a 50mm equivalent focal length was used for site photography
- In location where this did not adequately capture the characteristics of the view, a smaller focal length was used and the focal length is noted and factored into the model alignment
- One photograph was used to minimise distortion

The modelling and photo alignment was undertaken by Beluca, specialist 3D modelling consultants.

The process used to prepare these images was as follows:

- At each photograph location the GPS coordinates (Cannon GPS Receiver GP-E2 and verified with hand held Garmin GPS unit), camera height and direction of view were recorded
- A terrain model was prepared using contours with 5m intervals
- Cameras were positioned in the model using the photograph GPS data for each image
- A minimum of three points were identified in each view, from the terrain model, and used to align the view
- The proposed solar panels and associated infrastructure were modelled in 3D
- The solar panels and infrastructure were laid out according to the site plan (4061-DWG-G-002)

These modelled views were then edited in photoshop by IRIS Visual Planning + Design. Vegetation was placed on the area identified as vegetation in the model, to illustrate the design intent of this vegetation. This process involved the use of reference images from the study area and species from the plant list to illustrate the potential screening effect of the proposed vegetation and desired landscape character.

The details of each photograph are as follows:

Viewpoint 3 - View west from Old Sydney Road (Refer to Figure K)
Date taken: 20.06.2018 2.07pm
Camera: Canon EOS 100D
Focal length: 28.8mm equivalent (18mm x 1.6x crop factor)
Viewpoint location: Lat 34; 48; 35.29, Lon 147; 24; 25.90
Distance from site: 25m

Viewpoint 6 - View north east from Milbank Lane (Refer to Figure M)
Date taken: 20.06. 2018 2.17pm
Camera: Canon EOS 100D
Focal length: 51.2mm equivalent (32mm x 1.6x crop factor)
Viewpoint location: Lat 34; 49; 40.85, Lon 147; 33; 20.85
Distance from site: 1.5km

## References:


Australian Institute of Landscape Architects, Queensland Chapter, 2018, *Guidance note for Landscape and Visual Assessment*

Roads and Maritime Services NSW, 2018, *Guidance note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment*

TransGrid Easement Guidelines – Third Party Development, https://www.transgrid.com.au/being-responsible/public-safety/living-and-working-with-powerlines/Documents/Easement%20guidelines%20for%20third%20party%20developers.pdf, accessed 11/10/18

**Key:**

1. Existing vegetation

2. Native screen planting (10 metres wide) alongside vegetation on Old Sydney Road

3. Native screen planting (10 metres wide)

Trees to be removed


N

0m 50m 100m 150m

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**Junee Solar Farm, Old Sydney Road, Junee, NSW**

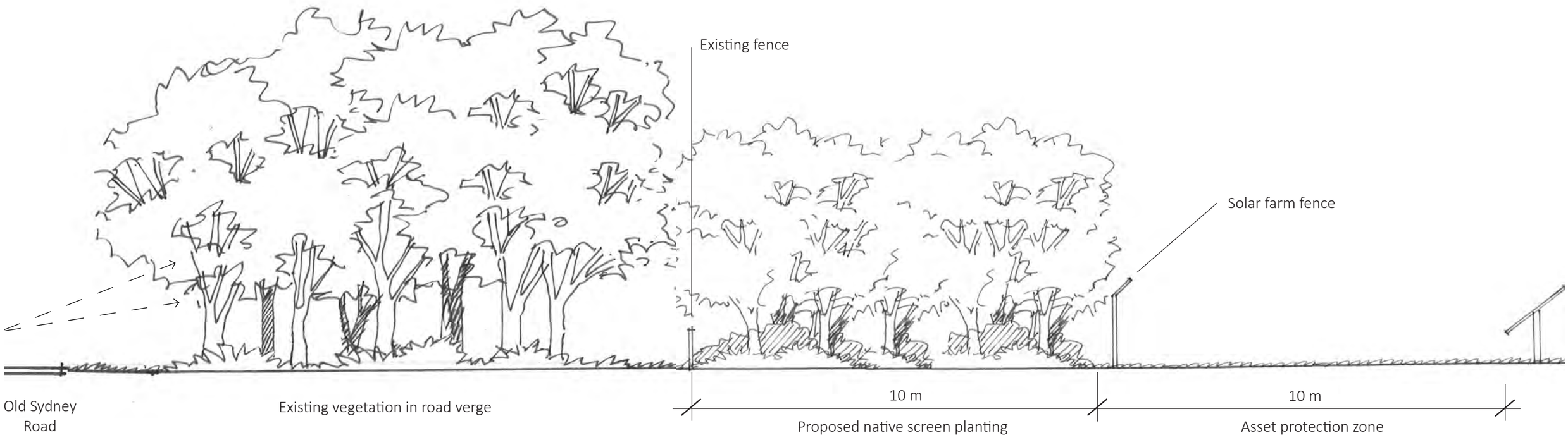
*Terrain Solar*

## FIGURE 2-1: LANDSCAPE CONCEPT PLAN

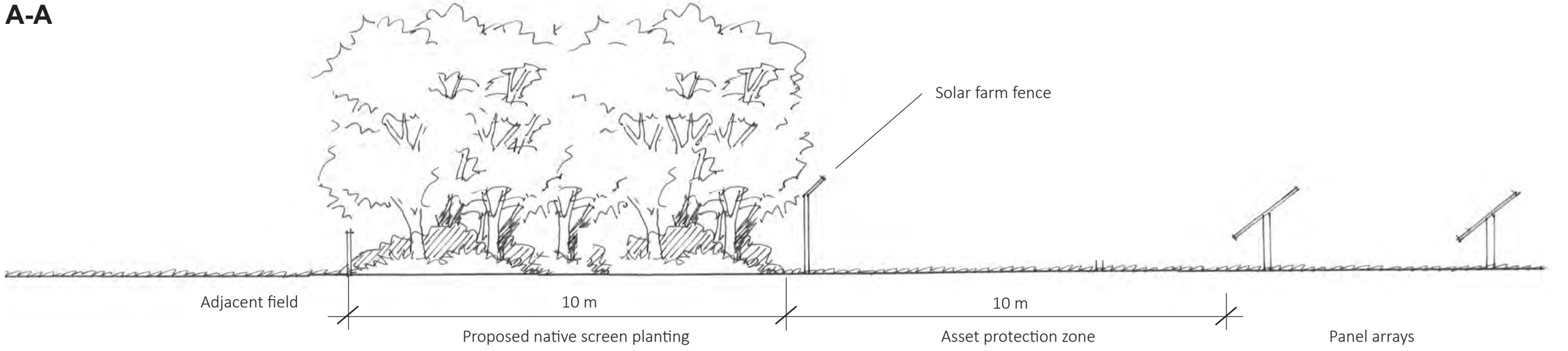
Date: September 2018
Job Number: 2018-108

Drawn: PK
Issue: REV2
Dwg Number: 2018108-05

## A-A




## B-B




Scale: 0m 1 2 5m

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*Terrain Solar*

**FIGURE 2.2: LANDSCAPE CONCEPT SECTIONS**

Date: September 2018
Job Number: 2018-108

Drawn: SR
Issue: REV2
Dwg Number: 2018108-06

## PLANT COMMUNITY TYPES

According to the NSW BioNet Vegetation Map Collection there are three existing Plant Community Types (PCTs) in areas surrounding the site. These are the:

- *Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion*
- *Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South-western Slopes Bioregion*
- *White Box grassy woodland in the upper slopes sub-region of the NSW South-western Slopes Bioregion*

The following plant lists include plant species found in these PCTs, and also identified in the Junee Shire Roadside Vegetation Survey and Management Guidelines, Greening Australia NSW (2002). This will ensure they are suited to local site conditions, including soils, aspect and rainfall.

## PLANT LIST

A mix of trees, shrubs and grasses have been selected, with a maximum height of 15 metres, and including species with a dense habbit to provide a maximum screening effect whilst not extensively shading the solar arrays.

Proposed plant list:

**Canopy trees**
*Allocasuarina luehmannii (9-15m)*
*Allocasuarina verticillata (8-10m)*
*Callitris endlicheri (9-15m)*
*Pittosporum angustifolium (6-10m)*

**Shrubs**
*Acacia dealbata (6-15m)*
*Acacia decora (2-5m)*
*Acacia deanei subsp. paucijuga (2-7m)*
*Acacia implexa (10-15m)*
*Dodonaea viscosa subsp. cuneata (6-8m)*
*Maireana microphylla (1-2m)*
*Myoporum montanum (6-8m)*
*Santalum acuminatum (2-4m)*

**Grasses**
*Aristida ramosa sens. lat.*
*Austrodanthonia setacea*
*Austrostipa bigeniculata*
*Bothriochloa macra*
*Poa sieberiana*
*Themeda australis*

## NOTES

- New planted areas are to be cultivated to a minimum 150mm depth.
- Individual planting holes are to excavated one and a half times the depth and twice the width of the pot. Plant pot so that the base of the plant is level with the surrounding ground and backfill with ameliorated site soil. Form a shallow basin around each plant to retain water.
- All planting areas to have a 100mm depth organic mulch.
- Organic mulch shall be free from deleterious material, including rocks, plastic and any material toxic to plant growth. Mulch shall comply with the requirements of AS4454 Composts, soil conditioners and mulches.
- Install proprietary Tree guard sleeves (Tree Max or approved equivalent) and stakes for each tree & shrub. Install as per manufacturer's specification.
- Install 1 x Agriform tablet (or approved equivalent) per plant as per manufacturers specification.
- Maintain setbacks from services as shown on the engineering plans.
- A star picket, or durable temporary fence, is to be erected around the perimeter of the drip line of retained trees in accordance with AS4970 Protection of trees on development sites.
- No materials or equipment are to be stored at the base of the retained trees.
- Areas outside the construction footprint which are impacted during construction should be reinstated.
- All plant stock to be minimum 50x50x120mm tubestock. Plants are to be healthy and well formed. No rootbound stock.
- A planting density of 2 x plants per $m^2$ (1 x grass and 1 x tree or shrub) will be achieved for native vegetaiton screening.
- Plant Establishment Period is to be 13 weeks commencing from the date of Practical Completion.
- The establishment period is to include watering, weeding, and replacement of failed or damaged plants.
- Tree guard sleeves and stakes to be removed upon establishment.

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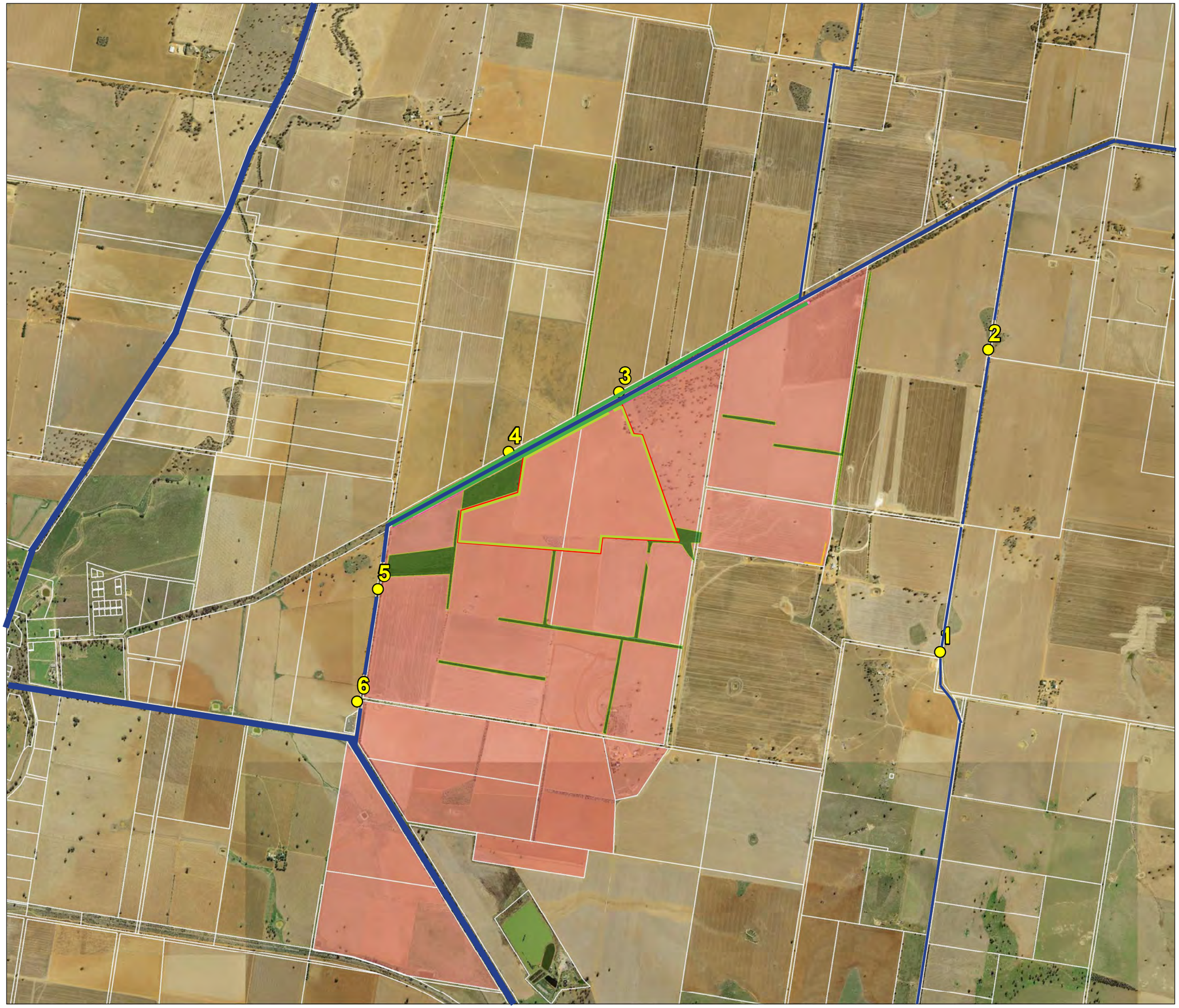
*Terrain Solar*

**FIGURE 2-3: PLANT LISTS & LANDSCAPE NOTES**

Date: September 2018
Job Number: 2018-108
Scale: NTS
Drawn: PK
Issue: REV2
Dwg Number: 2018108-07




## Junee Solar Farm

**FIGURE A:**
**EXISTING SITE CONDITIONS**

- Public road
- Site
- Viewpoint location
- Property extent
- Existing trees (20m wide x assumed height of 12m)
- Existing trees (assumed height of 9m)
- Proposed native screen planting (assumed height of 6m)

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2015

N
W E
S

0 0.25 0.5 0.75 1 1.25
Kilometers

A3 Scale: 1:25,000

File:JuneeSolarFarm_FIG7_Vegetation_181004 Date: 4/10/2018



GEOVIEW
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Junee Solar Farm

*Figure B*

# Zone of Visual Influence

## (Existing vegetation)

# Viewpoint 1

5000m
4000m
3000m
2000m
1000m
Goldfields Way
Panurara Lane
Old Sydney Road
MARINNA
Pikedale Road
Murrulebale Road
OLD JUNEE
Millbank Road
Old Junee Road
Wyoming Lane
Danswans Lane
1

IRIS Visual Planning + Design

- Subject Site
- Observer Point (1.65m)
- Visible from observer point
- Distance Buffers
- Existing Vegetation

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N
W
E
S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT1_ExistingVeg_180727 Date: 27/09/2018



GEOVIEW
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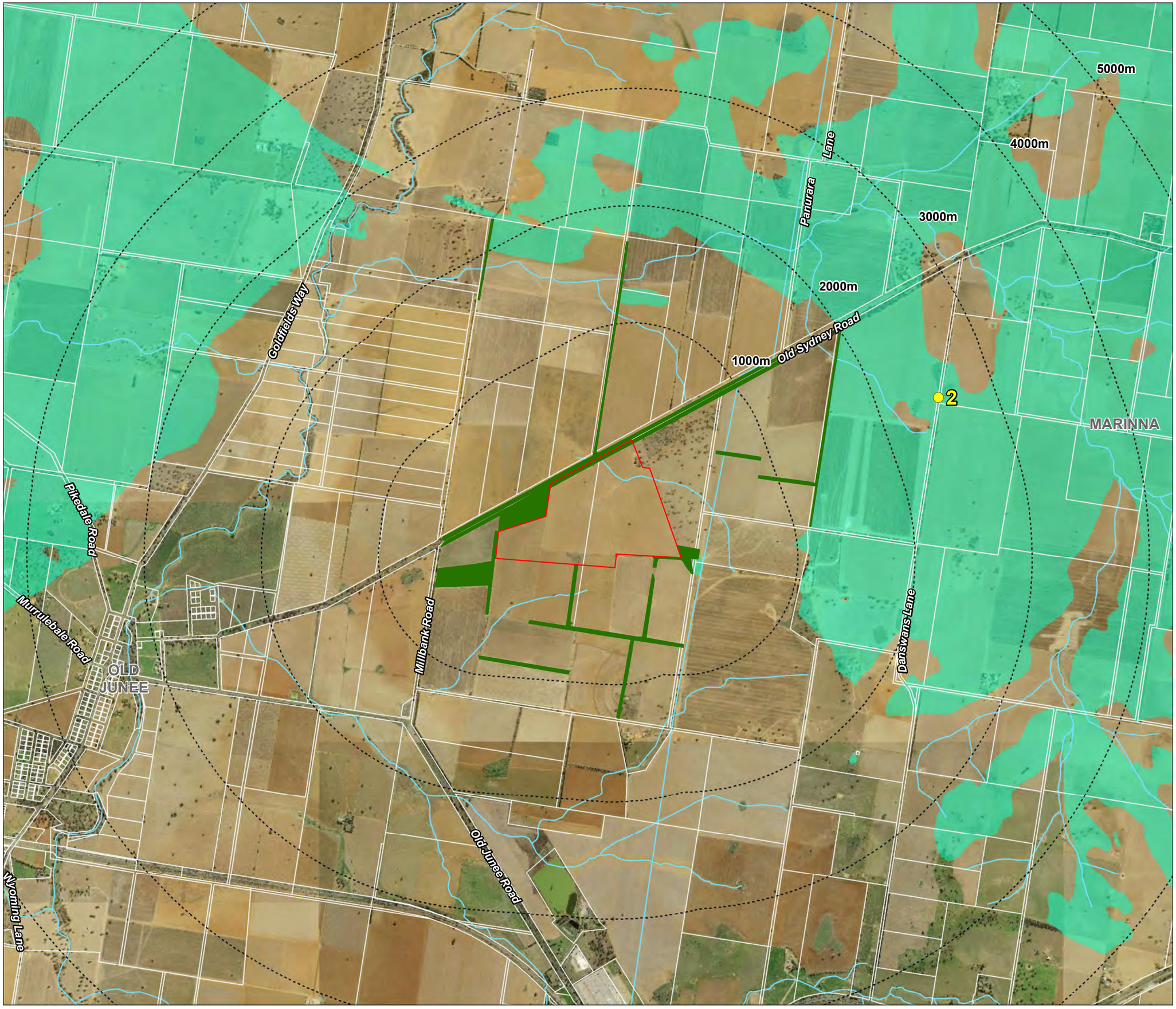


Junee Solar Farm

*Figure C*

**Zone of Visual Influence**

**(Existing vegetation)**

# Viewpoint 2

IRIS Visual Planning + Design

Subject Site

Observer Point (1.65m)

Visible from observer point

Distance Buffers

Existing Vegetation

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N W E S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT2_ExistingVeg_180727 Date: 27/09/2018



GEOVIEW
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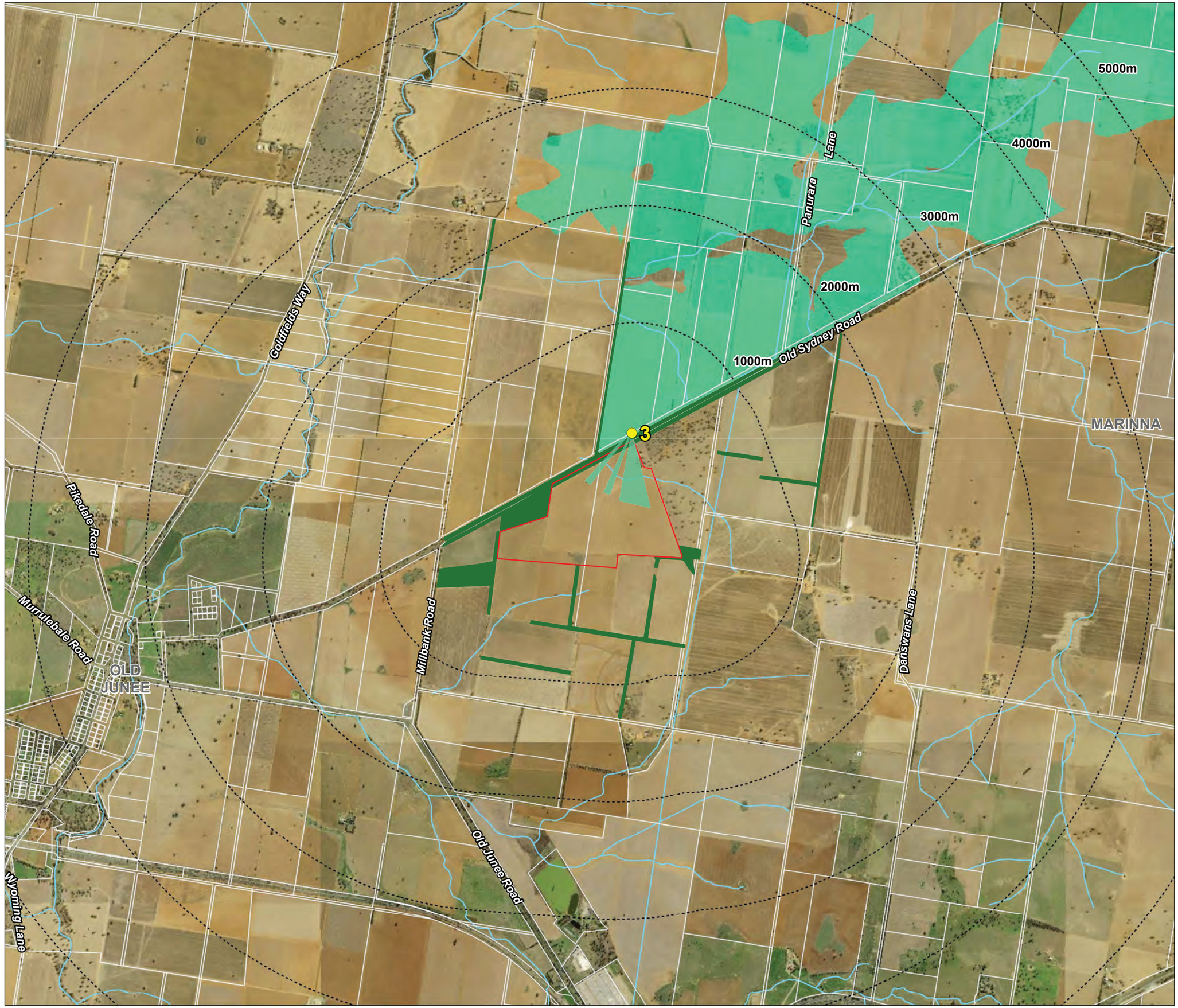
Junee Solar Farm

*Figure D*

# Zone of Visual Influence

## (Existing Vegetation)

# Viewpoint 3




IRIS Visual Planning + Design

- Subject Site
- Observer Point (1.65m)
- Visible from observer point
- Distance Buffers
- Existing Vegetation

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N W E S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT3_ExistVegM2_181004 Date: 4/10/2018



GEOVIEW
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Junee Solar Farm

*Figure E*

# Zone of Visual Influence

## (Existing & proposed vegetation)

# Viewpoint 3

IRIS Visual Planning + Design

- Subject Site
- Observer Point (1.65m)
- Visible from observer point
- Distance Buffers
- Existing Vegetation
- Native Screen Planting

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N
W E
S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT3_Screen1_180727 Date: 27/09/2018



GEOVIEW
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Junee Solar Farm

*Figure F*

# Zone of VIsual Influence

## (Existing Vegetation)

# Viewpoint 4

5000m
4000m
3000m
2000m
1000m
Old Sydney Road
Panurara Lane
Goldfields Way
Pikedale Road
Murrulebale Road
Millbank Road
Old Junee Road
Danswans Lane
Wyoming Lane
OLD JUNEE
MARINNA
4

IRIS Visual Planning + Design

- Subject Site
- Observer Point (1.65m)
- Visible from observer point
- Distance Buffers
- Existing Vegetation

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N W E S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT4_ExistingVeg_180727 Date: 27/09/2018



GEOVIEW
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Junee Solar Farm

*Figure G*

# Zone of Visual Influence

## (Existing & proposed vegetation)

# Viewpoint 4

IRIS Visual Planning + Design

- Subject Site
- Observer Point (1.65m)
- Visible from observer point
- Distance Buffers
- Existing Vegetation
- Native Screen Planting

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N
W E
S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT4_Screen1_180727 Date: 27/09/2018



GEOVIEW
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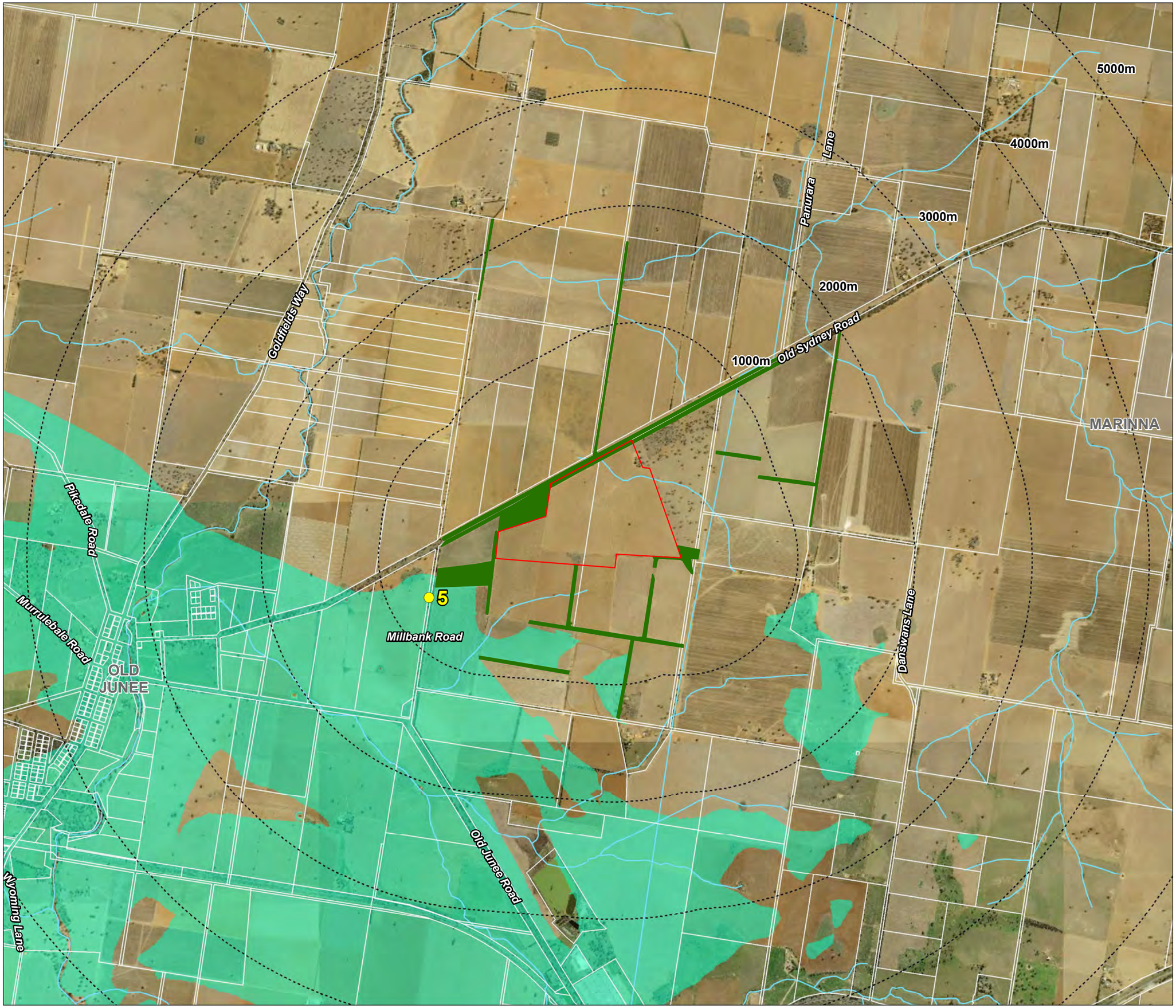
Junee Solar Farm

*Figure H*

# Zone of Visual Influence

## (Existing vegetation)

# Viewpoint 5




IRIS Visual Planning + Design

- Subject Site
- Observer Point (1.65m)
- Visible from observer point
- Distance Buffers
- Existing Vegetation

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N W E S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT5_ExistingVeg_180727 Date: 27/09/2018



GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

Junee Solar Farm

*Figure I*

**Zone of Visual Influence**

**(Existing vegetation)**

# Viewpoint 6

5000m
4000m
3000m
2000m
1000m
Goldfields Way
Panurara Lane
Old Sydney Road
MARINNA
Pikedale Road
Murrulebale Road
OLD JUNEE
Millbank Road
6
Old Junee Road
Danswans Lane
Wyoming Lane

IRIS Visual Planning + Design

- Subject Site
- Observer Point (1.65m)
- Visible from observer point
- Distance Buffers
- Existing Vegetation

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N
W E
S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT6_ExistingVeg_180727 Date: 27/09/2018



GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

Junee Solar Farm

*Figure J*

**Zone of Visual Influence**

**(Existing & proposed vegetation)**

# Viewpoint 6

IRIS Visual Planning + Design

- Subject Site
- Observer Point (1.65m)
- Visible from observer point
- Distance Buffers
- Existing Vegetation
- Native Screen Planting

SOURCE:
Cadastral Boundaries: (c) NSW Land & Property Information 2018
Watercourse: Geoscience Australia 2015
Aerial Photo: (c) NSW Land & Property Information 2014
Surface Analysis based on JUNEE, 2kmx2km 5 metre Resolution Digital Elevation Model 2015

N
W E
S

0 0.5 1 1.5
Kilometers

A3 Scale: 1:30,000

File:JuneeSolarFarm_FIG6_ZVI_PT6_Screen1_180727 Date: 27/09/2018



GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

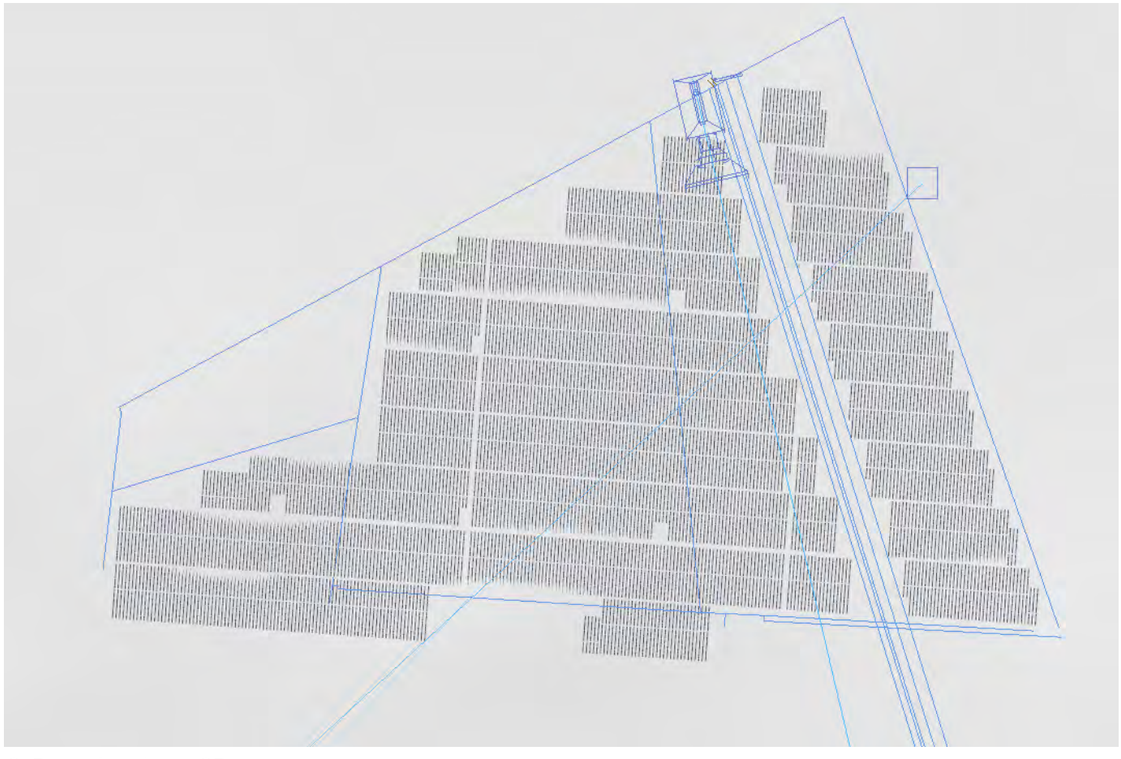
5000m
4000m
3000m
2000m
1000m
Old Sydney Road
Panurara Lane
Goldfields Way
Pikedale Road
Murrulebale Road
OLD JUNEE
Millbank Road
Old Junee Road
Danswans Lane
Wyoming Lane
MARINNA
6

**A. Existing photograph**

**View west from Old Sydney Road**
Photograph details:
Date taken: 20.06. 2018 2.17pm Camera: Canon EOS 100D
Focal length: 51.2mm equivalent (32mm x 1.6x crop factor)
Viewpoint location: Lat 34; 49; 40.85, Lon 147; 33; 20.85
Distance from site: 25m

A. Existing photograph
B. Model alignment, wireframe terrain, panels, and powerline locations
C. Plan view in 3D model
D. Photomontage, built infrastructure only
E. Photomontage, built infrastructure with vegetation shown
(shown at medium term growth)
F. Photomontage, built infrastructure only, zoomed view


**B. Model alignment (centreline of powerlines in red, terrain in blue, panels in grey)**



**C. Plan view from 3D model**

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*Terrain Solar*

**FIGURE K: Viewpoint 6 - Photomontages**

Date: October 2018 Drawn: Beluca
Job Number: 2018108 Issue: REV1
Scale: NTS

**D. Photomontage, built infrastructure only**

**E. Photomontage, built infrastructure and screening vegetaton**

**F. Photomontage, built infrastructure only, zoomed view**

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**FIGURE L: Viewpoint 3 - Photomontages**

Date: October 2018
Job Number: 2018108
Scale: NTS

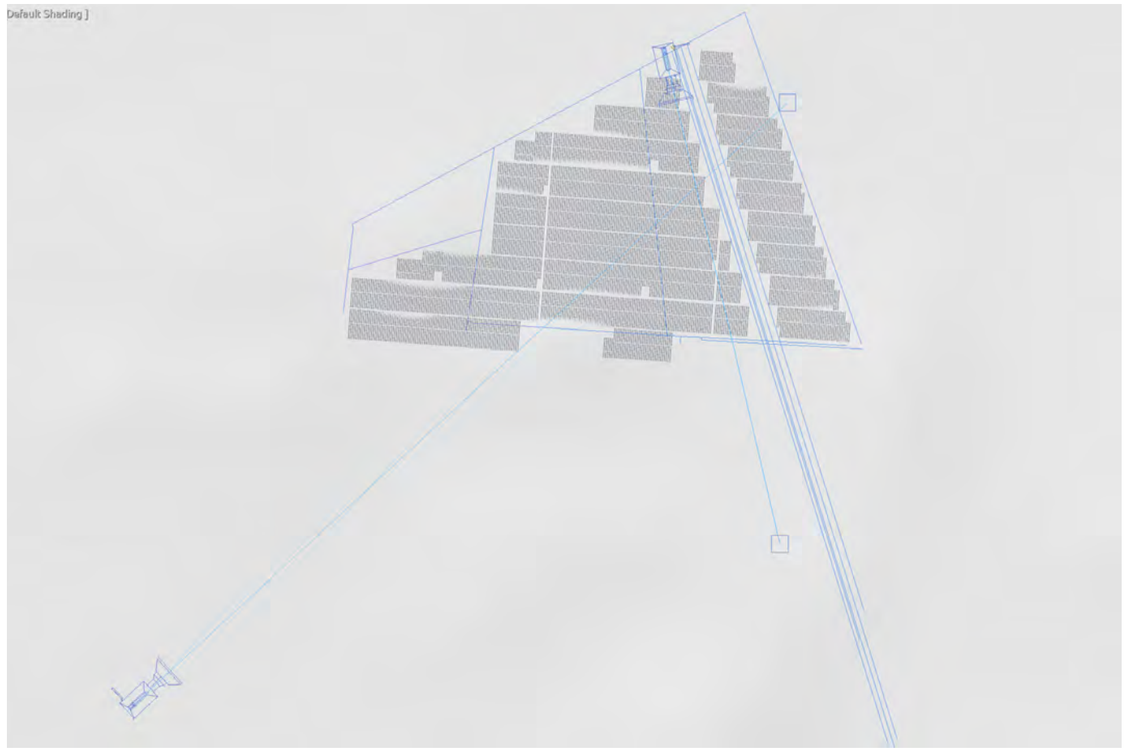
Drawn: Beluca
Issue: REV1

**A. Existing photograph**

**View west from Old Sydney Road**
Photograph details:
Date taken: 20.06. 2018 2.17pm Camera: Canon EOS 100D
Focal length: 51.2mm equivalent (32mm x 1.6x crop factor)
Viewpoint location: Lat 34; 49; 40.85, Lon 147; 33; 20.85
Distance from site: 1.5km

A. Existing photograph
B. Model alignment, wireframe terrain and panels
C. Plan view in 3D model
D. Photomontage, built infrastructure only
E. Photomontage, built infrastructure with vegetation shown (shown at medium term growth)
F. Photomontage, built infrastructure only, zoomed view
G. Photomontage, built infrastructure with vegetation shown, zoomed view

**B. Model alignment (terrain in pink, panels in blue sitting mostly behind the terrain)**




**C. Plan view from 3D model**

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*Terrain Solar*

## FIGURE M: Viewpoint 6 - Photomontages

Date: October 2018
Job Number: 2018108
Scale: NTS
Drawn: Beluca
Issue: REV1


D. Photomontage, built infrastructure only


E. Photomontage, built infrastructure with vegetation shown


F. Photomontage, built infrastructure only, zoomed view


G. Photomontage, built infrastructure with vegetation shown, zoomed view

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**Junee Solar Farm, Old Sydney Road, Junee, NSW**

*Terrain Solar*

## FIGURE N: Viewpoint 6 - Photomontages

Date: October 2018
Job Number: 2018108
Scale: NTS

Drawn: Beluca
Issue: REV1

# Manildra Solar Farm

# Groundcover Management Plan

FEBRUARY 2016

## Document Verification

Project Title: Manildra Solar Farm CEMP

| | |
|---|---|
| Project Number: | 6274 |
| Project File Name: | Manildra_Groundcover_Management_Plan_final v1 3 |

| Revision | Date | Prepared by (name) | Reviewed by (name) | Approved by (name) |
|---|---|---|---|---|
| Final v1.3 | 03/02/16 | Jane Blomfield (minor changes) | | Brooke Marshall |



www.nghenvironmental.com.au e ngh@nghenvironmental.com.au

**Sydney Region**
18/21 mary st
surry hills nsw 2010 (t 02 8202 8333)

**Canberra - NSW SE & ACT**
unit 17/27 yallourn st (po box 62)
fyshwick act 2609 (t 02 6280 5053

**Wagga Wagga Riverina and Western NSW**
suite 1, 39 fitzmaurice st (po box 5464)
wagga wagga nsw 2650 (t 02 6971 9696)

**Newcastle – Hunter and North Coast**
153 tudor st
hamilton nsw 2303 (m 0475 946 632)

**Bega - ACT and South East NSW**
suite 1, 216 carp st (po box 470)
bega nsw 2550 (t 02 6492 8333)

**Bathurst - Central West and Orana**
35 morrisset st (po box 434)
bathurst nsw 2795 (m 0448 820 748)

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| BA | Biodiversity Assessment |
| CEMP | Construction Environmental Management Plan |
| DoPE | (NSW) Department of Planning and Environment |
| FFMP | Flora and Fauna Management Plan |
| EEC | Endangered Ecological Community |
| LLS | Local Land Services |
| NSW | New South Wales |
| OEH | (NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water |
| PV | Photovoltaic |
| SoC | Statement of Commitment |
| sp/spp | Species/multiple species |

# 1 INTRODUCTION

## 1.1 THE PROJECT

The approved Manildra Solar Farm will be constructed in the central western area of NSW, on farmland adjacent to an existing substation, approximately 2 kilometres north-east of Manildra and 30 kilometres east of Parkes. The project encompasses the construction and operation of approximately 50MW of photovoltaic (PV) arrays over an area of approximately 180 hectares. It includes associated electrical infrastructure, maintenance facilities, access tracks and minor upgrades to adjacent roads.

## 1.2 RELATIONSHIP TO PROJECT APPROVAL, OTHER ASSESSMENTS AND PLANS

The Manildra Solar Farm project was approved by the NSW Department of Planning in March 2011, under Part 3A (Major Projects) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). In October 2014, a modification application was submitted to the NSW Department of Planning and Environment under Section 75W of the EP&A Act. The Modification 1 application sought to include the use of tracking panels that would have a 5 metre maximum height. This Modification was approved on 25 March 2015 by the delegate of the Minister for Planning, subject to conditions.

In July 2015, a second Modification application was submitted to the NSW Department of Planning and Environment under Section 75W of the EP&A Act. The modification 2 application sought to modify the Project's Approval, including: extending the lapse date of the approval by 3 years (i.e. to March 2019); allowing string inverters to be installed at the project; changing the noise monitoring requirements; and, updating the schedule of land for the project. The Modification 2 application was approved on 28 August 2015 by the Minister for Planning, subject to conditions.

Specific mitigation measures to minimise impacts to groundcover form part of the project's consent conditions, including the commitment to prepare a management plan to monitor and respond to adverse groundcover impacts, as required.

This Groundcover Management Plan forms a sub-plan of the Construction Environmental Management Plan (CEMP) for the project and is linked to the Flora and Fauna Management Sub-Plan (FFMP). The plan also addresses rehabilitation of disturbed areas and weed control and has operational management aspects, as per condition of consent requirements.

A Biodiversity Assessment (BA) was completed in November 2010 as part of an environmental assessment for the project (NGH Environmental 2010a). The BA discussed the potential impacts to groundcover within areas that would be covered by the solar arrays, due to altered microclimate. The degree of impact to vegetation composition and cover from factors such as reduced light, altered moisture distribution and near ground wind levels following the installation of the PV arrays cannot be predicted with certainty.

## 1.3 OBJECTIVES OF THIS PLAN AND APPROACH

This management plan has been prepared to address relevant statements of commitment made by the proponent and the conditions of approval for the project. This plan is structured as follows:

- Background information
    - Vegetation types and their condition onsite
    - Disturbance and weeds onsite
- Potential impacts of the project and management strategies
- Management protocols specific to:
    - Minimising disturbance to groundcover
    - Weed control
    - Rehabilitation of areas disturbed by the project
    - Grazing management, if desirable
    - Reporting and responding to the results of monitoring
- Groundcover monitoring requirements and protocol

While the monitoring program is specific to detecting changes in groundcover vegetation within the array area, management protocols for minimising disturbance, weed control and rehabilitation, apply to the entire project site.

## 1.4 APPROVAL CONDITIONS CROSS REFERENCE TABLE

Table 1-1 below identifies the statements of commitment and conditions of consent relevant to groundcover management and how they have been addressed in this plan.

Table 1-1 Details of how each relevant statement of commitment and consent condition has been addressed by this management plan.

| ID | Commitment/condition | Comment | Section Reference |
|---|---|---|---|
| **Revised Statements of commitment, Submissions report 2010** | | | |
| 14 | Where practicable, grass surfaces and shrubs will be retained or restored on infrequently used vehicle routes. | The rehabilitation protocol provided in this document satisfies this condition. | Section 4.1 |
| 15 | Site stabilisation, rehabilitation and revegetation of all disturbed areas would be undertaken without delay. | The rehabilitation protocol provided in this document satisfies this condition. | Section 4.3 |
| 17 | Works will be avoided during and immediately following heavy rainfall events to protect soils and vegetation at the site. | The minimal disturbance protocol provided in this document satisfies this condition. | Section 4.1 |
| 18 | Weed/pathogen controls will be implemented, including:<br>• Machinery and vehicles used in construction works will be washed before and after site access to reduce the introduction and spread of weeds and pathogens.<br>• Laydown sites for excavated spoil, equipment and construction materials will be weed-free or treated for weeds wherever practicable.<br>• Weed monitoring will be carried out at all sites after the completion of construction works and ongoing weed control will occur where noxious or invasive species are recorded. In particular, monitoring will be undertaken during the following late spring/early summer, and remedial action taken as required.<br>• Sediment control materials should be weed free (straw bales, geotextiles). | The weed control protocol provided in this document satisfies this commitment. | Section 4.2 |

| ID | Commitment/condition | Comment | Section Reference |
|---|---|---|---|
| | • Imported materials such as sand and gravel will be sourced from sites which do not show evidence of noxious weeds or Phytophthora infection. | | |
| 24 | A groundcover management plan would be developed that would include regular monitoring of vegetation cover and composition and allow for adaptive management. This would include:<br>• Establishment of a shade tolerant perennial groundcover across the cropping and exotic dominated grazing paddocks prior to the installation of the PV arrays<br>• Advice from an agronomist in relation to preferred species/varieties, establishment methods of alternative pastures and best practice management<br>• Where information is lacking, trials may be required onsite | This monitoring protocol in section 5 has been developed with reference to several botanical investigations of the site over several years. Currently the site to be developed has had several species of shade tolerant perennial groundcover established. These include exotic species such as Lucerne, Phalaris and Sub Clover Species. | Section 5 |
| 26 | The space between the PV array rows should be maintained and kept clear to enable access by vehicles for ongoing weed control, and pasture renovation if required. | Addressed in Design phase but noted in the weed control protocol. | Sections 4.2 |
| 27 | Efforts should be made to minimise disturbance to existing groundcover during construction. Construction and maintenance vehicles should not access the site when soils are very wet to minimise soil compaction and disturbance. | The minimal disturbance protocol provided in this document satisfies this condition. | Section 4.1 |
| 62 | Thick and continuous pasture cover should be established prior to the installation of the array, and maintained at all times, including during winter and drought periods if possible. | The minimal disturbance protocol provided in this document satisfies this condition. | Section 4.1 |
| **NSW Department of Planning and Environment Conditions of Consent** | | | |
| C14 b) | A Ground Cover Management Plan, developed in consultation with OEH, to outline measures to ensure adequate vegetation cover and composition beneath the solar PV array. The Plan shall include, but not necessarily be limited to: | This management plan satisfies this commitment. The input of an agronomist was not considered necessary in developing the protocols contained herein. Consultation with an agronomist is included within this plan's protocols, where rehabilitation targets are not being met. NSW OEH | Entire document |

| ID | Commitment/condition | Comment | Section Reference |
|---|---|---|---|
| | | were provided with a draft plan for comment. This document now includes their comments regarding temporary impacts. | |
| | i) procedures to minimise disturbance to ground cover not impacted by the project particularly in the area of the native pasture in good condition; | | Section 4.1 |
| | ii) procedures for the stabilisation, rehabilitation and revegetation of disturbed ground cover including reference to field trials where required; | | Section 4.3 and 5 |
| | iii) weed management measures to control and prevent the spread of noxious weeds; | | Section 4.2 |
| | iv) monitoring methods to assess the impact of the project on the ground cover vegetation; and | | Section 5 |
| | v) a procedure to review management methods where they are found to be ineffective. | | Section 5 |
| F6 | The proponent shall implement a revegetation and rehabilitation program for all areas of the development footprint which are disturbed during the construction of the project but, which are not required for the ongoing operation of the project including temporary construction facility sites and sections of construction access roads, The Proponent shall ensure that all revegetation measures are implemented progressively where possible and in all cases within six months of the cessation of construction activities at the relevant area. Unless otherwise agreed to by the Secretary, the Proponent shall monitor and maintain the health of all revegetated areas until such time that the plantings have been verified by an independent and suitably qualified expert (whose appointment has been agreed to by the Secretary) as being established, in good health and self sustaining. | The rehabilitation protocol provided in this document satisfies this condition. | Section 4.3 |
| **Text from Environmental Assessment (page numbers provided as ID)** | | | |
| P37 | Once the construction phase has finished, any tracks not used for | The rehabilitation protocol provided in this | Section 4.3 |

| ID | Commitment/condition | Comment | Section Reference |
|---|---|---|---|
| | normal farming practice or PV array maintenance would be rehabilitated. Internal access tracks would be maintained to allow maintenance and repairs to the PV array. | document satisfies this commitment | |
| P43 | Weed control would be undertaken as required using a spray unit mounted on a quad bike. Groundcover vegetation around the panel rows would be either slashed or grazed by sheep to maintain a safe height below the panels. | The weed control and grazing management protocols provided in this document satisfies this commitment. | Section 4.2 |

# 2 BACKGROUND INFORMATION

## 2.1 GROUNDCOVER VEGETATION AND ITS CONDITION

The majority of the proposal site (excluding the far western paddock) was under cropping at the time of the Biodiversity Assessment (2010a), or was dominated by exotic grass species. These areas where no overstorey is present do not constitute native vegetation. However, scattered paddock trees were present in cropped and exotic pasture areas and, in comparison with more intact native vegetation within and adjoining the proposal site, it was possible to ascertain the vegetation community that these trees were derived from.

Remnant native vegetation within and adjoining the proposal site is representative of Box-Gum Woodland communities including species such as White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and Blakely's Red Gum (*E. blakelyi*). Native grassland occurs in the far west of the site and is likely to be derived from these communities.

Other vegetation present within the proposal site was restricted to isolated paddock trees comprising Kurrajong (*Brachychiton populneus*) and the introduced Pepper Tree (**Schinus areira*).

In summary, three vegetation types were identified:

- Derived native grassland
- Box-Gum Woodland (native)
- Exotic (crop or pasture)

As part of this investigation, extensive surveying of vegetation condition was undertaken, demonstrating while some small areas were in good condition, the majority of the native vegetation was found to be in relatively poor condition as a result of extensive grazing. The distribution of the vegetation types within the project area at the time of the Biodiversity Assessment is shown in Figure 2-1.

## 2.2 DISTURBANCE AND WEEDS

Forests and woodlands have been cleared and thinned at the site to provide pasture. Clearing and agriculture has produced a range of direct and indirect impacts to flora habitats, including altered microclimate, loss of fauna responsible for pollination and dispersal, sheet erosion of soils, watercourse bed incision and damming, localised sedimentation and elevated soil nutrients. Minor gully erosion was evident in the drainage line in the south west of the western section of the site.

Agricultural activities have also resulted in the majority of the site being planted with introduced crop species such as Wheat and Canola. The disturbance has led to the colonisation of a range of other introduced plant species. In areas not utilised for cropping, grazing is likely to have reduced or eliminated selectively grazed or grazing sensitive species, such as Kangaroo Grass (*Themeda australis*), terrestrial orchids, forbs, wattles and pea shrubs.

Minor pasture weed species were common across the majority of the study area. Three noxious weeds declared for the Cabonne Shire Council Area under the *Noxious Weeds Act 1993* were recorded at the subject site. The status and distribution of these weeds at the site are summarised in Table 2-1.

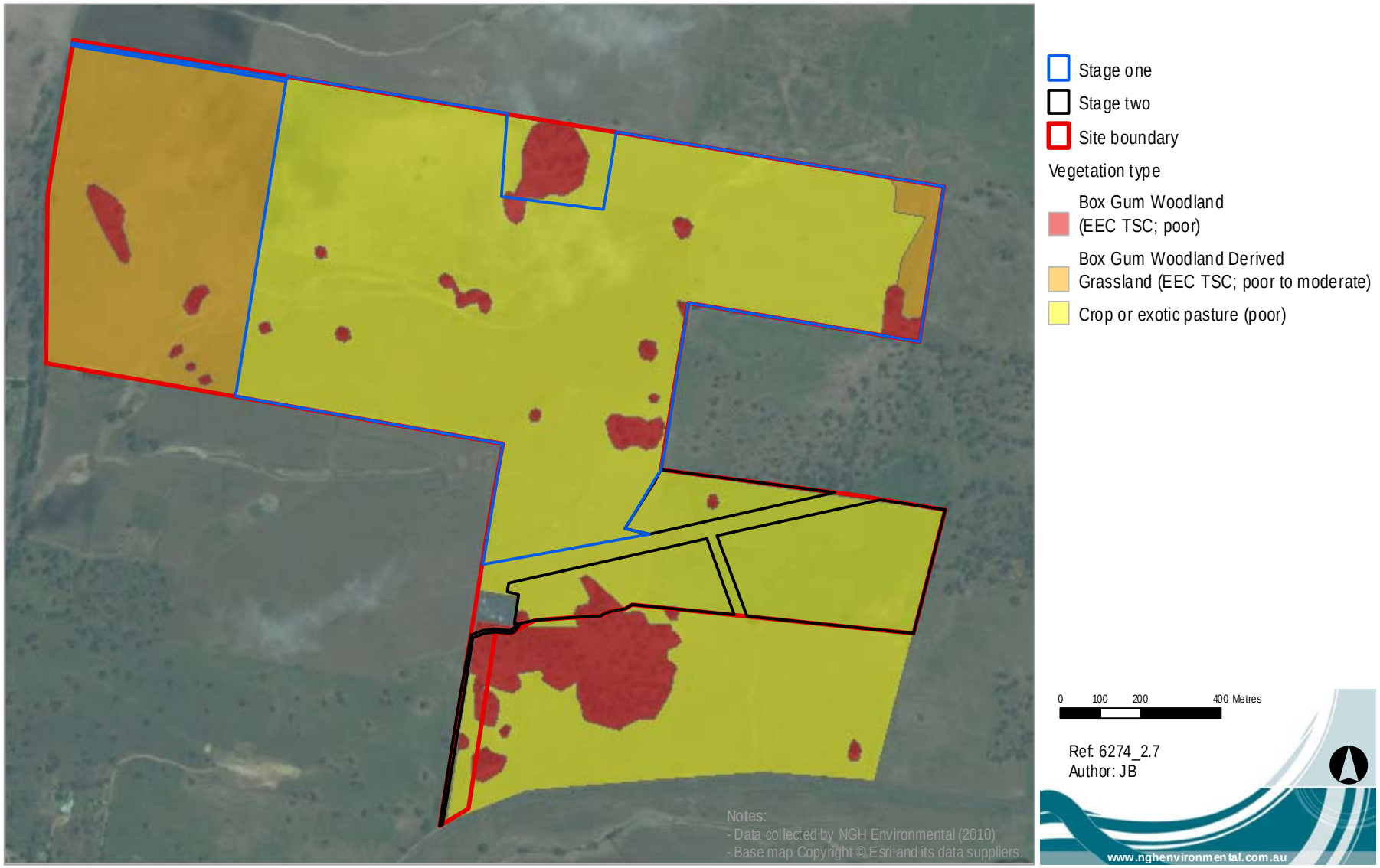


Figure 2-1 Distribution of vegetation types within the project area (Biodiversity Addendum; 2010d)

All of the recorded noxious weeds are listed as Class 4 weeds, meaning that the growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.

Table 2-1 Noxious weeds at the subject site and their distribution

| Weed species | Status | Abundance and distribution |
|---|---|---|
| African Boxthorn<br>**Lycium ferocissimum* | Class 4 | Uncommon in pasture across the site |
| Bathurst Burr<br>**Xanthium spinosum* | Class 4 | Occasionally in pasture across the site |
| Scotch Thistle<br>**Onopordum acanthium* | Class 4 | Uncommon in pasture across the site |

Figure 2-2 African Boxthorn

Figure 2-3 Bathurst Burr

Figure 2-4 Scotch Thistle

The site carries noxious weeds which would require control before and after the proposed works. With the application of weed controls during and following construction, weed impacts within and off the proposal site are not expected to be significant. The spacing between the PV array rows would be adequate to allow an all-terrain vehicle to access the site for ongoing weed control and pasture renovation, as required.

# 3 POTENTIAL IMPACTS OF THE PROJECT

## 3.1 CONSTRUCTION IMPACTS

### 3.1.1 Impact areas

Based on an 'upper limit' of impact (largest layout being considered), around 137 ha of ground cover would be affected by the development. This is the total area within the development envelope and the vast majority of this vegetation is exotic (non-native); 129.50ha. The native vegetation to be affected is in poor condition although is listed as an Endangered Ecological Community (Box Gum Woodland and derived grasslands) at the State level. The loss of this vegetation is not considered to be significant and would be subject to an offset plan.

The major impacts to groundcover during construction would be:

- Through minor stripping and grading of the array area. To prepare site for installation of solar arrays, some areas under the arrays may need to be stripped and graded. If required, this activity will temporarily remove ground cover from the affected areas and compact the soil. Ground cover will be restored post-construction. Stripping and grading would be limited as much as practical.
- Through shading and trampling caused by vehicle movements and stockpiling of materials.

The development envelope and affected vegetation is mapped in Figure 2.1.

Table 3-1 Estimated impact areas of final layout (provided September 2015).

| Total area of impact | Stage one (ha) | Stage two (ha) | Total (ha) |
|---|---|---|---|
| Native vegetation | 6.34 | 0.92 | 7.26 |
| *Box Gum Woodland Derived Grassland (EEC, TSC)* | *2.92* | *0.00* | *2.92* |
| *Box-Gum Woodland (EEC, TSC)* | *3.42* | *0.92* | *4.34* |
| Crop or exotic pasture | 105.97 | 23.53 | 129.50 |
| **Total:** | **112.31** | **24.44** | **136.76** |

### 3.1.2 Management and monitoring strategies

The rehabilitation of areas disturbed temporarily during construction is addressed in Section 4.3: Rehabilitation protocol.

Short term monitoring (during the construction phase) of the ground cover at the Manildra Solar Farm will be undertaken with reference to photographic records of the ground cover. Photos will be taken

before impacts and regularly taken during the construction phase to allow for comparison monitoring of vegetation to be made and remedial actions taken where necessary.

## 3.2 OPERATIONAL IMPACTS

### *3.2.1 Impacts - known and unknown*

Once construction has been completed, the solar farm will affect grassland at the site in two ways

- Through microclimatic changes, particularly in terms of rainfall distribution, shading from ground covering by the solar array
- Through trampling of vegetation caused by vehicle movements within the array area required for maintenance activities. The predicted impacts are discussed further below.

**Rainfall distribution**

There will be a concentration of rainfall runoff in a strip below the lower edge of the solar panel rows. This will increase rain splash intensity and soil erosion potential in this area during heavy rainfall events however, this will be partially offset by the operation of the tracker as the drip line will move change the position of the array throughout the day. A rain shadow below the solar panel rows will also be created. Soil in this area may be drier than surrounding soil, but this will be offset by reduced evapo-transpiration losses due to shading and reduced air movement, variations in the angle of rainfall and lateral movement of water from adjacent rain-exposed areas.

Note that no water will be introduced to wash the modules. If module washing is required, a dry brush will be used.

**Shading**

The total area of permanent shading has been modelled to be up to 30% of the area under the array (Biodiversity Assessment for the project; NGH Environmental 2010) affecting 36 ha of exotic dominated groundcover. 70% (84 ha) will be partially shaded depending on the season and time of day and operation of the tracker.

The shading effect is likely to lead to reduced insolation and daytime temperatures and result in lower rates of plant growth and biological productivity under the array. Growth may be offset by increased soil moisture in some seasons but the shading is likely to result in some shift in species composition (favouring more shade tolerant species).

**Vehicle movements within the array**

Periodically, vehicles will be required to move between the rows of solar panels for access and maintenance. This activity may result in compaction of the soil which may impede vegetation growth. The risk of compaction is particularly high during periods where the soils are wet.

Vehicle, equipment and the movement of personnel also provides a vector for the introduction and spread of weeds at the site.

### *3.2.2 Management and monitoring strategies*

The project life will be approximately 50 years. Changes to micro-climatic conditions and shading under the arrays will have an unknown effect. Consistent with the findings of the environmental assessment for

the project, the best means of managing any future impact is considered to be through monitoring and adaptive management during the life of the project.

The management measures and groundcover monitoring protocol in Section 4 and 5 will allow for adaptive management to avoid and minimise these operational impacts.

# 4 GROUNDCOVER MANAGEMENT PROTOCOLS

Four protocols have been developed to manage impacts to ground cover as a result of the construction and operational phase of the Manildra Solar Farm:

1. Minimal disturbance: most relevant to construction impacts
2. Weed controls: required throughout construction and operation
3. Rehabilitation: required during construction and at the end of construction
4. Grazing management: most relevant to operation

## 4.1 MINIMAL DISTURBANCE DURING CONSTRUCTION PROTOCOL

**OBJECTIVE: Minimise disturbance to ground cover**

The following protocol outlines procedures to minimise disturbance to existing and established groundcover during construction, including areas that are subject to monitoring. This protocol applies during construction.

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|
| 1 | Minimise disturbance to groundcover: under the array | • Prior to the installation of the PV array, thick and continuous pasture cover must be established at the site. The pasture must be maintained at all times during construction, including during winter and drought periods if possible. The exception to this will be where stripping and grading is required.<br><br>It is noted that currently the site to be developed has had several species of shade tolerant perennial groundcover established. These include exotic species such as Lucerne, Phalaris and Sub Clover Species. This ground cover will only be removed if stripping and grading is required for construction of solar arrays. | EPC Construction Manager |
| 2 | Minimise disturbance to groundcover: other areas within the development envelope | • Temporary impacts include construction traffic and all equipment laydown areas and stockpiles required during construction. Temporary impacts would be confined to crop / exotic pasture areas as mapped on Figure 2.1. The rehabilitation protocol would be applied to restore all areas disturbed by temporary impacts | EPC Construction Manager |

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|
| | | progressively during construction, in accordance with Section 4.3.<br>• Where practicable, grass surfaces will be retained on infrequently used vehicle routes.<br>• Heavy vehicles, equipment and machinery will not be parked in areas outside of disturbed areas or formalised tracks for periods in excess of 24 hours. Access and parking for other vehicles will be rationalised to minimise impacts, in a Traffic Management Plan.<br>• Works will be avoided during and immediately following heavy rainfall events where there is pooling of water or flooding, to protect soils and vegetation at the site. | |
| 3 | Communicate about minimising disturbance: | • Toolbox / site inductions to discuss the importance of groundcover and minimising disturbance to ensure ongoing perennial groundcover across site. Topics to include soil disturbance, compaction, bare earth and erosion problems.<br>• Specific management required near areas in good condition will be discussed in environmental inductions. E.g. Western Offset Paddock – no vehicles to enter this area; area fenced off. | EPC Construction Manager |

## 4.2 WEED CONTROL PROTOCOL

**OBJECTIVE: Treat existing weeds / minimise new infestations**

The protocol below ensures that all relevant weed control mitigation measures are followed during construction works. This protocol applies to the entire development site. Ongoing operational weed monitoring will be undertaken as part of the ground cover monitoring, outlined in Section 5.

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|
| 4 | Treat existing infestations: | • Treat existing weed infestations in accordance with the noxious weed management methods outlined below this table.<br>• Herbicides will be selected to minimise impacts on non-target species. Cabonne Shire Council or a qualified person (ecologist or agronomist) will be consulted to determine suitable herbicides based on the weeds present at the site prior to treatment. | EPC Construction Manager |

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|
| | | • Laydown sites for excavated spoil, equipment and construction materials will be weed-free or treated for weeds prior to use, so weeds are not spread. | |
| 5 | Manage noxious weeds | • The works areas contain a number of Class 4 noxious weeds as outlined in Section 2.2.<br>o African Boxthorn, Bathurst Burr and Scotch Thistle<br>• Class 4 weeds must be controlled according to the measures specified in a management plan published by the local control authority; Cabonne Council have produced a Noxious Weeds Policy which includes a management plan for Class 4 noxious weeds.<br>• The most up to date policy and other relevant noxious weed information from Cabonne Council can be found on their website at http://www.cabonne.nsw.gov.au/sites/cabonne/files/public/images/documents/cabonne/mig/2757-weedsplan_20060621094609.pdf. A copy of this is provided in Appendix B. | EPC Construction Manager |
| 6 | Minimise new infestations: | • Minimise the area of disturbance by implementing the Vegetation Clearing Protocol within the Flora and Fauna Management Plan.<br>• Imported fill and sediment control materials (e.g. straw bales, geotextiles), if required, will be weed free (confirmed by supplier).<br>• Imported materials such as sand and gravel will be sourced from sites which do not show evidence of noxious weeds or Phytophthora infection.<br>• Vehicle and machinery movements and temporary storage of equipment/materials will be confined to disturbed areas and defined tracks where possible.<br>• Vehicles and machinery will be cleaned (tyres brushed or washed down) prior to accessing and leaving areas where noxious weeds have been identified.<br>• Post works, promptly rehabilitate all disturbed areas according to the Rehabilitation Protocol in Section 4.3. | EPC Construction Manager |
| 7 | Reuse of weedy material: | • Mulched vegetation, if non-weedy, can be used in rehabilitation works however, weedy vegetation cannot be reused. The status of the material will be confirmed by the environmental site officer or ecologist.<br>• Weedy vegetation will be treated onsite in preference to carting it away for disposal (mulching | EPC Construction Manager |

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|
| | | preferred over burning). Cartage of weedy material carries risk of spreading infestations. | |
| 6 | Maintain records: | • A map(s) will be prepared identifying the locations of existing noxious weed infestations.<br>• Methods used for weed control and the timing of weed control activities will be documented. | MSFPL Site Manager |
| 8 | Ongoing weed monitoring and control | • Weed monitoring will be carried out at all sites after the completion of construction works. Ongoing weed control will occur where noxious or invasive species are recorded. In particular, monitoring will be undertaken during late spring/ early summer and remedial action taken as required.<br>• The space between the PV array rows should be maintained and kept clear to enable access by vehicles for ongoing weed control, and pasture renovation if required. | MSFPL Site Manager |

## 4.3 REHABILITATION PROTOCOL

**OBJECTIVE: Successfully rehabilitate all areas disturbed by construction**

The following protocol will be implemented to maximise the success of rehabilitation in areas that are temporarily disturbed such as the laydown area and temporary access routes. The objective of this protocol is to rapidly re-establish stable surfaces resistant to erosion and weed ingress and to ultimately return disturbed areas to their undisturbed state.

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|
| 9 | During construction works: | • Photographic records should be used as tool to monitor progress. Photos will be taken before impacts and regularly taken during the construction phase to allow for comparison monitoring of vegetation to be made and remedial actions taken where necessary.<br>• Top soils from excavation that do not contain invasive or noxious weeds will be stored separately and respread prior to rehabilitation. Trenches will be filled such that top soil is placed above subsoil in the trench.<br>• Where practicable, whole sods will be removed with an excavator where these areas are well-vegetated with dense root systems. Sods will be stored in moist, shaded conditions and replaced following the works. Sod storage time will be minimised and sods will be replaced in a manner that maximises the chances of re-establishment.<br>• Rehabilitation and revegetation measures must be implemented at disturbed areas progressively throughout the construction phase where possible, and in all cases, within six months of the cessation of works at the relevant area.<br>• The protocols will be adapted as required to ensure the objective is achieved. Indicators to be monitored will include:<br>o Percentage grass cover – 70% is the minimum required (excluding areas required for internal access ways, roads and O&M facilities)<br>o Weed ingress – bare ground is susceptible to weed infestation<br>o Active soil erosion - bare ground is susceptible to soil erosion, further reducing the ability to re-establish ground cover | Ecologist to identify weedy areas where top soil is not to be reused. |

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|
| 10 | After construction works: | • After construction is complete, any tracks not required for normal farming practice or PV array maintenance will be rehabilitated. Where practicable, grass surfaces will be restored on infrequently used vehicle routes.<br>• In areas with limited topsoil, hydromulch or imported non-weedy topsoil will be used during rehabilitation and revegetation.<br>• If rainfall is insufficient to establish the growth of vegetation, reseeded areas will be watered weekly until plants are established and self-sufficient (evidenced by germination and active growth of seeded species based on weekly monitoring). If germination is not occurring within two (2) weeks of reseeding, follow-up works would be considered as outlined below.<br>• In rehabilitation areas that are actively grazed, stock will be restricted until a stable surface (70% grass cover) is achieved.<br>• The success of the rehabilitation works will be monitored on a monthly basis post works to ensure stable surfaces (70% grass cover) are achieved within three (3) months of the commencement of rehabilitation. Follow-up works would be conducted if this is not achieved.<br>• Follow-up works may include, surface ripping or scarification, using additives during watering to assist in water penetration, weed control and reseeding, as required by monitoring.<br>• Within the exotic dominated pasture area which will be disturbed by the installation of the solar array, a mix of summer and winter tolerant perennials are recommended for re-seeding and may include but not be limited to species such as Winter Fescue, Cocksfoot, Perrenial Rye Grass, and existing pasture species at the site such as Phalaris, Lucerne and Sub Clover. Further advice on an appropriate groundcover mix suitable for local conditions would be sort from a qualified local agronomist as required.<br>*Notes:*<br>*Additional strategies may be required to achieve 70% cover, dependent on season, amount of top soil and species selected. Strategies will involve an ecologist or agronomist where 70% cover has not been achieved within three months of the commencement of rehabilitation activities.*<br>*Rehabilitation techniques can range from replacement of top soil, allowing the natural seed bank to germinate, through to importation of topsoil and planting of tube stock. Maintenance (watering and follow-up seeding or planting) will similarly depend on the seasonal and other environmental conditions at the time of the works. The key to effective rehabilitation will be using strategies appropriate to the location and condition. These decisions will be made with input from an ecologist or agronomist as required.*<br>*If native tube stock is used, several months lead time will be required from local nurseries.*<br>*Erosion control devices work hand in hand with restoring ground cover – refer to Soil and Water Management Sub-plan.* | Site Construction Manager to ensure rehabilitation is undertaken as soon as possible as works progress.<br>Site Construction Manager to ensure grass cover achieves 70% before ceasing maintenance and monitoring of these areas. |

## 4.4 GROUNDCOVER MANAGEMENT

**OBJECTIVE: Successfully maintain appropriate groundcover while reducing weeds and enhancing native species diversity**

Grazing by sheep may be utilised within the array area to control biomass. A number of strategic grazing strategies can be implemented, for example; optimised, short-term or long-term deferred grazing or timed grazing. The strategy to be implemented will depend on the condition and composition of the grassland at the time and should be informed by a professional agronomist. It is noted that grazing may not be used and that slashing or isolated spraying (limited targeted applications where soil protection would not be reduced) may alternatively be implemented.

If grazing is to be utilised, the following protocol would be implemented.

| ID | ACTIVITY | PROTOCOL | RESPONSIBILITY |
|---|---|---|---|
| 11 | Determine and implement suitable grazing, slashing or spraying strategies | • Prior to operation, consult with an agronomist and the land owner to determine the most suitable grazing strategies for the array area. Different strategies may be required for the western and eastern paddocks considering their past management and current composition.<br>• Document the recommended strategy and append to this GCMP. Strategy must include suitable frequency of monitoring to gauge the impact of the grazing (i.e. in addition to annual groundcover monitoring) and each monitoring event must include agronomist advice regarding continuation of grazing or any changes to grazing management to ensure no adverse impacts are occurring.<br>• If stock are brought into the area, they would come off pastures that are free of noxious weeds or subject to regular weed control. | MSFPL Site Manager |
| 12 | Adapt grazing strategies to changing grassland condition and composition | • Following each grazing monitoring event (i.e. in addition to the annual groundcover monitoring), consult with an agronomist to discuss the suitability of existing grazing regimes and adapt if recommended.<br>• Document any alterations to the strategy.<br>• Implement changes proposed by agronomist to improve the on-ground results of the strategy. | MSFPL Site Manager |

# 5 GROUNDCOVER MONITORING REQUIREMENTS

Groundcover monitoring would commence the first winter after the PV panels have been installed and continue annually. Monitoring requirements are as follows:

| | |
|---|---|
| **Objectives** | • The primary objective of this monitoring is to determine the effects of the panel shading on groundcover.<br>• Secondarily, the monitoring will trigger management, where required, to maintain stable ground cover, suitable to resist erosion and weed infestation.<br>• Given the highly modified nature of the groundcover at the development site and the dominance of exotic species, monitoring would focus on the degree of general vegetative cover and biomass present. The relative abundance of all native and exotic species and species diversity is not considered an important factor however gaining an idea of what species are being successful (or not) is crucial to ongoing adaptive management. |
| **Personnel** | • The surveys require an individual competent in the identification of common pasture species. They would optimally be undertaken by the same person, to reduce variations due to subjective assessments (for example in estimating percentage ground cover) but this is not essential. |
| **Timing and duration** | • Monitoring would be undertaken annually during early winter (June). This timing is considered most suitable as pasture growth is generally lower but remnant reproductive material may still be present which would enable identification of species or at least genera. Assessing the groundcover during this time provides for a better indication of the health of the groundcover as growth rates are down and climatic stresses are generally higher. Shading from the solar arrays would also likely have their greatest impact during this time as there is reduced insolation in general.<br>• For at least the first three years, data will be collected annually and reported to the OEH. After three years, the need for monitoring and reporting would be reviewed in consultation with OEH. |
| **Survey protocol** | 1. Permanent 5m x 1m monitoring plots would be established throughout the array area. At each monitoring location there would be two plots with one each placed in the following areas<br>2. In permanent shade, directly beneath panels<br>3. Between panels that will receive the most sun<br>4. Each plot would consist of a series of three 1m x 1m quadrats each spaced one metre apart. The top left hand corner and the top right hand corner of the plot under the arrays would be permanently marked with a steel stake or similar. These would serve as reference points for placing the quadrats. From these points, tape measures could be used to place each quadrat. It is not recommended that the plot in the inter-row spaces be permanently marked as it is likely to be subject to occasional vehicular traffic. The distance from the plot under the array to that in the inter-row space will be dependent on the final constructed layout and will be recorded during the monitoring. The arrangement at each monitoring location is illustrated below. |

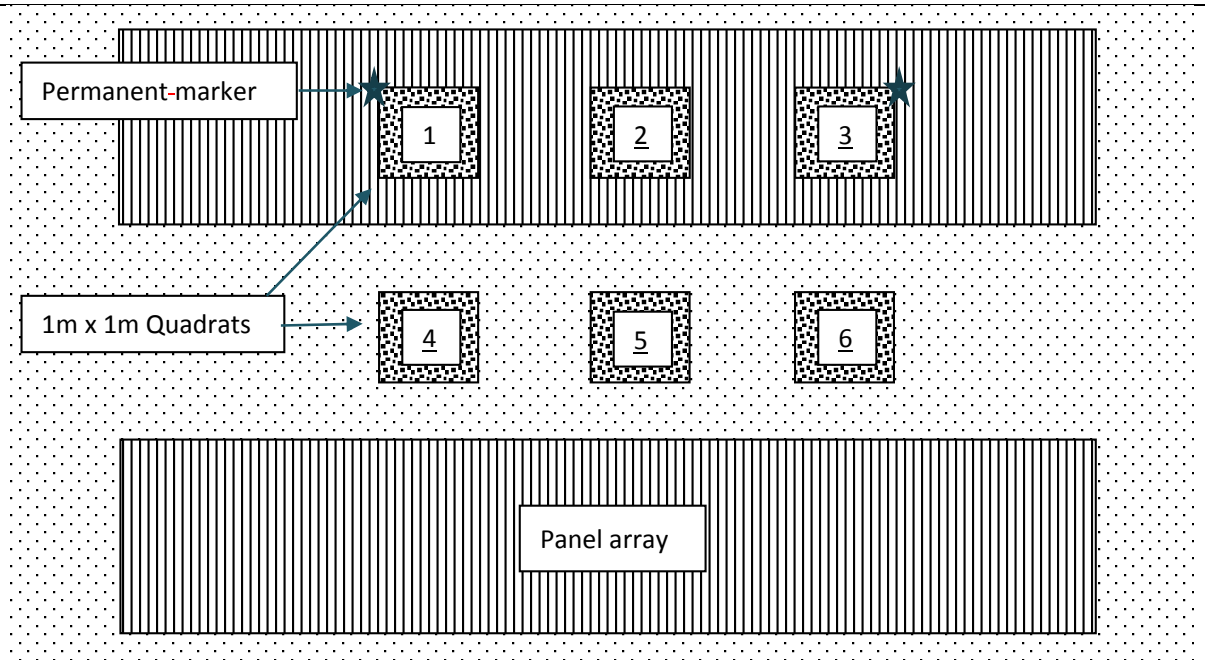


Figure 5-1 Monitoring plot arrangement

- It is suggested that monitoring plots be established at minimum of six locations across the array area (12 5m x 1m plots) capturing variations in aspect and topography. For each quadrat at a monitoring location the following will be recorded. Example data sheets as provided in Appendix A.
    - Total alive and dead/leaf litter vegetative cover using percentage cover estimates in 5% intervals
    - Total cover of bare ground using percentage cover estimates in 5% intervals
    - Dominant five species in each quadrat (or less if less species are present) and their percentage contribution to the living plant cover in each quadrat.
    - Total biomass using the rising plate method. Measurements will be taken at the centre of each quadrat.
    - A digital photographic image
    - Data recorded from each of the three quadrats would be averaged to provide a single value for each plot. Only one physical quadrat should be required which can be moved to the correct location in each plot using the reference points and a tape measure. The actual distance from the reference points back to the inter-row plot will also be recorded on the datasheets to allow for accurate replication.

| | |
|---|---|
| | ○ In addition to the plot data recorded above, incidental records of any noxious weeds will also be recorded across the broader site. |
| Analysis and interpretation of data | • The data can be simply analysed by plotting the variables recorded over time to identify trends in declining or increasing cover and biomass. The relative abundance of certain species could also be plotted over time to gain an understanding of species that are being successful or declining. The data would be used to inform the requirement for management actions such as weed control, alterations to grazing regimes or seeding/planting as outlined in the response to monitoring protocol. |
| Benchmarks and indicators | • Indicators to be monitored will include:<br>○ Percentage grass cover – 70% is the minimum required<br>○ Weed ingress – bare ground is susceptible to weed infestation<br>○ Active soil erosion - bare ground is susceptible to soil erosion, further reducing the ability to re-establish ground cover<br>• A data sheet including these indicators is provided in Appendix A. |
| Reporting requirements | • Within 3 months of annual monitoring events, the results will be written up in a report and submitted to the OEH. The report will contain as a minimum:<br>○ The noxious weed map(s) will be updated to reflect the current distribution of noxious weeds on the site<br>○ The results of monitoring<br>○ Details of management activities carried out such as weed control and rehabilitation<br>○ A discussion of the current groundcover condition relative to the results of monitoring from previous years monitoring<br>○ Recommendations for adaptive management |
| Response to results | • Management protocols will be adapted and implemented as required, as set out in Section 5. Particularly:<br>○ Weed control activities will be undertaken as per the Weed Control Protocol.<br>○ The OEH and an agronomist will be consulted to determine an effective approach to maintaining groundcover greater than 70% if this target is not being met.<br>○ Trials may be considered where information gaps are identified. |

# 6 CONCLUSION

This Groundcover Management Plan has identified the potential impacts to groundcover at the Manildra Solar Farm site. A monitoring framework has been developed to monitor these impacts and series of protocols have been developed to adaptively manage impacts, primarily during construction but also into operations. With the implementation of this Groundcover Management Plan, new information will be provided on the impacts of PV solar arrays and impacts to the groundcover vegetation at the site are expected to be minimised.

# 7 REFERENCES

NGH Environmental (2010a) Biodiversity Assessment - Manildra Solar Farm, October 2010

NGH Environmental (2010b) Submissions Report – Manildra Solar Farm, December 2010

# APPENDIX A MONITORING DATA SHEET

**Manildra Solar Farm ground cover monitoring program**

**General details**

| Recorder: | Date: | Plot identifier |
|---|---|---|
| Plot location (include distance from reference points if an inter-row plot): | | |

**Quadrat observations**

| **Quadrat 1** | | **Quadrat 2** | | **Quadrat 3** | |
|---|---|---|---|---|---|
| Percent total living cover: | | Percent living cover: | | Percent living cover: | |
| Percent total litter/dead cover: | | Percent total litter/dead cover: | | Percent total litter/dead cover: | |
| Percent bare ground: | | Percent bare ground: | | Percent bare ground: | |
| Dominant species<br>1.<br>2.<br>3.<br>4.<br>5. | % cover | Dominant species<br>1.<br>2.<br>3.<br>4.<br>5. | % cover | Dominant species<br>1.<br>2.<br>3.<br>4.<br>5. | % cover |
| Rising plate reading: | | Rising plate reading: | | Rising plate reading: | |
| Image reference: | | Image reference: | | Image reference: | |
| General notes, noxious weeds etc: | | | | | |

# APPENDIX B CABONNE SHIRE COUNCIL LOCAL NOXIOUS WEEDS MANAGEMENT RESOURCES

The following information was sourced from the Cabonne Shire Council Website http://www.cabonne.nsw.gov.au/sites/cabonne/files/public/images/documents/cabonne/mig/2757-weedsplan_20060621094609.pdf on the 3rd July 2015. It is recommended that the accuracy of this information be checked with Cabonne Shire Council on a bi-annual basis which is the review period of the plan.

Additionally, an A3 map is provided that can be used to plot infestations during weed monitoring.

## Local Noxious Weeds Management Plan

The purpose of the Local Noxious Weeds Management Plan is to specify the control measures required for the various Class 4 noxious weeds listed in the table below.

**Purpose**

To specify the control measures required for the various class 4 noxious weeds listed in table below.

**Control class**

According to the Weed Control Order 19 under the Noxious Weeds Act 1993 (dated 23 December 2005), issued by the Minister for Primary Industries. The noxious weeds listed in table below are classified as class 4 weeds (A locally controlled weed).

Class 4 weeds are plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.

**Control Objective**

The control objective for this class of weed is to minimise the negative impact of those plants on the economy, community and environment of New South Wales.

**Control Measures**

As listed in table below.

**Management Plan**

An owner/occupier (other than a public authority) of land in Cabonne Shire Council area must control class 4 noxious weeds according to the control measure specified in the table below. The management plan will be reviewed every two years.

| Common Name | Botanical Name | Specified Control Measure | Weed Class |
|---|---|---|---|
| African boxthorn | *Lycium ferocissimum* | The plant must be fully and continuously suppressed and destroyed. | 4 |
| African lovegrass | *Eragrostis curvula* | The plant must be prevented from spreading and its numbers and distribution reduced. | 4 |
| Bathurst/Noogoora/Californian/cockle burrs | *Xanthium* species | The plant must be fully and continuously suppressed and destroyed. | 4 |
| Blackberry | *Rubus fruticosus* aggregate species | The plant must be fully and continuously suppressed and destroyed and plant may not be sold, propagated or knowingly distributed | 4 |
| Biddy Bush | *Cassinia arcuate* | The plant must be fully and continuously suppressed and destroyed. | 4 |
| Blue Heliotrope | *Heliotropium amplexicaule* | The plant must be prevented from spreading and its numbers and distribution reduced. Or biological control agents introduced, maintained and monitored | 4 |
| Buffalo Burr | *Solanum rostratum Dunal* | The plant must be fully and continuously suppressed and destroyed. | 4 |
| Chilean needle grass | *Nassella neesiana* | The plant must not be sold, propagated or knowingly distributed. | 4 |
| Devil's Claw | *Proboscidea louisiancu / Isicella lutea* | The plant must be prevented from spreading and its numbers and distribution reduced. Or biological control agents introduced, maintained and monitored | 4 |
| Green Cestrum | *Cestrum parqui* | The plant must be fully and continuously suppressed and destroyed. Or biological control agents introduced, maintained and monitored | 4 |
| Harrisia cactus | *Harrisia* species | The plant must be fully and continuously suppressed and destroyed. Or biological control agents introduced, maintained and monitored | 4 |
| Hemlock | *Conium maculatum* | The plant must be fully and continuously suppressed and destroyed. | 4 |

| Common Name | Botanical Name | Specified Control Measure | Weed Class |
|---|---|---|---|
| Nodding thistle | *Carduus nutans* | The plant must be prevented from spreading and its numbers and distribution reduced. Or biological control agents introduced, maintained and monitored | 4 |
| Pampas grass | *Cortaderia* species | The plant must be fully and continuously suppressed and destroyed. | 4 |
| Rhus tree | *Toxicodendron succedanea* | The plant must be fully and continuously suppressed and destroyed. | 4 |
| Scotch broom/English broom | *Cytisus scoparius* | The plant must be fully and continuously suppressed and destroyed. | 4 |
| Scotch thistle, Stemless thistle, Illyrian thistle, Taurian thistle | *Onopordum* species | The plant must be prevented from spreading and its numbers and distribution reduced. Or biological control agents introduced, maintained and monitored. | 4 |
| Serrated tussock | *Nassella trichotoma* | The plant must be fully and continuously suppressed and destroyed. | 4 |
| Silverleaf Nightshade | *Solanum elaeagnifolium* | The plant must be prevented from spreading and its numbers and distribution reduced. | 4 |
| Spiny Burr-Grass | *Cenchrus incertus/Cenchrus longispinus* | The plant must be prevented from spreading and its numbers and distribution reduced. Or biological control agents introduced, maintained and monitored | 4 |
| St John's Wort | *Hypericum perforatum* | The plant must be prevented from spreading and its numbers and distribution reduced. Or biological control agents introduced, maintained and monitored | 4 |
| Sweet briar | *Rosa rubiginosa* | The plant must be prevented from spreading and its numbers and distribution reduced. | 4 |
| Tree of Heaven | *Ailanthus altissima* | The plant must be prevented from spreading and its numbers and distribution reduced. Or biological control agents introduced, maintained and monitored. | 4 |
| Wild Radish | *Raphanus raphanistrum* | The plant must be prevented from spreading and its numbers and distribution reduced. Or biological control agents introduced, maintained and monitored. | 4 |

**Cabonne Shire Council Contact Details**

Norm Townsend

Senior Environmental Services Officer (Weeds)

Phone: 02 6392 3202

Fax: 02 6392 3260

council@cabonne.nsw.gov.au

**Weed management map.** Use this map to record infestations prior to control actions. This will keep track of progress and note any new areas requiring treatment.